Final Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range, New Mexico

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Environmental Impact Statement

For

Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range, New Mexico

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S. EXECUTIVE SUMMARY

S.1 Introduction

WSMR is an Army installation with a tri-service installation presence (Army, Air Force, and Navy) and is managed and supported by the U.S. Army's Installation Management Command. WSMR encompasses the White Sands Test Center (WSTC), a Major Range and Test Facility Base (MRTFB), and is supported managed and operated by the Army for research, development, testing and evaluation (RDT&E) of military systems and similar high-technology commercial products. This Environmental Impact Statement (EIS) examines the environmental effects of developing new test and training capabilities to meet current and future mission requirements at White Sands Missile Range (WSMR). The EIS evaluates proposed changes in land use and activities to support future Army needs associated with Army Transformation, the Army Campaign Plan, modernization of the fighting force (including equipment and weaponry), Army Growth and Force Structure Realignment, Global Defense Posture Realignment, and other Army initiatives.

S.1.1 PROPOSED ACTION

The Army proposes to augment its capabilities at WSMR to support future testing and expanded training missions. To accomplish this, the Army proposes changes in land use on WSMR to allow for expanded off-road maneuvering. The Proposed Action also includes land use changes to expand built-up areas for housing and community functions, infrastructure, mission support, and administrative facilities to support a HBCT (or comparable unit) at WSMR in the future. The Proposed Action would result in adoption of a flexible, capabilities-based Land Use and Airspace Strategy Plan able to accommodate rapidly evolving customer needs, support current and future mission activities, and support test and training efforts from individual components up through major joint and multinational programs. The Proposed Action, to expand testing and training capabilities is needed to support the White Sands Missile Range (WSMR) as a test range for rapid development and deployment of new systems in response to dynamic world conditions and national defense priorities. The Proposed Action is also needed to support Army growth by using WSMR land, airspace, and facilities more fully. This includes use of WSMR's extensive land for more off-road vehicle maneuvers for test and training purposes. Over the long term, WSMR needs to continue supporting the evolving operational, infrastructure, training, and testing requirements of the Army and DoD to solidify its role as a Major Range and Test Facility Base (MRTFB) into the future. A MRTFB is a designated core set of DoD RDT&E infrastructure and associated workforce that must be preserved as a national asset to provide RDT&E capabilities to support the DoD acquisition system.

The WSMR is preparing this *Environmental Impact Statement (EIS) for Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range (WSMR)* in compliance with its responsibilities under the National Environmental Policy Act (NEPA) (Public Law 91-190, 42 United States Code 4321-4347, as amended) to assess the direct, indirect, and cumulative environmental and socioeconomic effects of implementing new mission requirements. This action includes two alternatives. Alternative 1 would implement land use changes and enhanced test capabilities at WSMR as described in the proposed Land Use and Airspace Strategy Plan. It would also provide for the expansion of the Main Post (built-up) area and Range Centers[1] for future development of facilities to support expanded test missions including maneuver-to-test. Alternative 2 includes all components of Alternative 1 and would allow for development of facilities to support stationing of a HBCT (or comparable unit) and provide for off-road maneuver for both testing and expanded training on WSMR in a newly designated specialized area called the Southeast Multi-Use Area.

[1] WSMR has four Range Centers that provide varying level of field support for remote activities away from the support services of the Main Post.

Since the publishing of the Draft EIS, the Army's proposed plan to station a HBCT at WSMR has changed. On June 2, 2009, the Secretary of the Army announced a decision not to station a HBCT at WSMR. This underscores the dynamic nature of world events and the continual need for DoD and specifically the Department of the Army to reassess force structure to respond to new situations. WSMR's land and airspace assets are sizable and strategically located adjacent to other Army and Air Force installations. Consequently, WSMR may be revisited as a suitable location for new or expanded training missions in the future. Therefore, the Final EIS retains the analysis of stationing and training a HBCT (or comparable unit) since this could potentially be selected in the future; however, the discussion of the HBCT has been eliminated from Alternative 1 and all HBCT related actions are addressed under Alternative 2 in the Final EIS. Alternative 2 also provides WSMR an essential analysis of the overall capability to host additional personnel and off-road maneuver training activities, should those needs arise in the future.

S.2 WSMR Mission and Geographic Setting

WSMR is an Army installation with a tri-service presence (Army, Air Force, and Navy) and is managed and supported by the U.S. Army's Installation Management Command. WSMR encompasses the White Sands Test Center, a MRTFB, and is managed and operated by the Army for research, development, testing, and evaluation (RDT&E) of military systems and similar high-technology commercial products. WSMR's major tenant is the U.S. Army Developmental Test Command (DTC), which reports to the Army Test and Evaluation Command, and uses the extensive test resources and infrastructure of this MRTFB to accomplish its RDT&E role. As one of the largest joint test and training ranges in the United States, WSMR provides unique infrastructure and test facilities including a nuclear survivability test reactor, radar test facilities, a high energy laser systems test facility, and a state-of-the-art range control center. As a U.S. Army DTC facility, WSMR's mission is to provide for testing and development of weapons and equipment (both hardware and software) for military use in combat zones and for homeland security. In accordance with DoD Directive (DoDD) 3200.11, WSTC may be used by other DoD users (including DoD training users), and by users outside the Department such as U.S. Government Agencies, State and local governments, allied foreign governments, and commercial entities. Any changes in land use or activities that will affect the test and evaluation capabilities of the MRTFB will, in accordance with DoDD 3200.11, be coordinated with the Director, Test Resource Management Center for approval. Compliance with the directive will be part of the action decision-making process. Appendix A (pages B-1 through B-6) provides a more comprehensive description of the activities performed at WSMR.

WSMR spans approximately 40 miles from east to west, and 100 miles from north to south, encompassing a land area of nearly 2.2 million acres in south central New Mexico. Fort Bliss, which is comprised of approximately 1.1 million acres, borders the installation to the south and southeast. Holloman Air Force Base (AFB), which is comprised of approximately 59,700 acres, is adjacent to WSMR on the east. Collectively, WSMR, Fort Bliss, and Holloman AFB provide nearly 3.4 million acres of neighboring land area to support DoD test and training missions. The City of Las Cruces lies approximately 15 miles southwest of the installation, Alamogordo lies about 10 miles east, and Albuquerque is approximately 100 miles north. The southern part of WSMR is bisected by US 70, which connects the Cities of Las Cruces and Alamogordo. The Main Post of WSMR is located south of US 70 to the east of the Organ Mountains.

WSMR holds leases and partner agreements with surrounding land owners on approximately 3.3 million acres. In these areas, known as "call-up" areas, WSMR is able to evacuate people temporarily during periodic hazardous test events, effectively doubling the size of the land area when required. Associated with the land area, restricted airspace overlies and extends beyond the WSMR land boundary.

S.3 Alternatives

S.3.1 NO ACTION ALTERNATIVE

The No Action Alternative includes on-going and previously approved testing, training, and infrastructure/facilities construction activities at WSMR. The No Action Alternative differs from existing conditions and operations at WSMR in that it includes actions that have been evaluated and approved recently, or are underway but not fully implemented. In particular, the stationing of an Engineering Battalion (EN BN) at WSMR began with the first Soldiers arriving in Summer 2008; however, the full complement of Soldiers and their Families will not arrive until 2010. Therefore, the 2007 and 2008 baseline environmental and socioeconomic data at WSMR do not reflect the full extent of the projected population and mission change. Similarly, the transformation of the 49th Fighter Wing at Holloman AFB is underway, but as yet, the full fleet of F-22A aircraft have not yet arrived nor begun training on WSMR. To provide a meaningful comparison of alternatives, the No Action analysis in this EIS accounts for these changes occurring under the No Action Alternative and provides estimates of the future baseline for each resource area.

Under the No Action Alternative, WSMR would continue to use its land and air resources as it does currently. Historically, WSMR has been a test range, focusing on short to extended range missile programs (involving use of specialized areas, surface and airborne weapons firing, with both temporary surface and Airspace Danger Zones). WSMR has also supported operations at specialized facilities and test beds, such as electromagnetic radiation, nuclear effects, and directed energy testing. Currently, intermittent off-road uses to support testing occur. WSMR additionally supports Air Force training operations using restricted airspace and bombing ranges on WSMR. More recently, WSMR has supported on-the-ground individual and combat skills on discrete training sites. Both hazardous and non-hazardous activities occur regularly. Most activities are non-hazardous, involving installation management, test setup, calibration of equipment and communication systems, and “dry runs.”

WSMR has developed a Land Use Classification system to assist in planning range use. The classifications primarily reflect the administrative status of land areas and overlying airspace and the associated limitations on use. Table S-1 lists 17 discrete Land Use Classifications involving combinations of land status and airspace designation at WSMR. Figure S-1 shows current land uses at WSMR under this classification system. Tables 2.2-2 and 2.2-3 in the EIS describe in more detail the types of activities that could occur within each Land Use Classification.

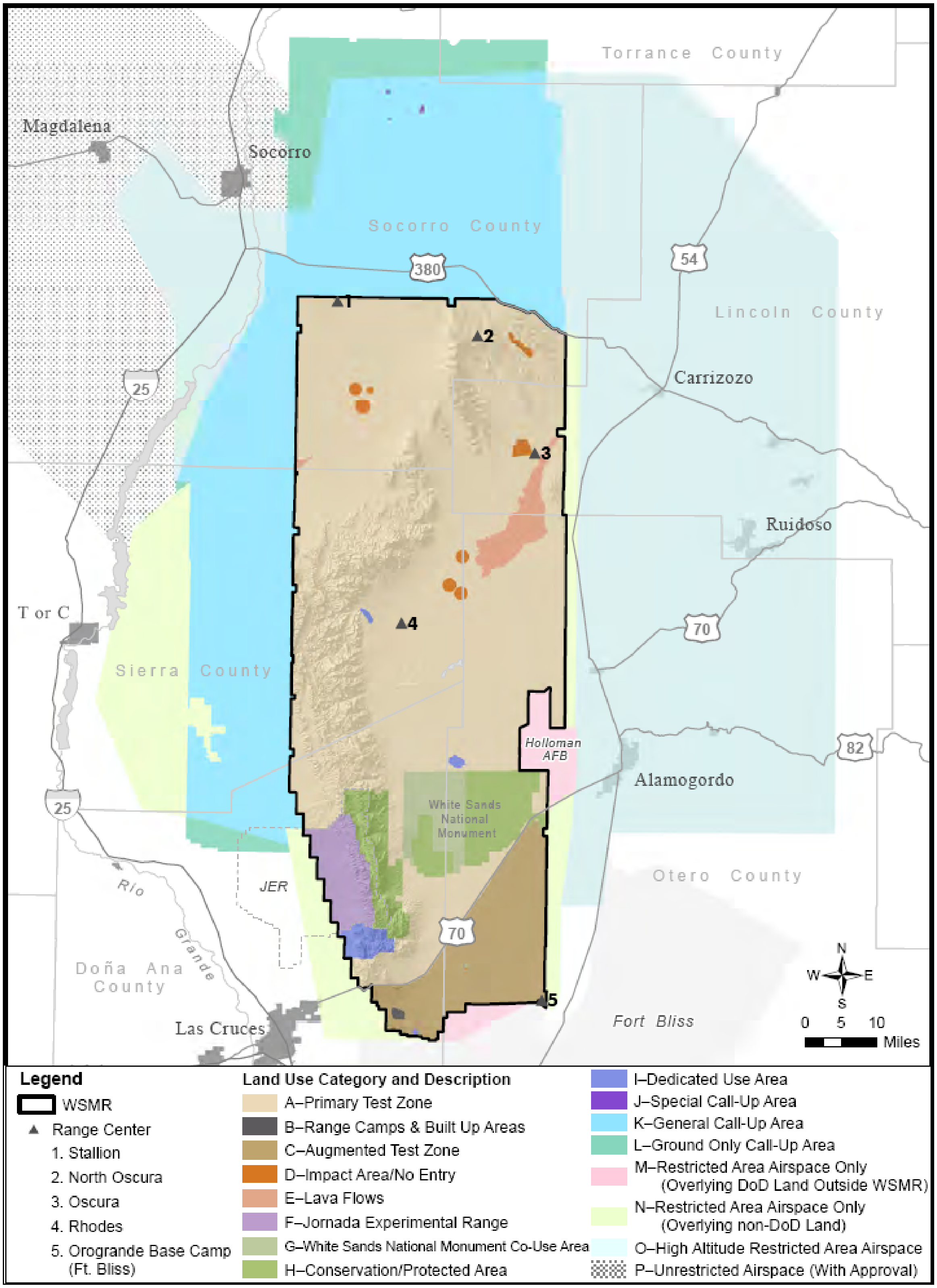

Figure S-1. Current Land Use Classifications

Table S-1. Land Use Classifications

Land Use Classification	Title	Description
A	Primary Test Zone	WSMR land used to support a variety of test and management activities; approved for lightweight off-road vehicle use; divided into sub-areas for planning purposes, may include hazardous activities with scheduled deconfliction of other uses.
B	Range Centers and Built-Up Areas	Includes Main Post, Stallion, Rhodes Canyon, Oscura, North Oscura Range Centers and Orogrande Base Camp; physical development of the Main Post is addressed under a separate planning process.
C	Augmented Test Zone	Same uses as category A, plus off-road activity by heavier tracked and wheeled vehicles, subject to archaeological survey and environmental approval. Portions may be excluded from use for environmental conditions such as slope, soil type, habitat sensitivity, cultural site.
D	Impact Area	Active impact area with unexploded ordnance (UXO) hazard. Entry limited to Explosive Ordnance Disposal or approved personnel.
E	Lava Flows	Uses limited by geologic context; not suitable for heavy vehicles.
F	Jornada Experimental Range	Uses governed by a Memorandum of Understanding (MOU) with the U.S. Department of Agriculture for co-use; WSMR use as safety fan area for conducting testing mission. WSMR uses include fire protection, clearing mission-related debris and removal of UXO as needed and scheduled evacuation for test missions. MOU may be revised based on WSMR mission needs and consultation process. Jornada Experimental Range (JER) uses primarily related to environmental stewardship, agricultural research, and land management; access by escorted public allowed. Both parties may construct facilities and structures, roads, and infrastructure with mutual review, but WSMR has mission priority.
G	White Sands National Monument Co-Use Area	Uses governed by a Memorandum of Agreement (MOA) and Interagency Agreement; military and test uses included temporary location of mobile instrumentation on existing roads, and removal of debris, duds, and UXO. New test-related development discouraged, and no planned (test) impacts permitted; WSMR adheres to National Park Service regulations; access by Monument personnel allowed except during missile test activity or for national security purposes.
H	Conservation/Protected Area	Areas off-limits to ground activity; includes San Andres National Wildlife Refuge, White Sands National Monument (excluding WSMR Co-Use area-see Classification G). Access and use restricted by MOUs and agreements.
I	Dedicated Use Area	Within WSMR boundary, reserved for exclusive use of one user. Includes National Aeronautics and Space Administration, White Sands Test Facility, National Radar Test Facility, Nuclear Effects complex, and Radar Cross Section Advanced Measurement System sites.
J	Special Call-Up Area (within Restricted Area airspace)	Periodic evacuation during missile firings; limited ground use such as launch sites and impact areas subject to special agreements with land owners.

Table S-1. Land Use Classifications (continued)

Land Use Classification	Title	Description
K	General Call-Up Area (within Restricted Area airspace)	Periodic evacuation during missile firings; subject to agreements with landowners.
L	Ground Only Call-Up Area (outside Restricted Area airspace)	Periodic evacuation during missile firings subject to agreements with landowners. No surface use.
M	Restricted Area Airspace Only (overlying DoD land outside WSMR and call-up areas – from surface)	Airspace use in accordance with Federal Aviation Administration (FAA) regulations, by Notice to Airmen (NOTAM). WSMR conducts weapons firings using facilities at Holloman AFB and Fort Bliss following procedures, approvals, and restrictions of those installations.
N	Restricted Area Airspace Only (overlying non-DoD land and outside call-up areas – from surface)	Airspace use only, in accordance with FAA regulations, by NOTAM. No surface use.
O	High Altitude Restricted Area Airspace (outside DoD land and call-up areas)	Airspace use only above Flight Level 240, in accordance with FAA regulations, by NOTAM.
P	Unrestricted Airspace (with approval)	Intermittent airspace use, in accordance with FAA regulations, for weapons fired from off-range.
Q	Non-Contiguous WSMR Land	Includes areas such as Green River, Fort Wingate, and leased areas that contain instrumentation sites.

WSMR employs a multi-disciplinary process to review and approve programs and activities within each land use classification. This process includes safety and environmental reviews. Range sustainability is a critical factor in preserving WSMR testing and training capabilities and assuring military readiness for the Army. The WSMR Environmental Division coordinates with its Integrated Training Area Management (ITAM) Program (see Section 1.10.2) to identify requirements and Best Management Practices (BMPs) for range activities. The specific measures required of individual missions and activities depend on the nature, intensity, timing, and geographic location of the proposed activity. The Land Use and Airspace Strategy Plan (Appendix A) describes the implementation of the activity planning process in more detail.

WSMR supports approximately 3,200 to 4,300 test events (or missions) annually, in recent years. “Hot” missions on WSMR are potentially hazardous events that require evacuation of personnel and all non-participants during the event. Between 2003 and 2008, hot missions comprised five to twelve percent of the test workload (229 to 360 events annually). WSMR established a MOU with the New Mexico Department of Transportation (DOT) to allow closure of selected highways (US 54, 70, and 380) for safety during hazardous missions. During Fiscal Year (FY) 2007, 32 highway closures occurred (22 for US 70 and 10 for US 380). WSMR has agreements with surrounding landowners to allow evacuation when a test may cause unsafe conditions on the ground. There are four designated evacuation (or “call-up”) areas: FIX, A-350, Advanced Ballistic Re-entry System (ABRES) 4A, and ABRES 4A Extension (see Figure 2.2-2 in Chapter 2). Between 2001 and 2006 there has been an average of 47 evacuations per year. “Non-hot” missions include a wide variety of activities, such as ground checks, communication checks, aerial cable missions, Soldier training, and unmanned aerial vehicle flights. Non-hot missions in 2008 accounted for approximately 85 percent of the scheduled missions on the range (2,575 events).

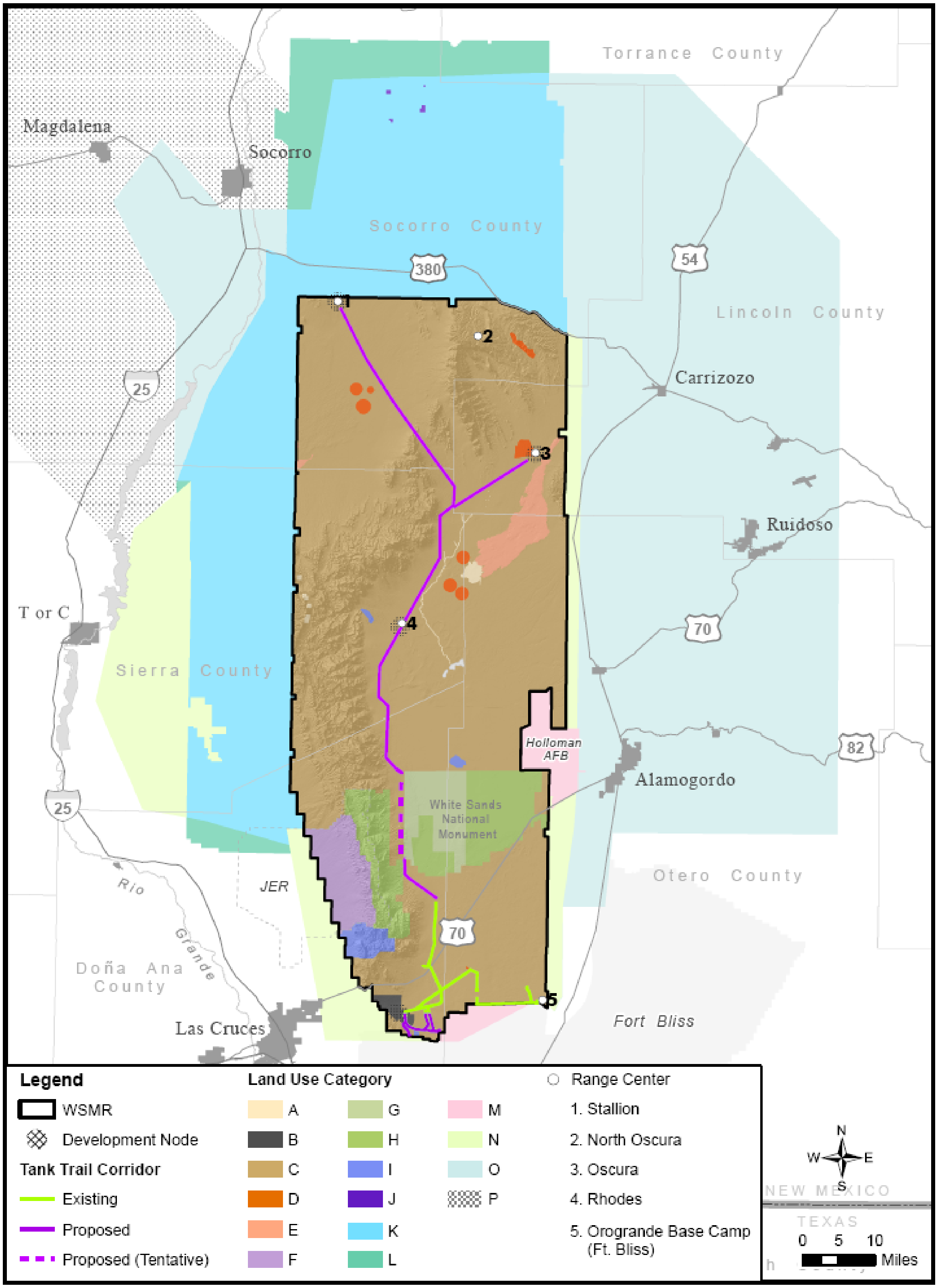

Figure S-2. Future Land Use under Alternative 1

Because of recent Army decisions, an EN BN was stationed at WSMR and began arriving in summer 2008. Current plans are for the EN BN to conduct training on neighboring Fort Bliss. The No Action Alternative includes construction and ground disturbance associated with ongoing actions at WSMR, as well as development of facilities for the EN BN. This includes the Main Post area, other built-up areas, infrastructure extending into WSMR, and discrete projects on sites throughout the WSMR Range (totaling about 1,000,000 square feet [s.f.] of new construction and land disturbance of about 220 acres). Total assigned personnel could increase from approximately 6,350 in 2007 to approximately 7,720 by 2013, with the number of military Family members increasing from approximately 600 in 2007 to 1,500 in 2013. Equipment levels at WSMR would increase under the No Action Alternative, primarily in response to the arrival of the EN BN, which by 2012 would add 315 wheeled/tracked vehicles and generator sets to the 2007 inventory of about 1,920 pieces (for a total of approximately 2,235).

S.3.2 ALTERNATIVE 1, IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Alternative 1 would include those activities described in the No Action Alternative, plus changes in land use to support new and evolving test and training requirements throughout the installation. Under Alternative 1 WSMR would:

- Change land uses to allow off-road use for testing by wheeled and tracked vehicles on an additional 1.6 million acres (for a total of 1.8 million acres designated Augmented Test Zone). This would provide land for Soldiers and vehicles to maneuver freely over a variety of terrains and geophysical conditions using heavy wheeled and tracked vehicles throughout the land designated Augmented Test Zone, though conditions and restrictions would apply based on management priorities and constraints. Uses would be coordinated with the WSMR Environmental Division to identify any general or specific measures required to reduce or avoid adverse environmental impacts, in accordance with WSMR plans, permits, and regulations. Also, expand Range Centers and Built-Up Areas by 7,000 acres, and convert 2,000 acres to Impact Area (Figure S-2 and Table 2.3-1 in Chapter 2). The land use changes would be reflected in a Land Use and Airspace Strategy Plan (Appendix A) designed to meet evolving mission requirements, facilitate user access to installation resources, and expand the type and frequency of testing and training activities for existing and future programs.
- Expand current test operations, such as missile firing, directed energy weapons, Future Combat Systems (FCS) testing (now Brigade Combat Team [BCT] Modernization), and support for next generation programs using the full extent of WSMR land and airspace resources. BCT Modernization provides a fully integrated combat capability encompassing manned and unmanned ground and air vehicles and munitions that are tied together by a network. Tests would need a variety of terrain and use of terrain features to separate operational locations, which could include off-road operations in mountainous terrain. For purposes of analysis, the EIS assumes about 1,080,000 acres of "least constrained" land within Land Use C, "Augmented Test Zone", would support the majority off-road maneuver for BCT Modernization test activities and other customers with similar ground operation requirements.
- Increase test-related ground and airspace missions during the next five years. It would be anticipated that hot missions would increase from 254 events in 2007 to 519 events in 2013. Non-hot missions would be expected to increase from 3,181 events in 2007 to 12,724 in 2013. Highway closures could more than double by 2013 from 2007 levels, to approximately 44 closures on US 70 and 25 on US 380 by 2013. In the same period, evacuations of call-up areas could increase by 25 percent; and airspace use for test and training programs may increase 25 percent.

- Develop new Mission Support Facilities and infrastructure throughout WSMR to support future tests and training, including reconstruction of 75 miles of existing tank trails, construction of a new 150-mile tank trail system to link the north and south range, Range Center expansions, and construction of utilities and communication infrastructure.
- Develop six new Specialized Areas, the specific locations of which have not yet been determined; including an Electro-Optical 0.50 Caliber Test Range; a Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) System; an Environmental Laboratory Complex; a Joint Urban RDT&E Environment; an Individual Combat Skills Training Area; and a Local Training Area for military training.

Under Alternative 1, a total of about 1.4 million s.f. of new construction would occur: approximately 120,000 s.f. in Range Center infrastructure and 1.3 million s.f. for the Specialized Areas. The upgrades to WSMR under Alternative 1 do not include any increases in currently assigned equipment; however, the level of use of non-tactical (general services) vehicles and generators may increase as a function of the increase support for test programs. There would be an expected five percent increase in personnel (an additional 480 persons) to the Main Post by 2013 over the No Action Alternative level.

New infrastructure projects would disturb approximately 4,480 acres of rangeland for improvements such as: expanded Range Center facilities, a new tank trail corridor, development of Specialized Areas, additional instrumentation sites, expanded communication networks, range road improvements and upgrades, Ammunition Holding Area, and the Uprange Medical Evacuation Facility.

S.3.3 ALTERNATIVE 2, IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

Alternative 2 includes all actions in the No Action Alternative and Alternative 1. In addition, Alternative 2 addresses the effects of stationing a HBCT (or comparable unit) at WSMR requiring Main Post expansion and additional supporting infrastructure. Alternative 2 also provides a capability for heavy off-road maneuver training (similar to a HBCT or comparable unit) at WSMR in a newly designated Southeast Multi-Use Area.

S.3.3.1 IMPLEMENTATION OF HEAVY BRIGADE COMBAT TEAM OR COMPARABLE UNIT STATIONING

The Army Growth and Restructuring decision to station a HBCT at WSMR (scheduled to arrive in October 2012 [FY2013]) was recently reversed; however, the Army's need remains for flexibility to respond to changing situations globally and to provide training for its future fighting force. Therefore, analysis of stationing and training a HBCT (or comparable unit) at WSMR is retained in this Final EIS under Alternative 2.

Under Alternative 2, WSMR would:

- Support the arrival of a HBCT (or comparable unit) with 3,800 Soldiers and approximately 5,100 Family members in 2013.
- Expand the Main Post and construct mission critical facilities, housing, and other mission and community support facilities.

Alternative 2 includes about 3.2 million s.f. of new construction in and around the Main Post by 2013 associated with the stationing of a HBCT (or comparable unit), including a new site (Future Development Area) up to 300 acres in size adjacent to the Main Post for HBCT core facilities. These developments would include office space for brigade, battalion, and company Headquarters units; barracks space for single enlisted soldiers; family housing; dining facilities; maintenance shops; parking for vehicles; and storage space. In addition, increased population on-post would generate requirements for other administrative facilities, shopping locations, recreational and physical fitness facilities, child development facilities and schools, medical and dental facilities, and utilities support facilities. Utility upgrades would include expansion of electrical substations and a new wastewater treatment plant.

The stationing of a HBCT (or comparable unit) at WSMR would result in an increase of approximately 3,800 military personnel and approximately 5,100 Family members. Approximately 2,400 civilians, above the levels in the No Action Alternative, would be included (by FY 2013) to support growth in test programs (particularly BCT Modernization and JLENS).

Alternative 1 would result in total on-post personnel of approximately 14,300 in FY 2013 (including the EN BN and Student Soldiers). This represents a total increase of approximately 7,900 personnel over FY 2007 levels, and 6,100 additional military Family members (Table 2.3-7 in Chapter 2).

A HBCT (or comparable unit) would bring approximately 900 tactical wheeled vehicles, 360 tracked vehicles, 165 generator sets, and other equipment (such as non-motorized trailers, variety of small arms) to WSMR. Based on the total increase in on-post personnel, the number of non-tactical and General Services Administration vehicles would double, for an ultimate total of about 3,170.

S.3.3.2 TRAINING WITHIN THE SOUTHEAST MULTI-USE AREA

Alternative 2 would provide capability for a HBCT (or comparable unit) to conduct off-road vehicle maneuver training at WSMR by creating a new specialized area called the Southeast Multi-Use Area.

Under Alternative 2, WSMR would:

- Develop the Southeast Multi-Use Area (approximately 120,000 acres located in the South Range, south of US 70 along the eastern WSMR boundary) – for intensive off-road maneuver testing and training, as well as less-intensive training such as Improvised Explosive Device route clearance training, among other possible uses (see Figure S-3).
- Develop a new tank trail network of approximately 100 miles south of US 70 within the Southeast Multi-Use Area. Specific locations of these tank trails have not yet been identified.
- Pre-select sites within the Southeast Multi-Use Area for logistics and command and control operations in the maneuver areas ranging from a half to a couple of acres in size. For analysis, it is assumed there may be five designated field sites. Suitable sites would undergo a screening and approval process with the WSMR Environmental Division to avoid operational and environmental constraints. Some sites may require a gravel surface and may have temporary structures (such as tents) where message centers or field functions could occur.

Training by a HBCT (or comparable unit) at WSMR would substantially increase field operations, dismounted training, and off-road vehicle maneuvers in the proposed Southeast Multi-Use Area. The level of use and intensity of maneuver training would differ from the off-road activities for test programs. Whereas maneuver-to-test activities for BCT Modernization and similar programs could be conducted throughout most of the areas designated Augmented Test Zone on an occasional, intermittent basis; training maneuvers would be concentrated in the Southeast Multi-Use Area at WSMR and performed on a regular basis.

In aggregate, the requirements for Alternative 2 would result in approximately 88,000 square kilometer days (km^2d) (34,000 mi^2d) of off-road vehicle maneuver training per year for a HBCT. Square kilometer

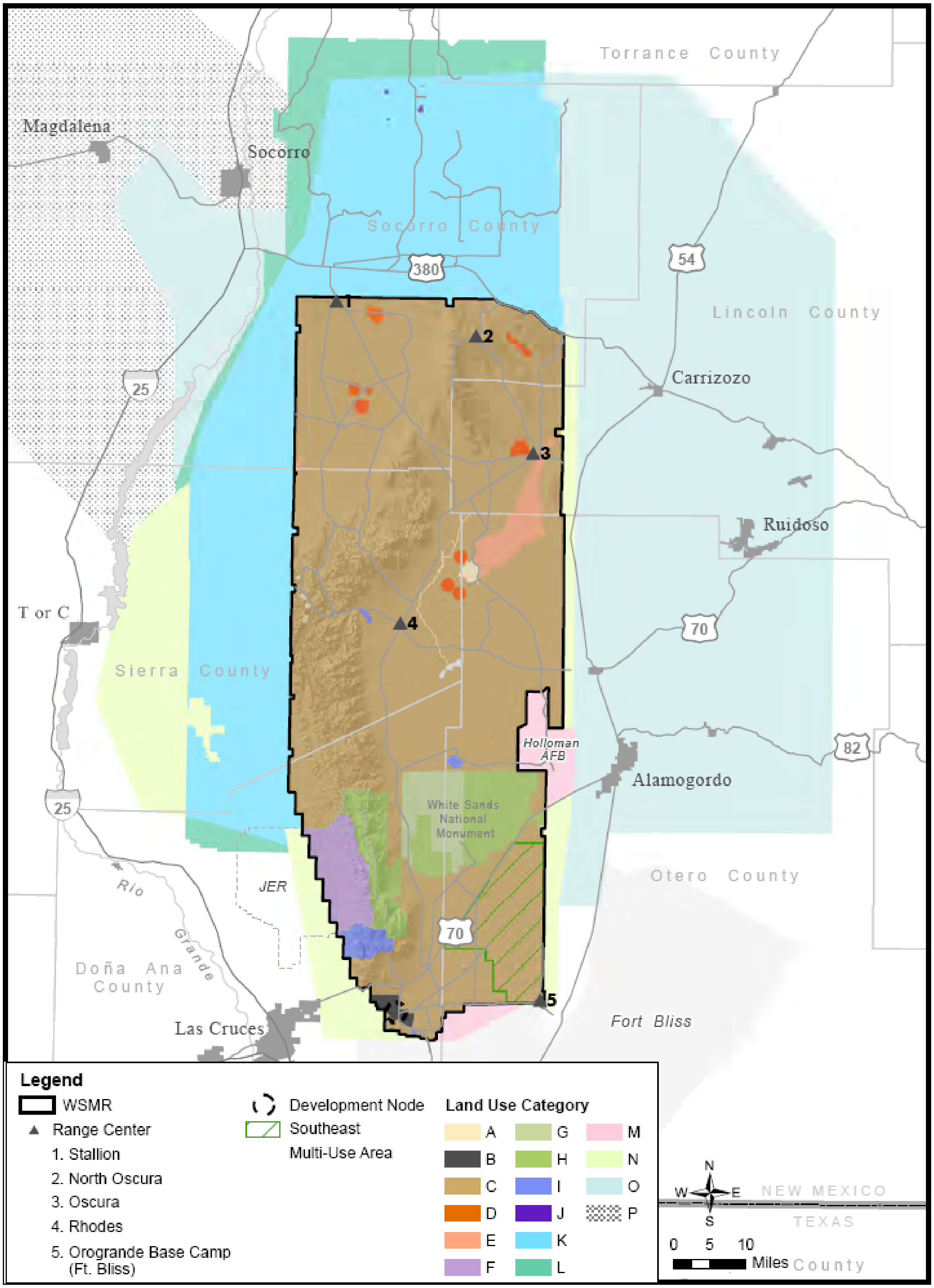

Figure S-3. Proposed Location of the Southeast Multi-Use Area

days are a measure of the amount of area used over time, in this case, over the course of a year. The total estimated area directly disturbed in a year due to off-road activity (including both wheeled and tracked vehicles) would be 148,000 acres (based on estimated width of tires and tracks and vehicle miles traveled). Within the proposed 120,000-acre Southeast Multi-Use Area, it is likely that activity would tend to concentrate in some areas, so that some areas may not be disturbed, while other areas disturbed more frequently.

The Southeast Multi-Use area was identified as the most viable location on WSMR for heavy off-road maneuver training as it would pose the least interference with up-range missile testing and other routine test missions, has distinct geographic boundaries on three sides to contain and limit activities to designated areas, would be operationally advantageous due to its proximity to the Main Post and Fort Bliss, and would pose the least environmental impact in terms of threatened and endangered species and surface water features. There is however, a relatively high potential for encountering UXO or cultural resources in this area. Subsequently, use of the Southeast Multi-Use Area would be first contingent on conducting both UXO and cultural resource surveys and then ensuring that only areas mitigated for these features would be authorized for training activities.

S.3.4 MEASURES INCORPORATED IN THE PROPOSED ACTION TO REDUCE ADVERSE IMPACTS

WSMR has established standard requirements for approval and execution of all programs and activities. These requirements are common to all alternatives, including the No Action Alternative. Table S-2 lists the standard procedures and requirements of all range users. Some unavoidable adverse impacts would result from implementation of the Proposed Action. Table S-3 (Section S.5) provides a summary of anticipated impacts and Table S-4 (Section S.5) provides mitigation measures. In addition, WSMR requires coordination, review, and approval for different activities undertaken on the range (as needed or appropriate) as listed below:

- Preparation of Test Plans and compliance with standard procedures (in Table S-2)
- Ground and flight safety review and approval
- Flight Termination System review (for missile firings)
- Scheduling of surface resources and airspace
- NOTAM and FAA coordination
- Highway closure/road block notifications
- Compliance with landowner MOAs
- Evacuation notifications
- Siting approval (for new facilities and test beds)
- Master Planning Board review
- Archeological survey and/or approval
- UXO survey and clearance
- Environmental permits
- Frequency approval and assignment
- Non-ionizing radiation review
- Compliance with DOT and county regulations when traveling on public roads

Table S-2. WSMR Standard Procedures and Requirements for Range Users

Land Use and Aesthetics	
Infrastructure	Infrastructure projects shall be sited through the WSMR master planning process.
	WSMR will continue to coordinate with the White Sands National Monument on new projects that are adjacent to or within the viewshed of the Monument that may affect visual resources.
Ground Operations	Prior to dismounted operations in the JER, coordination with the U.S. Department of Agriculture through the Public Works Environmental Division would occur.
	All activities shall be restricted to existing approved areas, unless authorized by the WSMR Environmental Division.
Hazardous Operations	Surface Danger Zones shall not extend beyond the boundaries of WSMR or its call-up areas.
	Hunting activities are de-conflicted from missions through scheduling.
	All hazardous activities shall be restricted to existing approved areas, unless authorized by the WSMR Environmental Division.
Air Quality	
General	Customers shall coordinate with WSMR Environmental Division (Air Quality Manager) when using an emission source.
Cultural Resources	
Infrastructure/General	Personnel shall notify the WSMR Environmental Division immediately if any historic or archaeological resources are discovered during construction activities.
Ground Operations	WSMR shall designate sensitive areas by various methods approved by the WSMR Environmental Division.
	Comply with installation Section 106 compliance process prior to using any area for off-road vehicle maneuver.
Earth Sciences	
Infrastructure	Following construction, disturbed areas not covered with impervious surfaces like roofs and paved areas, will take into consideration methods to minimize erosion.
Biological Resources	
General	WSMR shall protect migratory birds, nest, eggs, and nestlings in accordance with the WSMR Commander's Guidance on the Migratory Bird Treaty Act (MBTA), the DoD/U.S. Fish and Wildlife Service (USFWS) MOU to Promote the Conservation of Migratory Birds, and the Final Rule: Migratory Bird Permits; Take of Migratory Birds by the Armed Forces. The WSMR Environmental Division shall be contacted regarding any issues related to migratory birds.
	WSMR shall protect bald and golden eagles in accordance with the Bald and Golden Eagle Protection Act of 1940, as amended. WSMR is required (by permit) to report all eagle carcasses discovered to USFWS within 48 hours, and then the carcasses will be appropriately transferred to USFWS. The WSMR Environmental Division shall be contacted regarding any issues related to eagles, their nests, eggs, or nestlings.
	Restrict ground operations from intercepting within the boundaries of Limited Use and Essential pupfish habitat. Coordination required otherwise.
	Todsen's Pennyroyal areas will not be used for construction or ground disturbing test or training activities.

Table S-2. WSMR Standard Procedures and Requirements for Range Users (continued)

Biological Resources (continued)	
	WSMR is required to conserve Threatened or Endangered species listed under the Endangered Species Act. By permit, WSMR is required to report observations of the Northern Aplomado falcon to the USFWS within 24 hours. WSMR Environmental Division shall be contacted regarding observations for follow-up by permitted biologists.
	Projects occurring within Chihuahuan desert grassland habitat will be coordinated with WSMR Environmental Division to ensure that appropriate surveys are conducted by permitted biologists for the Northern Aplomado falcon. If a Northern Aplomado falcon nest is observed, projects will be sited to avoid impacts to the falcons, their nests, eggs, or nestlings.
	WSMR environmental shall be contacted when any bat roost or snake den site is discovered. Bat roosts are sensitive resources and will not be disturbed. Bats or snakes shall not be handled except by qualified WSMR biologists who are able to exclude bats from buildings or relocate snakes away from project sites.
Water Resources	
Infrastructure	Stormwater management strategies would be implemented as prescribed in the latest storm water management plan.
Safety	
Infrastructure	All residents, employees, and visitors requiring access to WSMR areas outside the Main Post must receive UXO awareness training. A statement shall be provided for each individual to sign, indicating that she/he has received the briefing, and the action proponent shall maintain the statement for follow-up monitoring.
Ground Operations	All government and contractor-owned vehicle and motorized heavy equipment shall be equipped with a portable fire extinguisher (minimum 2.5-pound dry chemical).
	Communication equipment is required when travelling beyond the Main Post.
General	The action proponent and the proponent's contractors(s) shall comply with Occupational Safety and Health Act of 1970, 29 U.S.C. §§ 651-678 and 29 C.F. R. Parts 1910 and 1926. . All personnel (construction and operational) shall be briefed on the potential hazards and necessary precautions to be taken and procedures to be followed.
Hazardous Operations	An approved Standard Operation Procedure (SOP) shall be submitted to and approved by the Safety Office prior to any hazardous operation.
Hazardous Materials and Hazardous Waste	
General	All tactical vehicles in the field are required to use drip pans.
	The action proponent shall be responsible for spill prevention and cleanup.
	All project debris shall be removed from the project areas following the action. Cleanup and restoration of the area shall be coordinated with WSMR Environmental Division personnel, as determined necessary.
Facilities and Infrastructure	
Infrastructure	Prior to digging, construction contractors shall obtain a digging permit. All underground utilities in the work area must be positively identified and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.
Ground Operations	Digging associated with ground operations will also require a digging permit. WSMR will update its SOP for the dig permit process to specifically address digging associated with military test and training events.

Table S-2. WSMR Standard Procedures and Requirements for Range Users (continued)

Transportation	
Infrastructure	Construction contractors shall conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on roads except with written permission of the Contracting Officer.
Hazardous Operations	US 70, 54, and 380 roadblocks shall conform to notification and time constraints outlined in the 1972 State Highway Commission Resolution.
Frequencies	
General	Coordinate all frequency uses with the WSMR frequency manager.
Wildland Fire	
Ground Operations	All wildfires shall be reported immediately to the WSMR Fire Department.

S.3.5 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD FOR FULL ANALYSIS

In developing the Proposed Action, the Army considered several additional alternatives to meet WSMR's needs, but did not further evaluate these alternatives for a variety of reasons. ***Please note that the alternatives described here are those that were included in the Draft EIS prior to the Army's June 2009 decision to not station a HBCT at WSMR.*** These alternatives included:

- Constructing firing ranges on WSMR for HBCT and EN BN training. The Army did not consider this as a reasonable component for any alternative, because the Army has adequate firing range assets on neighboring Fort Bliss.
- Allowing HBCT maneuver training in an uprange portion of WSMR. This alternative was not considered reasonable because of the lack of developed infrastructure to support Soldier training in that part of the Installation. In addition, these areas support varied test missions and experience the highest level of evacuations due to safety hazards from live-fire and directed energy test missions. Interrupted and limited availability of uprange locations would affect the quality and possibly the quantity of Soldier training that could be conducted. Conversely, Soldier training could constrain test activities that are also vital to supporting WSMR's MRTFB purpose; therefore, current and future operational constraints made this alternative unreasonable.

S.3.6 PREFERRED ALTERNATIVE AND ENVIRONMENTALLY PREFERRED ALTERNATIVE

WSMR has selected Alternative 1 as the Preferred Alternative, which would include implementation of the Land Use and Airspace Strategy Plan to change land use at WSMR and expand testing and training capabilities to support new and evolving test requirements throughout the installation, including providing small-scale field training capability within specialized areas and off-road maneuver areas for testing programs.

NEPA also requires that an environmentally preferred alternative be identified. The No Action Alternative provides a baseline of on-going and previously approved test and training activities at WSMR that have undergone previous NEPA evaluation. The No Action Alternative would have no significant adverse impacts, and would be the environmentally preferable alternative; however, the No Action Alternative would not meet WSMR's mission needs to support new and evolving test requirements through implementation of the Land Use and Airspace Strategy Plan, nor the small-scale field training capability needed at specialized areas.

S.4 Public Outreach

S.4.1 SCOPING

On June 19, 2008, the Army published a Notice of Intent (NOI) in the Federal Register to prepare this EIS. The NOI initiated scoping, during which agencies, organizations, and individuals were invited to submit comments on the scope of the EIS, environmental issues to be addressed, and alternatives to be considered. Public scoping meetings were held in Las Cruces, Socorro, and Alamogordo, New Mexico, on July 22, 23, and 24, 2008, respectively. Notifications of the scoping meetings were published in five local newspapers during the week of July 14, 2008. Notification letters were mailed to agencies and interest groups on July 18, 2008. The formal scoping period ended on August 8, 2008, though the Army continues to accept input throughout the EIS process.

Few comments on the scope of the EIS were received during the public scoping period. Those comments received generally addressed the protection of biological and water resources as well as the need to address potential cumulative impacts to natural resources. The evaluation of potential effects to recreational opportunities at White Sands National Monument was also discussed. The Army was also asked to evaluate impacts to cultural resources, particularly Indian burial grounds. The EIS has addressed these issues. Appendix C provides a summary of the scoping period and meetings.

S.4.2 PUBLIC HEARING ON THE DRAFT EIS

On May 8, 2009, the Army issued a Notice of Availability (NOA) for the Draft EIS for the Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range. The NOA initiated the public comment period where members of the public (including Federal, State, and local agencies, affected Federally recognized Indian tribes, and other interested persons) were invited to comment on the content of the Draft EIS (see Appendix D). As part of the NOA, comments and suggestions were requested to be received within the 45-day public comment period, which was extended by two weeks to July 6 due to technical problems with the WSMR website, limiting access to the Draft EIS via the internet. The NOA stated that public meetings would be announced in advance in local news media. Public hearings were held in Alamogordo, Las Cruces, and Socorro, New Mexico; on June 2, 3, and 4, 2009, respectively.

The majority of the comments received at the meetings and during the public comment period were concerned with either the decision not to station a HBCT at WSMR or the protection of natural resources in general. Appendix D provides a summary of the transcripts and responses to the public comments received.

S.5 Environmental Consequences

The Army determined that the actions associated with the alternatives had the potential to result in significant environmental impacts at WSMR and decided to prepare an EIS to evaluate the environmental consequences that may result.

Implementation of the Proposed Action by either Alternative 1 or Alternative 2 would result in adverse impacts to some environmental and socioeconomic resources. In many cases, impacts of Alternative 1 and Alternative 2 would be similar to each other; however, Alternative 2 will have greater environmental consequences due to the increased population with the addition of a HBCT (or comparable unit) and the greater intensity of ground maneuver operations within the Southeast Multi-Use Area.

S.5.1 ALTERNATIVE 1, IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Under the Proposed Action, WSMR would expand its current mission by allowing more off-road activity associated with test and training missions. WSMR would also expand its Range Centers and create six new Specialized Areas. While WSMR would alter its internal land use classifications, these changes in land use would have negligible impacts on adjacent non-military land use. Increase in off-road vehicle activity and the limited construction of the Range Center infrastructure and Specialized Areas would cause minor short-term adverse air quality impacts. Increased areas of off-road vehicle use, that has the potential to compact soils and damage vegetation and soil crusts, would cause increased soil erosion, damage to vegetative cover and degradation/fragmentation of associated wildlife habitat, which can result in decreased wildlife species diversity. Increased off-road maneuvers could cause soil, groundwater, and surface water contamination from leaks of hazardous substances from vehicles.

Based on the anticipated features of the six proposed Specialized Areas, the following resource areas would be key aspects for determining a suitable site, because they would have a moderate to high potential for adverse effects. Therefore, these resource areas would require more detailed analysis in future environmental review:

- **Environmental Laboratory Complex**: Land use, cultural resources, biological resources, water resources, safety, hazardous materials and waste, facilities and infrastructure, and energy.
- **JLENS**: Land use, airspace, cultural resources, biological resources, water resources, facilities and infrastructure, energy, and frequency management.
- **Joint Urban RDT&E Environment**: Land use, cultural resources, earth sciences (soils), biological resources, water resources, noise, facilities and infrastructure, and energy.
- **Electro-Optical 0.50 Caliber Range**: Land use, cultural resources, earth sciences (soils), biological resources, water resources, safety, noise, facilities and infrastructure, and energy.
- **Individual Combat Skills Course**: Land use, cultural resources, earth sciences (soils), biological resources, water resources, facilities and infrastructure, and energy.
- **Local Training Area:** Land use, cultural resources, earth sciences (soils), biological resources, water resources, noise, facilities and infrastructure, and energy.

S.5.2 ALTERNATIVE 2, IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

Alternative 2 includes the actions and impacts under Alternative 1 and the No Action Alternative. Alternative 2 would generate environmental consequences due to the increased population with the addition of a HBCT (or comparable unit) and the greater intensity of ground maneuver operations within the Southeast Multi-Use Area.

Air quality would be adversely affected by increased emissions from facilities and vehicles. These increased emissions of priority pollutants would generally fall just within WSMR’s existing permitted levels, with the exception of very marginal increases in VOCs and HAPs just above allowable air permit limits; however, the larger permitted sources of VOCs and traces of HAPs are stationary and portable generators (internal combustion), miscellaneous chemical sources (ranging from solvents and paints, to distributed material and rocket tests), surface painting, and unleaded fuel storage tanks. WSMR would need to develop additional BMPs to minimize VOC and trace HAP emissions from these sources.

WSMR would update its installation-wide air permit to address the new air emission sources anticipated under Alternative 2.

Increases in impervious surfaces associated with proposed construction in the Main Post area and throughout WSMR would cause increased stormwater runoff, which may affect surface waters (contamination from pollutant runoff and sedimentation) and requires additional/upgraded stormwater utility infrastructure. The increase in population and the development of new facilities would increase the demand for potable water, which could result in aquifer drawdown and may require new utility infrastructure.

The increase in population would also increase the amount of solid waste transferred to the Otero-Lincoln County Landfill, which could cause moderate impacts in terms of capacity. Traffic flow on US 70, 54, and 380 would experience an increase of roadblocks by up to 50 percent although the durations of these roadblocks would continue to adhere to existing Department of Transportation MOA provisions. Increased housing needs on WSMR and in the surrounding community could result in a shortfall of housing that would be expected to be accommodated by the local housing market resulting in new construction and associated land use changes. Public services in Doña Ana County are already below target levels and these services would be further strained. Increased numbers of school-aged dependents would cause strains on existing education facilities in the Las Cruces Public School District and additional facilities would need to be developed.

Alternative 2 would include the ability of a HBCT and other comparable units to conduct high intensity ground maneuver operations within the proposed Southeast Multi-Use Area. These operations would exacerbate potential impacts to resources affected by ground disturbances, such as biological resources and earth sciences, in this area. Under Alternative 2, the amount of annual direct land disturbance would exceed the area of the proposed Southeast Multi-Use Area, so that if off-road activities were evenly distributed, some areas would be disturbed more than once in a year. The impacts on soils and vegetation would be significant and while mitigation measures may reduce impacts, it is likely that these resources would remain in a significantly degraded state while the area is dedicated to HBCT-type training.

S.5.3 IMPACT AND POTENTIAL MITIGATION SUMMARY TABLES

Table S-3 provides a summary of anticipated impacts. Table S-4 provides a summary of potential mitigation measures that WSMR would commit to for the Preferred Alternative in the Record of Decision (ROD). Chapter 4 of the EIS describes BMPs, siting considerations, and mitigation measures that would minimize or avoid impacts.

Table S-3. Summary of Environmental Impacts

Alternative	Potential Impacts by Resource Area
	Land Use and Aesthetics
No Action Alternative	• Minor expansion of the Main Post with new development is compatible with surrounding uses with avoidance of safety areas and other pre-existing uses and facilities, therefore minor impacts would occur. • Slight change in extent of developed area of the Main Post would be visible from distant viewing locations on US 70 and Aguirre Springs campground but would not diminish the visual quality of the overall landscape.
Alternative 1	• Changes in land use classifications would have beneficial impacts on the management of land use resources. • Infrastructure development could cause adverse impacts to land use; however, utilizing an integrated siting process should reduce the potential for land use conflicts to arise. • Ground operations may result in adverse impacts including land degradation from maneuvers that may limit the viability of future land uses in certain areas. • Hazardous operations (e.g., increases in hot missions) could result in several adverse impacts including safety issues, nuisance factors (e.g., noise, dust, and smoke), increased evacuations of call-up areas, and potential degradation of visual environment. • An increase in air operations may generate minimal amounts of additional noise with a low potential to cause land use compatibility issues. The proposed North-South tank trail would require an agreement with either the San Andres National Wildlife Refuge or the White Sands National Monument, as it would need to traverse at least one of these areas to reach the northern portion of the range. If mutually acceptable provisions can be reached for the location, construction practices, maintenance and operation of the tank trail, otherwise significant land use impacts could be mitigated to less than significant.
Alternative 2	• Construction of a HBCT complex and associated infrastructure would not be expected to cause land use conflicts and no greater than minor adverse impacts to aesthetic values. • New facilities, particularly around the Main Post, could adversely affect the aesthetic values of distant viewing locations (such as the Aguirre Spring Campground) and may generate more night light that could affect night sky viewing. • Increases in personnel and Family members resulting from HBCT (or comparable unit) stationing would result in greater housing demand in Doña Ana County, particularly the City of Las Cruces, potentially causing a housing shortfall that would likely result in new construction and associated land use conversions. • Increased use of the Southeast Multi-Use Area for off-road maneuver training may cause minor nuisance factors (e.g., noise and dust) on adjacent land owned by the Federal government (managed by the Bureau of Land Management) and the State of New Mexico; however, this is not expected to result in land use compatibility issues. • Increased use of the Southeast Multi-Use Area for off-road training maneuver could cause potential safety hazards from blowing dust on public highways. • Blowing dust may affect overall visibility of landscape and reduce potential for viewing distinctive panoramic landscape from key observation points such as US 70. Airborne dust from repeated soil disturbance of off-road vehicles could result in moderate to significant levels of haze over time.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Airspace
No Action Alternative	• Increased use of restricted airspace for Holloman AFB F-22A training could cause minor to moderate impacts on the availability of low-level airspace for WSMR missions.
Alternative 1	• Overall the 25 percent increase in hot missions and airspace use for test purposes would not exceed restricted airspace capacity, but would slightly decrease the amount of time WSMR airspace is returned to FAA control, potentially causing minor impacts.
Alternative 2	• Impacts would be similar to those described for Alternative 1.
	Air Quality
No Action Alternative	• Emissions from normal operations would track population increases potentially causing minor impacts, but would fall well within allowable permitted levels. • Minor indirect impacts from an increase in privately owned vehicles and associated emissions. • Planned construction would result in increased emissions causing minor local short-term adverse impacts.
Alternative 1	• Ground operations (i.e., off-road vehicle use) would result in additional emissions of tail-pipe pollutants and cause soil disturbance resulting in particulate matter emissions and minor local short-term impacts. • Increases in hazardous operations (i.e., missile firing and weapons impact) would also result in minor amounts of air emissions, including release of particulate matter from soil impacts causing minor local short-term impacts.
Alternative 2	• New construction to support the stationing of a HBCT (or comparable unit) would result in increased emissions during construction causing minor local short-term adverse impacts. • The operation of new facilities constructed to support the stationing of a HBCT (or comparable unit) would increase emissions, potentially causing moderate impacts. • Minor indirect impacts would be expected from increased use of privately owned vehicles due to HBCT (or comparable unit) stationing. • Vehicles traveling to and from Fort Bliss for training along the proposed connector tank trails would result in some release of particulate matter from soil disturbance, although with use of BMPs to stabilize soils would cause minor impacts. • Frequent high-intensity off-road use in the Southeast Multi-Use Area would cause increases in vehicular emissions and particulate matter during operations resulting in minor impacts. Airborne dust from repeated soil disturbance of off-road vehicles could result in moderate to significant levels of haze over time.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	**Potential Impacts by Resource Area**
	Cultural Resources
No Action Alternative	• Moderate to minor impacts from increased visits to architectural resources, sensitive locations, particularly archaeological sites, could result in erosion, trampling, and possibly vandalism. • Paleontological resources could be affected, if increased visits to the Plio-Pleistocene Mammalian Paleontology Special Natural Area occur. Adherence to SOPs would reduce effects to minor or none. • NRHP-eligible WSMR historic district on the Main Post includes 52 Cold War-era buildings. Seven of these buildings are planned to be demolished, which would be an adverse effect; however, they would follow all applicable regulations including coordination with the New Mexico State Historic Preservation Office (SHPO) to determine appropriate mitigation.
Alternative 1	• Changes in land use classifications to allow increased off-road vehicle use could inadvertently adversely affect previously unidentified archaeological and paleontological sites. • Changes in activities and levels of use, for Infrastructure development, Ground Operations, and Hazardous Operations could cause archaeological/paleontological site disturbance as well as erosion or deposition to these sites.
Alternative 2	• Construction to support the stationing of a HBCT (or comparable unit) could cause alterations and adverse effects to structures eligible for the National Register of Historic Places; however, mitigation measures would be developed in consultation with the SHPO. • Population increases from the stationing of a HBCT (or comparable unit) could result in impacts to historic properties and paleontological resources from increased recreational visitation of locations potentially containing these resources and inadvertently causing damage from surface disturbances.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Earth Sciences
No Action Alternative	• Minor adverse impacts to soils would occur. Existing testing and training activities have the potential of causing soil compaction, loss of biological crusts and subsequent soil erosion.
Alternative 1	• Increased areas of Augmented Test Zone would permit greater areas of off-road vehicle use, which has the potential to compact soils and damage vegetation and soil crusts, exposing the soils to wind and water erosion causing minor to moderate impacts. The high frequency and density of projected maneuvers by wheeled and tracked vehicles, as well as the concentrations of Soldiers on foot, would likely lead to increasing areas of bare ground or mesquite coppice dunes where they do not currently exist. • The expansion of Impact Areas could permanently alter soil in these areas with the potential to contaminate soils with chemicals and/or explosives. • Ground Operations, particularly off-road vehicle maneuvering, can compact soils and damage vegetation and soil crusts, exposing the soils to wind and water erosion, potentially causing significant impacts. • Hazardous Operations can adversely affect soils through ground disturbance and accelerated erosion, as described above, or by contaminating soils with chemicals and explosives. • Earthmoving for construction of range infrastructure could cause moderate to severe localized soil erosion hazards. • Infrastructure development, Ground Operations and Hazardous Operations could cause loss of biological crust and erosion. Ground Operations and Hazardous Operations could cause desertification. • Construction of tank trails would cause surface disturbances and erosion.
Alternative 2	• Construction to support the stationing of a HBCT (or comparable unit) would result in an estimated surface disturbance of 244 acres within the facility boundaries and an additional 202 acres of disturbance in the laydown area; both locations contain a high portion of erodible soils. • The type of impacts to soils from Alternative 2 would be similar to those described for off-road maneuvering under Alternative 1; however, these impacts would be exacerbated within the Southeast Multi-Use Area. • The Southeast Multi-Use Area would involve maneuver operations on 120,000 acres. It is likely that this activity would tend to concentrate in some areas, so that some areas may not be disturbed, while others would be disturbed more frequently. The tank trails within the Southeast Multi-Use Area would permanently disturb up to 300 acres of land for operations.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Biological Resources
No Action Alternative	• Minor impacts would occur to vegetation and wildlife habitat (no species of concern) from construction of new facilities on the Main Post.
Alternative 1	• Changes in land use to Augmented Test Zone would allow increased off-road vehicle use, which has the potential to cause adverse impacts to biological resources through the degradation of habitat, fragmentation, decreases in species diversity and affects on species behavior. • Increases of Impact Areas would cause losses of biological resources, concentrated in those locations. • An increase in Range Centers and Built-Up Areas would result in a loss of up to 7,000 acres of vegetation. This loss of habitat would constitute less than 0.5 percent of available habitat, and would therefore be minor. • Changes in activities and levels of use for infrastructure development and Ground Operations could cause potentially significant impacts including: the loss/degradation of habitat, the introduction/spread of invasive species, avoidance behaviors and displacement of wildlife, and direct mortality of individuals through collisions with vehicles and equipment. • Impacts to vegetation from Ground Operations could be localized significant adverse impacts in terms of vegetation loss and desertification; particularly in disturbed areas containing higher erosive soils such as grasslands. • Changes in activities and levels of use for Hazardous Operations could cause habitat degradation and fragmentation, which can lead to decreased species diversity as well as impacts to protected species. Other adverse impacts would include avoidance and displacement of wildlife, startling behavior, interruptions to nesting and breeding, and interruptions to migration/wildlife corridors. • Aircraft and fly-over operations could, but are not likely to, impact populations of Federally-protected bird species, including the Northern Aplomado falcon and Mexican spotted owl. • Impacts to wetlands and arroyo riparian drainages would likely be avoided, minimized, or mitigated by using best management practices for sediment control during construction and from siting footprints of these actions outside of these resources. • Proposed tank trails would be adjacent to existing roads minimizing vegetation and additional habitat fragmentation impacts. The proposed tank trail has the potential to affect "limited use" White Sands Pupfish Habitat; however, WSMR would aim to avoid these areas during the siting process.
Alternative 2	• HBCT (or comparable unit) infrastructure would result in the development of approximately 300 acres of previously undisturbed low quality vegetated habitat, resulting in vegetation loss, habitat loss, and habitat fragmentation. • Impacts would be similar to those described for Alternative 1, but would be highly localized within the Southeast Multi-Use Area. • The approximate amount of disturbed area resulting from off-road activity within the Southeast Multi-Use Area would be 120,000 acres annually causing vegetation and habitat disturbances. • Wildlife within the Southeast Multi-Use Area would experience increased disruption due to noise, ground disturbance, and human activity. In addition, wildlife habitat throughout the 120,000-acre area would be degraded, through changes in land cover and fragmentation resulting in locally significant adverse impacts. • Development and use of the Southeast Multi-Use Area would not be expected to result in any impacts to threatened or endangered species.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Water Resources
No Action Alternative	• Adverse impacts could occur from continued training and testing activities through contamination of water resources and the alteration of surface water flow patterns from increased development of impermeable surfaces. • Increased impermeable surface areas in and around the Main Post would increase stormwater runoff, which could cause impacts to nearby surface water resources; however, these impacts would likely be avoided or reduced through BMPs. • WSMR's current water supply would accommodate the additional potable water demand for new personnel and military Family members.
Alternative 1	• Conversion of land to Augmented Test Zone would allow increased off-road vehicle use, which could substantially alter surface water flow conditions, patterns, and rates should these vehicles be allowed to operate within surface water features. Disturbances from these vehicles could increase the probability of flooding as well as decrease available surface water for wildlife. • An increase of Impact Areas could cause adverse impacts to water resources, the degree to which would be dependent upon their proximity to surface water features and potable wells. • Construction activities would involve the use of substances that could cause surface and ground water contamination. Earth moving activities around surface water features could cause increased sediment loads to enter water bodies, which can result in altered hydrology and flow conditions, increased flooding potential, and, ultimately, a decrease in the availability of water for wildlife. These impacts could be avoided or minimized through BMPs. • Ground Operations in the area of surface water could cause increased sediment loads to enter water bodies, which can result in altered hydrology, increased flooding potential, and, ultimately, a decrease in the availability of water for wildlife. Also, vehicles could leak substances (e.g., fuel, oils, antifreeze, battery acids) that could cause surface and ground water contamination. The off-road test activities would have minor to moderate impacts on surface waters depending on the event size. • Hazardous Operations have the potential to create large-scale alterations to landforms and topography. If located in close proximity to surface waters, ground target impacts could severely alter hydrology and surface flow conditions, increase flooding potential, and decrease the availability of water for wildlife. These activities could also be a potential source of surface and ground water contamination. • The tank trail would cross two intermittent streams, which are tributaries to Salt Creek (pupfish habitat) which could cause minor impacts through sedimentation, contamination, and alteration of stream flow characteristics; however, the use of BMPs during construction would minimize the potential for these impacts to occur. • Additional personnel would result in minor increased water demand, which would cause minor impacts on groundwater resources; however, WSMR could avoid saline water intrusion based on their current pumping rates.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
Water Resources (continued)	
Alternative 2	• Infrastructure development to support the stationing of a HBCT (or comparable unit) and increased numbers of personnel and military Family members would result in increased water demand, which could cause moderate impacts on groundwater resources; however, WSMR could avoid saline water intrusion with some modifications to their water system and wells. • Ground Operations in the area of surface water could cause increased sediment loads to enter water bodies, which can result in altered hydrology, increased flooding potential, and, ultimately, a decrease in the availability of water for wildlife. Also, vehicles could leak substances (e.g., fuel, oils, antifreeze, battery acids) that could cause surface and ground water contamination. The off-road maneuver activities would have minor to moderate impacts on surface waters. • Off-road use by heavier vehicles can have significant impacts on soils, depending on (1) the size of the area affected, (2) the frequency of repeat disturbance, (3) the soil's erosion potential, and (4) slope. Repeated use of areas with moderate or severe erosion potential, especially areas of severe water erosion potential and steep slopes would result in significant impacts both at the location of use and potentially off site due to wind- or water-borne sediments. Use of relatively flat areas with slight erosion potential would have localized impacts but would not be expected to have significant indirect effects.
Safety	
No Action Alternative	• The construction, demolition, and/or renovation of facilities could result in minor impacts from occupational hazards (accidents, noise, and physical hazards) for those personnel directly involved in these activities. • Continuation of current test and training activities could cause none to minor safety impacts.
Alternative 1	• The potential increase in lands designated as Impact Areas may cause minor impacts in terms of active range safety hazards and the creation of new UXO hazards. • Increased Ground Operations would cause minor impacts in terms of personnel exposure to natural hazards. Additionally, the use of heavier, tracked vehicles may cause an increase in dust generation during maneuvers. In high winds, drifting dust could diminish visibility along US 70, potentially causing safety hazards to motorists. Similarly, increases in use of countermeasures could produce smoke or dust that may obscure visibility. • Increases in Hazardous Operations would cause minor impacts to personnel safety in terms of active range risks, UXO hazards, and occupational and natural hazards. • The construction of new tank trails would be expected to enhance traffic safety by minimizing traffic conflicts with military convoys and other vehicles along those routes.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
Safety (continued)	
Alternative 2	• The construction of infrastructure to support the stationing of a HBCT (or comparable unit) could result in low impacts in regard to occupational hazards. • Increased exposure to UXO hazards in Southeast Multi-Use Area. • Increased levels of occupational and natural hazards during soldier training. • The more intensive use of the Southeast Multi-Use Area may cause an increase in dust generation during maneuvers. In high winds, drifting dust could diminish visibility along US 70, potentially causing safety hazards to motorists. Similarly, increases in use of countermeasures could produce smoke or dust that may obscure visibility.
Noise	
No Action Alternative	• Increase of population and additional vehicle traffic would increase noise around the Main Post and local highways; however, it remains relatively localized and similar to any community environment. • Noise impacts from construction would be short-term, ranging from none to minor.
Alternative 1	• Expansion and modification of missions requiring ground and air assets, the reconfiguration of these assets, construction, and additional personnel stationed at WSMR would create noise having varying degrees of intensity. • Changes in mission activities and levels of use have the potential to increase noise levels in some areas although this would occur in localized areas away from receptors; however, until these proposals are better defined, a valid assessment of potential noise impacts cannot be made. • Of the five proposed Specialized Areas, the Electro-Optical .50 Caliber Range, the Individual Combat Skills Course, and the Joint Urban RDT&E Environment could cause adverse noise impacts; therefore, noise would be a key consideration in future environmental review of these projects.
Alternative 2	• Increase of population associated with the stationing of a HBCT (or comparable unit) and additional vehicle traffic would increase noise; however, it would be relatively localized and similar to any community environment. • Noise impacts from construction to support the stationing of a HBCT (or comparable unit) would be short-term, ranging from none to minor, considering the Future Development Area would be located away from base-housing (resident receptors). • More intense use of the Southeast Multi-Use Area and tank trails would create additional noise sources in that area, but those impacts would be no greater than minor considering relatively large distances to potential receptors.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
Hazardous Materials and Hazardous Waste	
No Action Alternative	• Increase in the generation and disposal of solid waste causing minor impacts on landfill capacity. • Increase in Petroleum, Oils, and Lubricants (POL) wastes. • Potential for increase in exposure to and disposal of asbestos containing material and other hazardous building materials during facility renovations/demolition. • Materials used with hazardous components would increase for test missions, for example, missiles or targets with lithium or silver-zinc batteries. • Missile debris requiring recovery would increase. • Hazardous materials use and hazardous waste generation would increase. • Increased use of solid-state lasers, chemical lasers, and free-electron lasers resulting in an increase of battery waste. • Increased non-ionizing radiation. • Increase in herbicide/pesticide use due to expansion of the golf course and new lawn areas.
Alternative 1	• Increase in POL wastes and increased potential for spills. • Increase the use, storage, and transportation of hazardous materials and could increase the quantity of hazardous waste in storage and requiring disposal. • Increase in the number of recovery missions. • Increase in solid waste. • Increase in radioactive sources.
Alternative 2	• Increase in construction and debris waste. • Increase in herbicide/pesticide usage (additional lawn areas). • Increase in solid waste due to increased population resulting from stationing of a HBCT (or comparable unit). Impacts to the Otero-Lincoln County Landfill could be moderate (reaching capacity two years earlier than under the No Action Alternative) if no other landfills are utilized. • Off-road activity impacts from Alternative 2 would be similar to Alternative 1; however, there is a potential for higher incidence of accidental POL spills from vehicle leaks and POL storage/use within the Southeast Multi-Use Area.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Facilities and Infrastructure
No Action Alternative	• Adverse impacts on the Main Post water treatment facility and on water supply in the region (potable water use is expected to increase by an estimated 68 percent). Adverse impacts on the Main Post sewage treatment plant from increases in wastewater generation (estimated at approximately 50 percent). Construction and development of facilities and infrastructure would increase stormwater runoff and associated erosion due to disturbed land and increased impervious areas, which would cause minor impacts to serving capacities of stormwater systems. • Continued off-road vehicle use and field operations includes the risks of damaging underground utility lines as vehicles and digging may rupture utility encasements or sever utility lines. • Impacts to communication resources that could occur are peak usage of and potential overloading of communication systems as a result of increased population levels at WSMR.
Alternative 1	• Increase in Ground Operations and associated off-road vehicle maneuvers and dismounted operations would increase risk of damaging underground utility lines, such as gas pipelines, causing minor impacts. • Additional personnel and facilities at the training ranges would increase the use of utilities at the training areas and are expected to have minor to moderate impacts to existing utilities in these areas.
Alternative 2	• New construction to support the stationing of a HBCT (or comparable unit) would be expected to cause minor to moderate impacts on stormwater control infrastructure and minor impacts from disruptions to utility services. • Increased population resulting from the stationing of a HBCT (or comparable unit) would have moderate impacts in terms of potable water supply. Impacts to the Main Post's wastewater infrastructure is expected to be significant, but mitigable to less than significant with major modernization of the aging system and possibly the addition of a new wastewater facility. • Minor impacts to existing stormwater system from increased impervious surfaces. • Minor impacts to communication systems (planned upgrades to communication systems are expected to minimize impacts).
	Transportation
No Action Alternative	• Minor impacts to the primary highways surrounding WSMR (e.g., US 70 and US 380) as the population increases. • Moderate impacts to Main Post traffic - increased traffic volumes, delays, road maintenance, and accidents from increased privately-owned vehicle (POV) usage. • Temporary and localized disruptions to local traffic patterns during construction resulting in increased congestion and traffic delays to local users.
Alternative 1	• Traffic impacts related to increased populations under Alternative 1 would be similar to those discussed under the No Action alternative.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Transportation (continued)
Alternative 2	• Moderate impacts to Main Post traffic in the form of increased traffic volumes, delays, road maintenance, and accidents from increased POV usage. • Up to 25 percent increase over the next five years in the number of roadblocks on US 70, 54, and 380 because of increased testing activities (approximately 44 roadblocks per year) resulting in temporary traffic delays and back-ups during these events (up to 80 minutes on US 54 and 70 and up to two hours on US 380). • Temporary and localized disruptions to local traffic patterns during construction resulting in increased congestion and traffic delays to local users. • Traffic levels at WSMR gates would exceed capacity during the morning rush hour even with the planned lane expansion projects under Alternative 1. WSMR will pursue mitigation measures that could include encouragement of car-pooling and use of Park and Ride services, implementing methods to stagger personnel work hours, and/or implementing telecommuting where feasible.
	Socioeconomic Resources
No Action Alternative	• Increases in population within the Region of Influence (ROI); changes will be highest in Doña Ana County. • Slight beneficial impact with increases in employment, personal income, and sales taxes in the ROI and Doña Ana County. • Increased need for housing in the community and at WSMR for military, their Families, and for civilians. The housing market, including WSMR on-post housing, would be able to accommodate increased personnel and population therefore impacts would be minor. • Increased school-aged dependents could cause strains on the existing education facilities in the Las Cruces Public School District; however, the District has plans to expand the school system, which would alleviate the potential for impacts to occur. • Public services, including law enforcement and fire services, and quality of life measures such as acreage for public parks, are already strained and below target levels in Doña Ana County. Increasing baseline populations and WSMR-related population increases could further strain these services.
Alternative 1	• Employment increases would provide a positive impact with increases in employment and personal income in the ROI and Doña Ana County.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Socioeconomic Resources (continued)
Alternative 2	• Increases in population within the ROI would be 2.5 percent. • Employment increases would provide a positive impact with increases in employment and personal income in the ROI and Doña Ana County. • Increased number of school-aged dependents would cause strains on the existing education facilities in the Las Cruces Public School District. Although the District has plans to expand the school system, without additional schools beyond those currently planned, high impacts to the school system could occur. • Shortage in WSMR housing units for military Families would likely be accommodated by the local housing market causing minor impacts. • Public services, including law enforcement and fire services, and quality of life measures such as acreage for public parks, are already strained and below target levels in Doña Ana County. Increasing baseline populations and WSMR-related population increases could further strain these services.
	Environmental Justice
No Action Alternative	• No disproportionately high and adverse human health or environmental effects would be expected to occur to minority and low-income populations.
Alternative 1	• Same as No Action Alternative.
Alternative 2	• Same as No Action Alternative.
	Energy Demand
No Action Alternative	• Electricity use would increase, which could be accommodated by the existing provider. A new substation may be required. • Natural gas consumption would increase; however, this increase in peak demand would not exceed the capacity of the existing natural gas supply lines.
Alternative 1	• Increases in Hazardous Operations could result in increases to the peak energy demand during those missions and may also require expansion of energy infrastructure for the new firing points. • Development of the five proposed Specialized Areas may require expansions of utility infrastructure; therefore, providing electricity and natural gas to these facilities should be considered during the siting process and environmental review of these projects. • Annual electricity use would increase by five percent compared to the No Action Alternative, which could be accommodated by the existing provider. Natural gas consumption would increase, but would not exceed supply capacity.

Table S-3. Summary of Environmental Impacts (continued)

Alternative	Potential Impacts by Resource Area
	Energy Demand (continued)
Alternative 2	• Increased population resulting from the stationing of a HBCT (or comparable unit) could cause peak electrical demand to exceed the capacity of the existing electrical substations requiring further expansion of the electrical distribution system. • Electricity use would increase by 126 percent compared to the No Action Alternative, which could be accommodated by the existing provider. New substations and electrical distribution lines may be required. • Natural gas consumption would increase, but would not exceed supply capacity.
	Frequencies
No Action Alternative	• Evolving and new mission activities would result in no or only minor adverse impacts as new transmission systems or use of new frequency bands should be manageable under current procedures.
Alternative 1	• Conflicts with the safe and secure operation of systems and avionics within WSMR or with neighboring military installations could occur, but would be unlikely. • Conflicts with residential, commercial, or municipal electronic systems and communication systems, to include air traffic control systems could occur, but would be unlikely. • Minor to moderate impacts in terms of the potential to impair the ability of WSMR to meet its test and training mission requirements due to the unavailability of dedicated frequencies. • JLENS could create significant impacts in terms of frequency “jamming” during operation both within and outside the installation. These impacts could be reduced to less than significant through coordination with other military agencies, FAA and the Federal Communication Commission.
Alternative 2	• Impacts would be similar to those described for Alternative 1.
	Wildland Fire
No Action Alternative	• Impacts from actions that are approved, but have not yet been fully implemented would increase the potential for wildland fires.
Alternative 1	• An increase in testing activities would cause an increase in the potential for wildland fires.
Alternative 2	• Impacts would be similar to the No Action Alternative and Alternative 1; however, due to the increase in off-road maneuvering and training activities, the potential for unplanned wildfire ignitions would increase in the Southeast Multi-Use Area.

Table S-4. Summary of Potential Mitigation Measures for the Preferred Alternative

Resource Area	Potential Mitigation Measures
Land Use and Aesthetics	WSMR would coordinate with the applicable land management agency(s) to develop mutually acceptable provisions for the location, construction practices, maintenance, and operation of the North-South tank trail where it traverses non-WSMR land.
Airspace	No mitigation measures would be warranted.
Air Quality	Effects on ambient air quality from the Proposed Actions would be minor. Existing management programs are adequate to mitigate adverse effects and protect air quality. Fugitive dust emissions from soil disturbance would be minimized through existing WSMR construction BMPs (Ref #155). During site preparation or other earth-moving activities, BMPs would be implemented to minimize fugitive dust emissions, such as wetting soil surfaces, covering truckloads of dirt with tarps to reduce windborne dust, and properly maintaining equipment. Furthermore, WSMR intends to follow County ordinances regarding erosion control and construction where practical and when it is not in conflict with the mission of WSMR, as well as the recommendations developed under the WSMR Particulate Matter Control Plan. WSMR would also finalize a revised installation-wide air permit that encompasses all new, regulated stationary air-emission sources.
Cultural Resources	WSMR would implement the Programmatic Agreement between the Army and the SHPO as a mitigation measure that would govern future actions. WMSR would also abide by its decision to ensure that any areas authorized for off-road maneuver or intensive ground operations would be surveyed and mitigated for archeological and historic properties as necessary. WSMR would request additional resources (funding and manpower) to manage cultural resources surveys and mitigation measures as necessary relative to the degree of anticipated ground disturbance and construction.
Earth Sciences	Due to the variability in timing, duration, frequency, and location of off-road vehicle maneuvers, WSMR would use adaptive management for identifying mitigation measures to reduce the impacts to soils. Mitigative strategies could include using a combination of approaches such as applying soil stabilizers, using windbreaks, and rotating areas authorized for off-road use. WSMR would develop workplans for mitigating impacts to soils and request Army funding to implement these plans. Also, WSMR would request funding to complete soil surveys of applicable portions of the installation. This information would be a necessary foundation for effective adaptive management and siting decisions.
Biological Resources	The potential for significant adverse biological impacts primarily exists from the increased land available for off-road testing and training activity under Alternative 1. Consequently, WSMR would monitor areas used for ground disturbing activities and develop strategies to rehabilitate areas where significant vegetation is lost due to human activities. WSMR's goal would be to limit man-made vegetation loss to less than 30 percent in areas approved for ground disturbing activities. Methods of achieving this goal could include intensive habitat restoration activities (e.g., stabilizing soils, reseeding, etc.), timing and rotating the locations of off-road vehicle use to allow for proper restoration to succeed, and limiting activities to highly localized areas so as to continually affect the same areas at a rate of less than 30 percent of the total vegetation cover. In order to achieve this, a heavy emphasis would be placed on utilizing an adaptive management approach that allows for variation in environmental conditions and an informed response to such variation. As part of using adaptive management, WSMR would then be able to determine what type and location of specific mitigation measures are needed to protect or restore biological resources through biological monitoring of lands subject to off-road vehicle use.

Table S-4. Summary of Potential Mitigation Measures for the Preferred Alternative (continued)

Resource Area	Potential Mitigation Measures
Biological Resources (continued)	WSMR would request funding for additional monitoring studies and for Integrated Natural Resource Management Plan and Integrated Training Area Management projects to reduce impacts of testing and training throughout the 1,825,000 acres having the potential for off-road activities. WSMR would request funding for and implement an update to its INRMP to reflect the proposed changes in land use and activities. WSMR would coordinate with the NMDGF and USFWS to ensure that the construction and operation of the proposed tank trail would not adversely affect population of White Sands pupfish. Mitigation measures would include re-routing the tank trail to avoid Limited Use and Essential Pupfish Habitat (an option that seems feasible based on the local terrain) or working with NMDGF and USFWS to develop best management practices to prevent or limit sedimentation of streams or other adverse impacts where these areas cannot be avoided.
Water Resources	WSMR should create and employ an adaptive management plan for recovery of disturbed areas. Maintaining soil stability would mitigate the indirect effects of dust generation and sedimentation resulting from accelerated erosion of existing intermittent streams and arroyos. WSMR would coordinate with the White Sands National Monument on any tank trail or road improvements near the Monument to develop methods to prevent flash flood events from washing unnatural debris into the Monument. WSMR has established BMPs based on land use classification to provide guidelines for avoiding significant water resource impacts from existing known actions and from future undefined actions. These BMPs are treated as guidelines for project planning and contain principals in avoiding impacts during the planning or construction process or through facilitating restoration activities following construction or use. If potential and recommended management actions are followed for future activities, then no regulatory or administrative mitigation measures would be warranted.
Safety	WSMR would develop new SOPs and directives to address safety components of off-road activities. In particular, an SOP would be needed to address potential adverse impacts to visibility on public and military roads from dust created from tactical vehicles conducting off-road maneuvers. WSMR would continue to examine the risks associated with specific test and training activities, tailor operating conditions accordingly, implement evacuations and impose access restrictions as necessary, and cease any operations that would pose an imminent danger to human health and safety.
Noise	No mitigation measures would be warranted.
Hazardous Materials and Waste	No mitigation measures would be warranted.
Facilities and Infrastructure	To protect existing buried utilities, WSMR would request funding for and construct hardened crossings over existing gas lines in areas designated for off-road maneuver.
Transportation	No mitigation measures would be warranted.
Socioeconomics	No mitigation measures would be warranted.
Environmental Justice	No mitigation measures would be warranted.
Energy Demand	No mitigation measures would be warranted.
Frequencies	No mitigation measures would be warranted.
Wildland Fire	No mitigation measures would be warranted.
Cumulative Impacts	No mitigation measures would be warranted.

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This Environmental Impact Statement (EIS) examines the environmental effects of developing new test and training capabilities to meet current and future mission requirements at White Sands Missile Range (WSMR). The EIS evaluates proposed changes in land use and activities to support future Army needs associated with Army Transformation, the Army Campaign Plan, modernization of the fighting force (including equipment and weaponry), Army Growth and Force Structure Realignment, Global Defense Posture Realignment, and other Army initiatives. This action supports WSMR as a facility for rapid development and deployment of new systems in response to rapidly changing world conditions and national defense priorities. These represent changes and expansions in capabilities at WSMR that have evolved since the preparation of the WSMR Range-Wide EIS and Record of Decision (ROD) in 1998 (Ref# 001). This action also assesses the site-specific effects of implementing the decision of the ROD for the *Programmatic EIS for Army Growth and Force Structure Realignment* (Ref# 002) to station a Heavy Brigade Combat Team (HBCT) at WSMR.

The EIS has been prepared in compliance with the National Environmental Policy Act (NEPA) (Public Law 91-190, 42 United States Code [USC] 4321-4347, as amended); Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508); and 32 CFR Part 651, (Army Regulation [AR] 200-2) "Environmental Analysis of Army Actions."

This chapter provides background information on WSMR and its current role as a Major Range and Test Facility Base (MRTFB). A MRTFB is a designated core set of Department of Defense (DoD) Research, Development, Testing and Evaluation (RDT&E) infrastructure and associated workforce that must be preserved as a national asset to provide RDT&E capabilities to support the DoD acquisition system. Each MRTFB comprises test installations, facilities, and ranges operated primarily for DoD test and evaluation missions. This chapter describes the purpose of and need for the Proposed Action to support Army and other DoD test and training requirements at WSMR. Also, it summarizes the decisions to be made pursuant to this EIS, the NEPA and public involvement processes, and the scope of this EIS.

Since the publishing of the Draft EIS, the Army's proposed plan to station a HBCT at WSMR has changed. On June 2, 2009, the Secretary of the Army announced a decision not to station a HBCT at WSMR. This underscores the dynamic nature of world events and the continual need for the DoD and specifically the Department of the Army to reassess force structure to respond to new situations. WSMR's land and airspace assets are sizable and strategically located adjacent to other Army and Air Force installations. Consequently, WSMR may be revisited as a suitable location for new or expanded training missions in the future. Therefore, the Final EIS retains the analysis of stationing and training a HBCT (or comparable unit) since this could potentially be selected in the future; however, the discussion of the HBCT has been eliminated from Alternative 1 and all HBCT related actions are addressed under Alternative 2 in the Final EIS. Alternative 2 also provides WSMR an essential analysis of the overall capability to host additional personnel and off-road maneuver training activities, should those needs arise in the future.

1.2 Background

1.2.1 WSMR MISSION AND GEOGRAPHICAL SETTING

WSMR is an Army installation with a tri-service presence (Army, Air Force, and Navy) and is managed and supported by the U.S. Army's Installation Management Command. WSMR encompasses the White Sands Test Center (WSTC), a MRTFB, and is managed and operated by the Army for research, development, testing, and evaluation (RDT&E) of military systems and similar high-technology commercial products. WSMR's major tenant is the U.S. Army Developmental Test Command[1] (DTC), which reports to the Army Test and Evaluation Command and uses the extensive test resources and infrastructure of this MRTFB to accomplish its RDT&E role. As one of the largest test ranges in the US, WSMR provides unique infrastructure and test facilities including nuclear survivability test reactor, radar test facilities, a high energy laser systems test facility, and a state-of-the-art range control center. As a U.S. Army DTC facility, WSTC's mission is to provide testing and development of weapons and equipment (both hardware and software) for military use in combat zones and for homeland security. In accordance with DoD Directive 3200.11, WSTC may be used by other DoD users (including DoD training users), and by users outside the Department such as U.S. Government Agencies, State and local governments, allied foreign governments, and commercial entities. Any changes in land-use or activities that will affect the test and evaluation capabilities of the MRTFB will, in accordance with DoD Directive 3200.11, be coordinated with the Director, Test Resource Management Center for approval. Compliance with the directive will be part of the action decision-making process. Appendix A (pages B-1 through B-6) provides a more comprehensive description of activities performed at WSMR. The WSTC supports RDT&E operations on a reimbursable basis under the direction of DoD Directive 3200.11. Training is also performed on a reimbursable basis and is secondary to the test mission. Leadership at the installation is provided by the WSMR Commanding General, the Test Center Commander, and the Garrison Commander (IMCOM). Day-to-day direction is provided by Team WSMR, which is comprised of the installation leadership, the Deputies for Navy and Air Force, and the primary tenant organizations located at the installation.

In 1941, the War Department established the White Sands Proving Grounds through a combination of land purchases and condemnations (totaling approximately 810,400 acres). This new site supported critical testing for the nation's nuclear bomb program in the 1940s. In 1952, by way of Public Land Order 833, the area was significantly expanded to nearly its present size through the withdrawal of Federal land for military purposes. Other minor acquisitions and land adjustments have also contributed to the compilation of approximately 2.2 million acres within the current boundary of WSMR.

Figure 1.2-1 shows the regional location of WSMR in south central New Mexico. The installation spans approximately 40 miles from east to west, and 100 miles from north to south. Within WSMR lies the White Sands Test Facility (WSTF) operated by the National Aeronautics and Space Administration (NASA). The WSMR land area also encompasses White Sands National Monument, operated and managed by the National Park Service (NPS); and San Andres National Wildlife Refuge (SANWR), operated and managed by the U.S. Fish and Wildlife Service (USFWS). The U.S. Department of Agriculture's (USDA's) Jornada Experimental Range (JER) is partially encompassed by the WSMR land area. Co-use of these areas is governed by a Memorandum of Agreement (MOA) between WSMR and each managing agency. Table 1.2-1 summarizes the land components of WSMR.

[1] The DTC is the Army's premier materiel testing organization for weapons and equipment. DTC tests military hardware of every description under precise conditions across the full spectrum of natural and controlled environments on highly instrumented ranges and test courses. DTC test technologies and facilities are helping the Army develop and acquire the equipment and systems it needs to transform into the responsive, lethal, agile, and highly versatile military force of the 21st century envisioned by the Army Chief of Staff and senior Army leadership.

Table 1.2-1. WSMR Land Area

Area	Acres[1]
WSMR[2]	1,926,300
White Sands National Monument	146,000
San Andres National Wildlife Refuge	56,800
Jornada Experimental Range[3]	60,600
Total	**2,189,700**

1. Acres derived from geographic information system (GIS) data.
2. Includes NASA – WSTF; excludes 12,000 acres owned by the Department of Army in Mendiburu Ranch, between the north boundary and US 380.
3. Portion of JER within WSMR boundary.

WSMR is bordered to the south and southeast by Fort Bliss (see Figure 1.2-1), which is comprised of approximately 1.1 million acres. Directly to the south is the Doña Ana Range and training areas, with McGregor Range (on Bureau of Land Management [BLM]-withdrawn land) on the east side of US 54. Holloman Air Force Base (AFB), which is comprised of approximately 59,700 acres, is adjacent to WSMR on the east. Collectively, WSMR, Fort Bliss, and Holloman AFB provide nearly 3.4 million acres of neighboring land area to support DoD test and training missions.

In addition, WSMR holds leases and partner agreements with surrounding land owners on approximately 3.3 million acres. In these areas, known as "call-up" areas (see Figure 1.2-2), WSMR is able to evacuate people temporarily during periodic hazardous test events, effectively doubling the size of the land area when required.

Associated with the land area, restricted airspace[2] overlies and extends beyond the WSMR land boundary as shown in Figure 1.2-2. The Federal Aviation Administration (FAA) authorizes WSMR to control WSMR-restricted airspace when needed, and WSMR returns control of its airspace to FAA when not in use. Figure 1.2-3 shows regional restricted airspace including those associated with Fort Bliss, Fort Wingate, and Cannon AFB.

WSMR also uses several land parcels (either owned or leased) outside its boundary that support test activities conducted at WSMR. Fort Wingate in west central New Mexico is such a site capable of firing missiles to support live tests at WSMR. In addition, there are numerous small parcels located on leased lands near the installation, mostly used for instrumentation sites and test functions. In 2008, WSMR was deeded approximately 12,000 acres from the estate of the Mendiburu Ranch, between the north boundary and US 380, within the Northern Call-Up Area.

The land surrounding WSMR consists of public land managed by BLM, land owned by the State of New Mexico, and privately-owned land. The dominant use of this land is grazing with recreational use of the public lands. There are also several conservation areas, including the Bosque del Apache National Wildlife Refuge (NWR) and the Sevilleta NWR, near WSMR. The Lincoln National Forest and the Mescalero Apache Indian Reservation are located to the east of WSMR (see Figure 1.2-1).

Figure 1.2-4 shows the topography in the region. WSMR is located in the Basin and Range physiographic province and is characterized by north-south oriented mountain ranges and drainage basins. Approximately one-quarter of the installation consists of mountainous terrain; the remainder is basin lowlands and gently sloping alluvial fans.

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[2] Restricted airspace - Airspace having defined vertical and lateral dimensions that has been established by the FAA (via the rule-making process) within which the flight of aircraft, while not wholly prohibited, are subject to restriction. Restricted airspace is established to contain or segregate activities which would be hazardous to other nonparticipating aircraft.

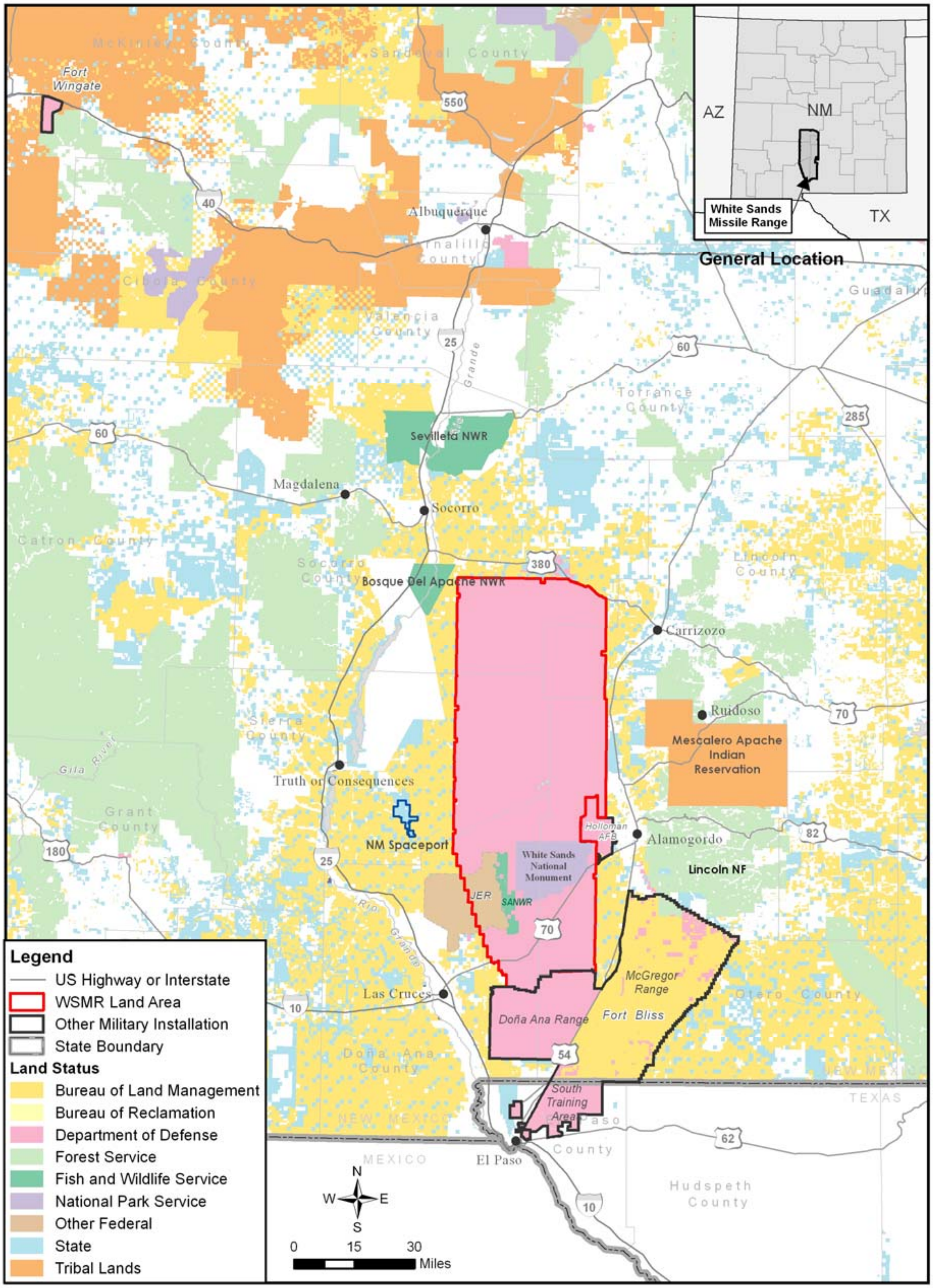


Figure 1.2-1. WSMR and Land Status in Surrounding Areas

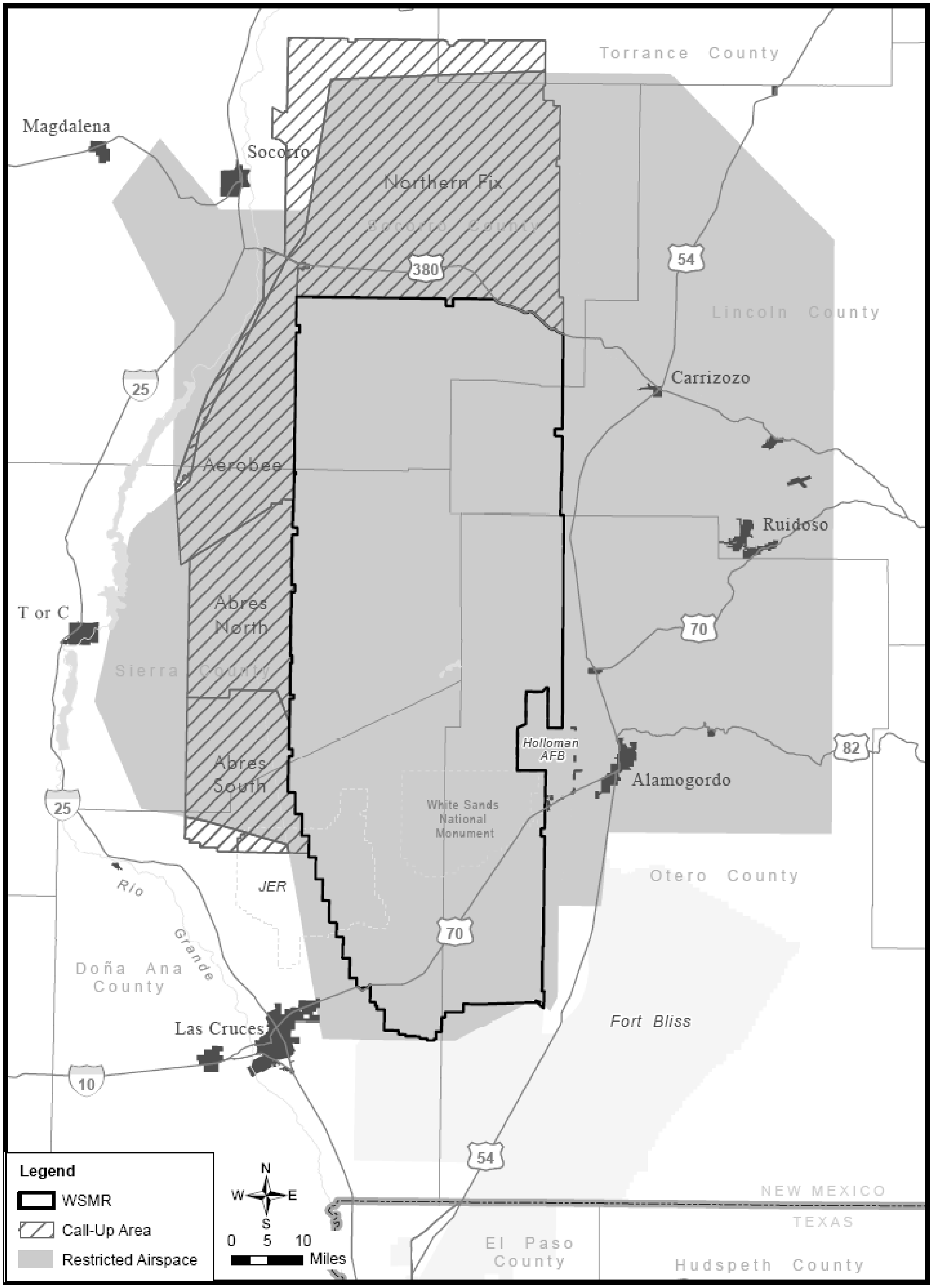


Figure 1.2-2. WSMR Call-Up Areas and Restricted Airspace

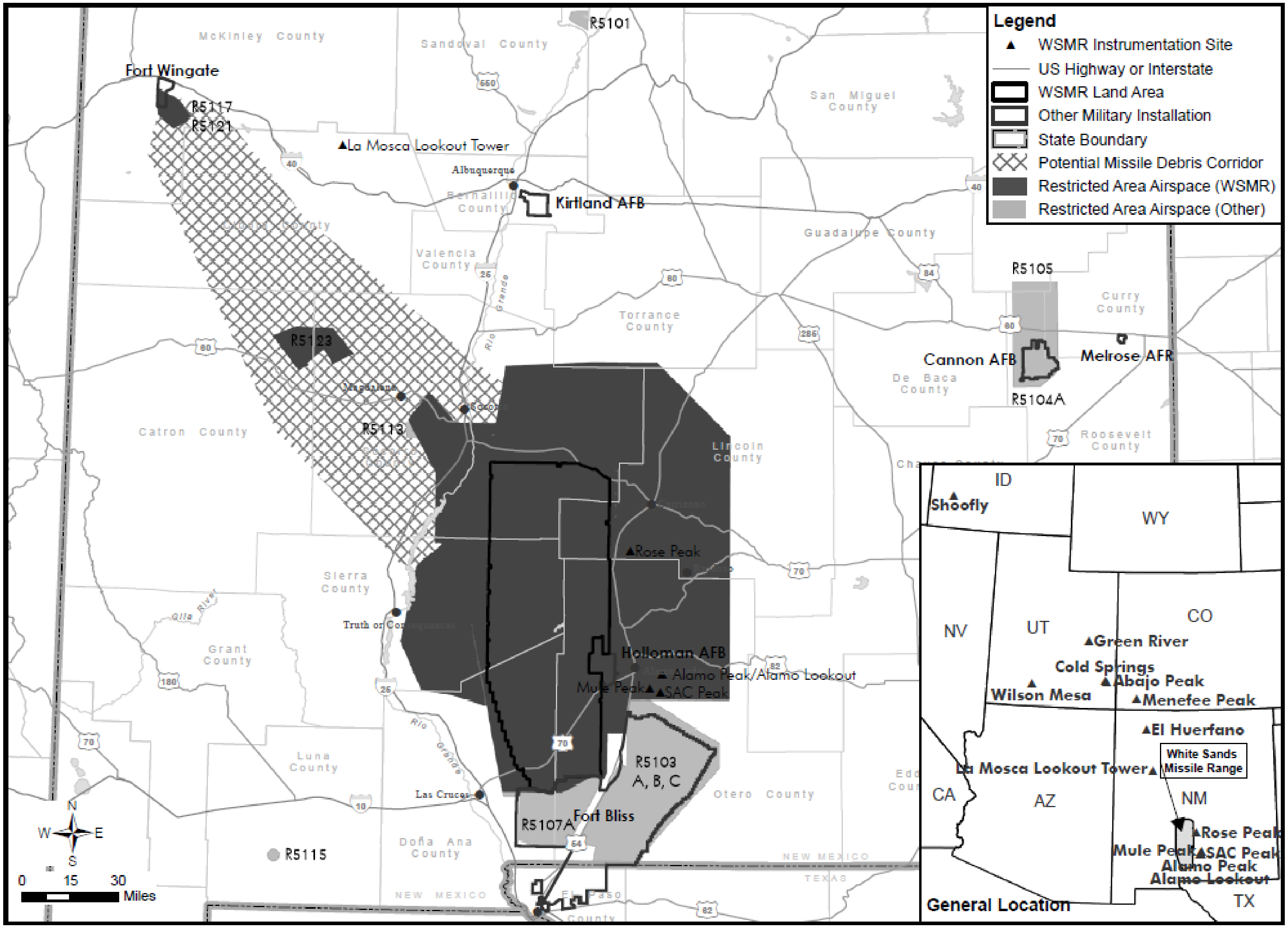


Figure 1.2-3. WSMR Airspace and Off-Range Regional Military Assets

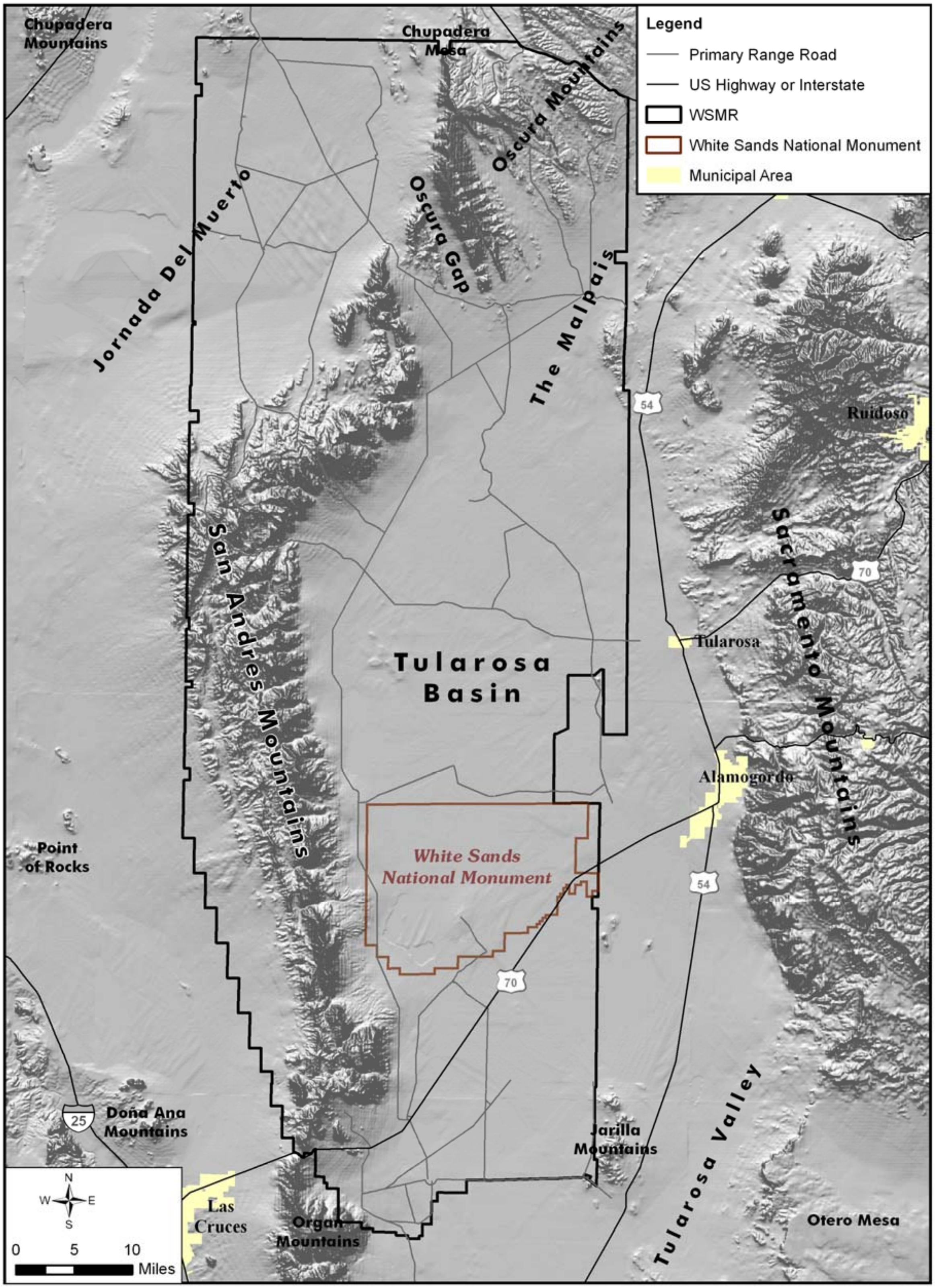


Figure 1.2-4. WSMR Regional Topography

The southern part of WSMR is bisected by US 70, which connects Las Cruces and Alamogordo. WSMR has a Memorandum of Understanding (MOU) with the New Mexico Department of Transportation that allows this highway to be closed during missile tests (Ref#161). The Main Post of WSMR is located south of US 70 to the east of the Organ Mountains.

1.2.2 WSMR MISSION

As a U.S. Army DTC facility, WSMR's mission is to provide for testing and development of weapons and equipment (both hardware and software) for military use in combat zones and homeland security. As one of the largest joint test and training ranges in the U.S., WSMR provides the DoD with unique infrastructure and test facilities including a nuclear survivability test reactor, radar test facilities, a high energy laser systems test facility, and a state-of-the-art range control center. WSMR supports authorized customers within and outside the DoD, including domestic agencies, foreign governments, and non-governmental organizations. DTC Regulation 10-6 lists the test programs and capabilities for which technology and facility investments maintain WSMR as a primary site (Ref# 003).

These include the testing of:

- Aircraft systems and aircraft fixed-wing armaments;
- Command, control, communication, computer, intelligence, surveillance, and reconnaissance systems;
- Directed energy weapons (including high-powered microwave and high energy laser weapons);
- Air/missile defense systems (surface- and air-launched, long range, and overland missile testing);
- Missiles and rockets (from stationary and moving ground platforms, detecting and striking non-line-of-site targets);
- "Systems of systems" (such as Army Brigade Combat Team [BCT] Modernization – formerly Future Combat Systems [FCS]) to develop and validate components and full functioning integration of all equipment and components in battle situations;
- Electromagnetic environmental effects, electromagnetic interference and electromagnetic compatibility, and electromagnetic pulse; and
- Nuclear weapons effects.

As a DTC installation, testing programs and missions have first priority for range scheduling and support. The following Team WSMR organizations are the primary users of WSMR's facilities and airspace (see Figure 1.2-5):

- Army Test and Evaluation Center
- Army Research Laboratory
- DoD Center for Countermeasures
- U.S. Air Force 46th Test Group
- Naval Surface Warfare Center-Port Hueneme Division
- Defense Threat Reduction Agency
- National Aeronautics and Space Administration
- U.S. Space and Missile Defense Command
- U.S. Army Training and Doctrine Command Analysis Center.

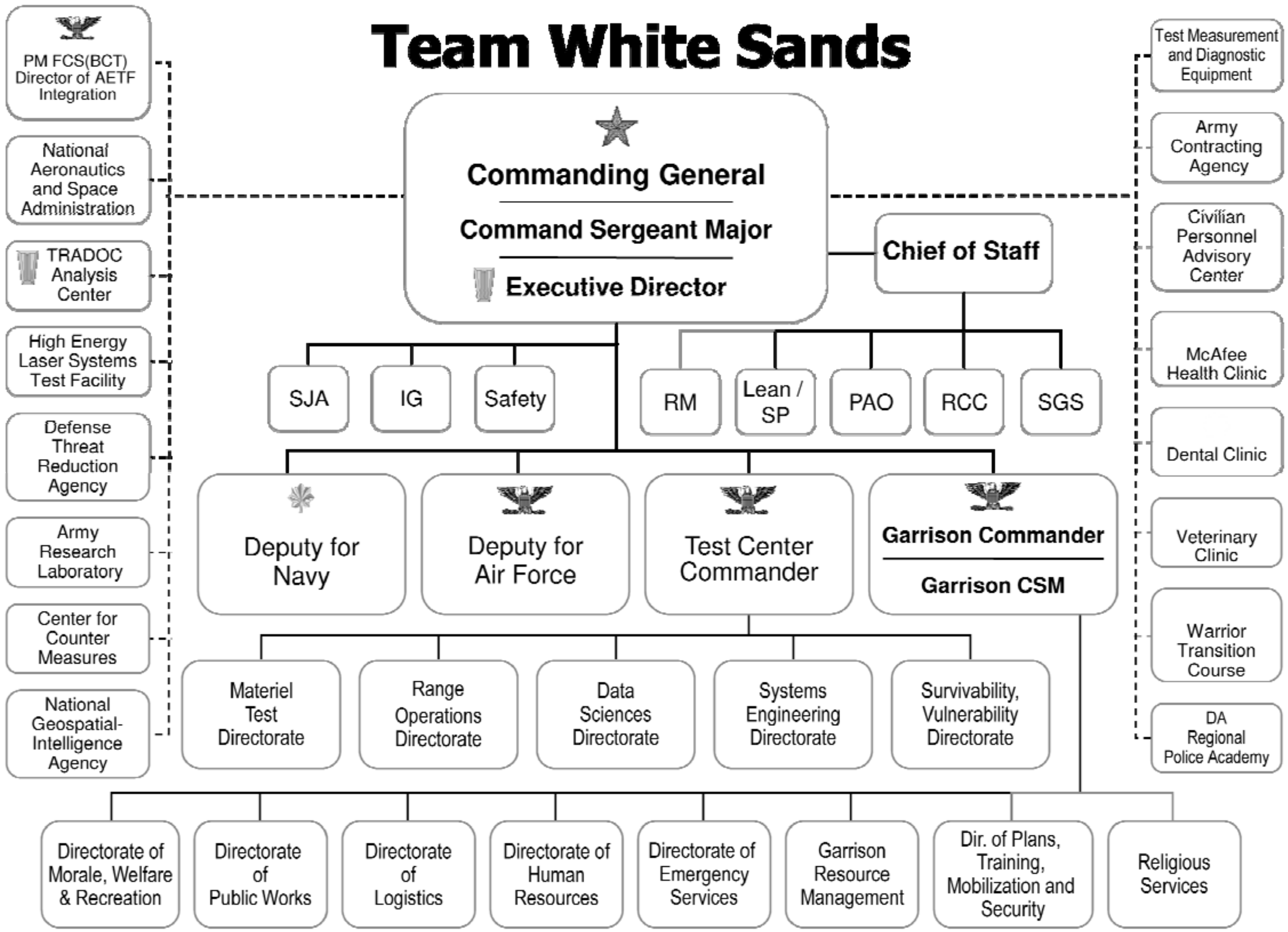


Figure 1.2-5. Team WSMR Organization

These represent WSMR's core customers who perform tests closely aligned with the DTC mission. Recently, the Army's BCT Modernization program moved into facilities on WSMR and began initial testing of new system components designed for an integrated battlefield fighting force. The 49th Fighter Wing (located at Holloman AFB) uses restricted airspace and bombing ranges in the north part of WSMR. WSMR completed a *Final Environmental Assessment—2nd Engineering Battalion Transition, White Sands Missile Range, New Mexico* (Ref# 004), to support the stationing of a Combat Engineer Battalion (EN BN), which began arriving in summer 2008.

1.3 Overview of the Proposed Action

The Army proposes to augment its capabilities at WSMR to support future testing and expanded training missions. To accomplish this, the Army proposes changes in land use on WSMR to allow for expanded off-road maneuvering. The Proposed Action also includes land use changes to expand built-up areas for housing and community functions, infrastructure, mission support and administrative facilities to support a HBCT (or a comparable unit) at WSMR in the future. The Proposed Action would result in adoption of a flexible, capabilities-based Land Use and Airspace Strategy Plan able to accommodate rapidly evolving customer needs, support current and future mission activities, and support test and training efforts from individual components up through major joint and multinational programs.

This EIS examines two alternatives developed by the Army for meeting the requirements of the Proposed Action. Alternative 1 would implement land use changes and enhanced test capabilities at WSMR as described in the proposed Land Use and Airspace Strategy Plan. It would also provide for the expansion of the Main Post (built-up) area and Range Centers[3] for future development of facilities to support expanded test missions including maneuver-to-test. This expanded area also provides a buffer between the community and support functions on the Main Post from mission activities on the operational range. Alternative 1 also considers the future use of land for an additional impact area. In addition, six "specialized areas" for testing and training (each with specific functions) are also proposed under Alternative 1.

Alternative 2 would include the land use changes and specialized areas of Alternative 1 to support enhanced test capabilities. It would also allow for development of facilities to support stationing of a HBCT (or comparable unit) of approximately 3,800 Soldiers and provide for off-road maneuver for both testing and expanded training on WSMR in a newly designated specialized area called the Southeast Multi-Use Area. Additionally, this alternative addresses changes in personnel and population from stationing of a HBCT or comparable unit. In both alternatives, training units would use Fort Bliss gunnery and small arms ranges for all required weapons firing.

Both alternatives meet the purpose and need of the Proposed Action and are described briefly in Section 1.6 and in greater detail in Sections 2.3 and 2.4. The land use changes of the selected alternative would be reflected in a Land Use and Airspace Strategy Plan. This plan identifies land use classifications and activities as a framework for selecting suitable locations for future testing and training activities. The plan would also identify recommended criteria for siting activities and facilities to minimize conflicts with the environment and other installation uses. Incorporation of recommended criteria is intended to streamline the review and approval process and facilitate user access to installation resources. WSMR would adopt the plan and implement changes to land use and infrastructure commensurate with the alternative selected in the ROD.

[3] WSMR has four Range Centers that provide varying level of field support for remote activities away from the support services of the Main Post.

The EIS also evaluates the No Action Alternative, under which ongoing and previously approved programs and activities would continue, but where the proposed land use changes, expanded activities, and facilities development would not occur.

1.4 Purpose of the Proposed Action

The purpose of the Proposed Action is to:

- Provide adequate land and infrastructure to support a broad spectrum of existing and future testing and expanded training activities;
- Designate land areas for potentially high intensity ground training and testing operations in a manner that would pose minimal conflicts with other missions and provide long-term sustainability of range resources;
- Provide a land use and airspace management framework that, in conjunction with additional facility and range management processes, would help expedite the approval and coordination of new and expanded range and airspace activities (including expanded off-road vehicle and ground maneuvers) using practices for range sustainability; and
- Reserve adequate suitable land for facilities and infrastructure to support future test and expanded training missions (including associated civilian personnel, Soldiers and Families).

1.5 Need for the Proposed Action

1.5.1 RANGE MISSION REQUIREMENTS AND CAPABILITIES

To adapt successfully to evolving national security circumstances, the U.S. military must expand its capability to develop and test new equipment and systems for its fighting force; it must be able to train Soldiers in the use of these new items and rapidly move new technology and battlefield tactics into the active units, replacing older and less effective weapons and equipment. As part of this modernization, not only hardware, but also the organization and functions of combat units are undergoing change. The Army must also be able to deploy quickly and function in any battle environment around the world. With these goals in mind, the DoD is reconfiguring current technologies and fighting techniques in order to create long-range, highly mobile, integrated capabilities, able to operate either as a single or a modular unit. The Army is also balancing its need to train, deploy, and rotate troops in an ever-changing global environment, requiring greater flexibility to use available resources at installations both at home and abroad.

The Proposed Action is needed to support WSMR as a test range for rapid development and deployment of new systems in response to dynamic world conditions and national defense priorities. The Proposed Action is also needed to support Army restructuring by more fully utilizing WSMR land, airspace, and facilities. This includes use of its extensive land for more off-road vehicle maneuvers for test and training purposes. Over the long term, WSMR needs to continue supporting the evolving operational, infrastructure, training, and testing requirements of the Army and DoD.

1.5.1.1 Changes in Mission Requirements

To support the Army's needs, WSMR must be able to respond rapidly to evolving requirements of its test customers. Besides supporting the test mission, WSMR must support training and fielding of state-of-the art systems to units engaged directly in combat. At the same time, WSMR needs to sustain its range resources for the long term.

The Army must be able to test weapon systems and equipment and deliver them to combat Soldiers as quickly as possible. This involves testing of components and systems through all phases of development and operational performance. Tests must include more integrated and realistic scenarios, simulating actual wartime conditions; translating into test layouts that replicate distances and environments that are similar to the battlefield in various parts of the world; and changing test activity from isolated sites used for missile launching with large unoccupied safety footprints, to intensive on-the-ground tests involving multiple vehicles and mobile instrumentation. An example of this type of testing is BCT Modernization that tests components and systems from initial development to insertion into existing Army units. As part of this process, active-duty Soldiers participate in tests to provide input into situations they may encounter in combat. Following this process, these systems are introduced into the active combat units for use in combat (Ref# 005).

WSMR provides limited support for combat training, which includes training missions for multiple armed services and the Department of Homeland Security. The stationing of an EN BN at WSMR, beginning in the Summer of 2008, with final arrivals in 2012, has increased the need to provide training capabilities at the installation.

1.5.1.2 Land Use and Airspace Changes

The changes in the test and training needs of WSMR tenants and users require a change in range land use designations to make them more flexible and responsive to evolving missions. Specifically, the installation needs to support off-road activities and more multiple, overlapping uses, rather than discrete, dedicated areas, and more intensive activity than in the past.

To do this, WSMR would provide an additional 1.6 million acres available for off-road wheeled and tracked vehicle operations, except in areas with known operational or environmental constraints. Built-up areas need to be expanded at the Main Post and at existing Range Centers in the middle and north part of the installation to support additional personnel and facilities. It is estimated that an additional 7,000 acres are needed for built-up uses, including approximately 6,600 acres around the Main Post, infill of approximately 200 acres in and around Stallion Range Center, and 100 acres at one or two other support nodes on the installation. Expanding the built-up areas would minimize the potential for encroachment between non-compatible range development and operations with more intensive development (including living quarters). Other changes in land use are needed to accommodate projected new weapons impact areas (encompassing a total of approximately 2,000 acres) and provide for off-road vehicle operations in support of test programs as BCT Modernization or similar programs.

At this time, no changes are needed in the structure of WSMR's special-use airspace, although the existing restricted airspace is expected to be used more intensively.

1.5.1.3 Changes in Range Activities

The Proposed Action defines changes in activities to meet the following primary increases in Army test and training needs:

- Six new **Specialized Areas** that support a wider spectrum of test and training functions;
- Increased **off-road vehicle maneuvers** for test events and training missions;
- Increase in dynamic **surface and airborne weapons firing** from moving platforms engaging with fixed or moving targets;

- Use of more powerful **directed energy** systems and weapons, with more powerful microwave and radar systems, jamming (using electronic countermeasures), and changing laser system technologies; and
- Other, existing activities do not require substantial changes, though they may need to occur over larger areas, more frequently, or for longer durations.

The demand for range use by tenants and other customers at WSMR is increasing. "Hot" missions (potentially hazardous events) at WSMR nearly doubled between 2006 and 2008, primarily due to increased use of directed energy systems, and the Army estimates that directed energy missions could double again over the next 5 years. Other hot missions, such as missile launches and bomb drops, could increase by about 25 percent. Non-hot missions also are projected to double over the next 5 years, primarily in direct response to ground and communication checks for tests, EN BN training, range management, and Soldier qualification training.

1.5.1.4 Range Facility and Infrastructure Improvements

New and expanded test and training programs at WSMR and associated personnel increases create a need for additional mission support facilities and infrastructure. These include new and improved tank trails and roads, expansion of communications and fiber optic systems; and development of facilities at the Main Post, Range Centers, and other key locations on the installation. Particular test and training activities also need new specialized areas on the installation to better serve specific functions.

1.5.2 IMPLEMENTATION OF ENHANCED TEST CAPABILITIES

Alternative 1 focuses on expanding capabilities to support expanded test activities. To do this, WSMR needs the ability to upgrade and expand infrastructure throughout the installation, including new tank trails to support off-road maneuvering for tests, expanded Range Centers, and additional buried fiber optic cabling and utilities. The Land Use and Airspace Strategy Plan identifies several future capabilities and test and training facilities, of which a selection are considered in this EIS that are ready for implementation. Four of these are needed for test programs and two for training purposes, supporting current assigned units, tenants, and customers.

Increased test activity would bring some increase in civilian and contractor personnel. Most of these individuals would reside in nearby urban areas, either as new residents or on a transient basis. Test customers and tenants would use existing facilities on the Main Post (possibly renovated) to meet the majority of future needs. Development of expanded built-up areas is considered broadly, with the expectation that future projects would undergo siting review and approval prior to implementation.

1.5.3 IMPLEMENTATION OF STATIONING AND TRAINING FOR A LARGE MILITARY UNIT

Alternative 2 considers changes in equipment and vehicles, personnel, and facilities needed to support expanded training on WSMR. For the purposes of analysis in the EIS, this is based on the requirements of a HBCT. The stationing of a HBCT (or comparable or smaller units) at WSMR would result in an increase in personnel and equipment at WSMR. Implementing this decision requires additional facilities, infrastructure, and services and would result in additional operations, maintenance, and training activities.

1.5.3.1 Personnel Changes

A HBCT would bring approximately 3,800 additional military personnel to WSMR, and over 5,000 Family members to the region. The garrison would need over 2,000 additional civilian and contractor personnel to support the larger post population and mission. In addition, during the pre-stationing construction period, a temporary population of construction workers may move into the local area.

1.5.3.2 Development of Facilities and Infrastructure

Implementation of a HBCT beddown at WSMR would require over 3 million square feet (s.f.) of new construction on the Main Post. This includes administrative, operations, and maintenance buildings; unaccompanied and family housing; and roads, pavements, and utilities. This need would result in the development of approximately 1,000 acres of land in and around the Main Post, including a 300-acre future development area for the core HBCT facilities.

1.5.3.3 Heavy Brigade Combat Team Operations and Training

A HBCT would arrive with over 2,600 pieces of equipment, including wheeled and tracked vehicles and generators. These would operate in authorized areas throughout the installation (either on Fort Bliss or WSMR) and require fueling and maintenance.

Training by a HBCT (or comparable unit) would primarily involve live-fire weapons qualification and continuation training with a variety of weapons and off-road vehicle maneuvers with both tracked (such as tanks and personnel carriers) and wheeled vehicles. All live-fire training would take place at the extensive target and range facilities at Fort Bliss, as the Army has no plans at this time for providing additional firing ranges on WSMR to support training. Field training of a HBCT to current doctrinal standards requires extensive standoff distances between combat forces, situational awareness over large expanses of battlefield, and the integration of advanced weapon and sensor systems. As weapons systems and doctrine evolve, the need increases for Soldiers and units to train in more realistic conditions and on larger training areas. WSMR is one of the few Army installations of sufficient size to support expanding training requirements driven by changes in weapon systems and doctrine.

A HBCT requires approximately 88,000 square kilometer days (see Section 2.4.2.3 for definition) of maneuver training per year. This includes exercises of varying sizes at each organizational level, including platoon, company, battalion, and brigade level. Specific requirements for each unit type, including spatial needs and frequency, are defined in Training Circular 25-1, *Training Land*. The off-road maneuver activity of a HBCT has a total annual surface disturbance footprint (from wheels and tracks on the ground) of 148,000 acres. This maneuver training could take place on Fort Bliss, or on both WSMR and Fort Bliss, or another installation, as addressed under Alternative 2 (see Section 1.6).

The needs of a HBCT provide a notional concept for the extent and intensity of unit training on WSMR. Different units (such as Stryker or Infantry brigades) have aspects of their training that are different from a HBCT, and could require further evaluation if proposed for WSMR in the future. The timing of an actual beddown could also warrant further investigation of effects on local social and economic capacity.

1.6 Decisions to be Made

Pursuant to this EIS, WSMR will decide whether to adopt and implement changes in land use and capabilities at WSMR to allow for expanded testing and training, including more off-road vehicle maneuvering. The Army will consider and decide on expansion of built-up areas around the Main Post and Range Centers to accommodate more test users and potential training units, construction of range infrastructure and training ranges, and testing activities for future weapons and countermeasure systems. In addition, WSMR will consider and make decisions about expanding capacity and capability sufficient to implement a stationing of a HBCT (or comparable unit) at WSMR, including the associated personnel, operations and maintenance activities, and training. Two alternatives are being considered; one for providing off-road maneuvers for testing purposes only, and one to support off-road for testing and training for a HBCT. In making these decisions, WSMR will select among the following alternatives that are described in detail in Chapter 2:

- ***No Action Alternative.*** Under this alternative, current test capabilities and existing land use designations on WSMR would continue at current levels of operations and activities. The No Action Alternative includes several previously approved actions that are in various stages of implementation having already undergone NEPA evaluations, including, but not limited to:
  - Stationing of the EN BN on WSMR with training on Fort Bliss, which will result in approximately 700 new Soldiers and approximately 1,200 Family members residing on-post and in surrounding communities;
  - Expansion of the Main Post by 70 acres and construction of 310,000 s.f. of new facilities on the Main Post to support the EN BN, BCT Modernization, and other test programs; and
  - Initial testing for the BCT Modernization program in the southeast part of WSMR and other ongoing tenant programs.

  The No Action Alternative would not meet the purpose and need for the Proposed Action as described in Sections 1.4 and 1.5, and therefore is not considered a reasonable alternative. It is included in this EIS as required by CEQ Regulations for purposes of comparison to Alternatives 1 and 2.

- ***Alternative 1.*** The ongoing and previously approved projects and activities included in the No Action Alternative would continue under this alternative. In addition, land use designations would change and testing capabilities expanded throughout the installation to support new and evolving test requirements. Additional field training capability would be provided on WSMR, including the EN BN, which currently conducts its training at Fort Bliss. Live-fire training by the EN BN would continue to be performed at Fort Bliss. The main elements of Alternative 1 are:
  - All elements of the No Action Alternative;
  - Approval of proposed land use changes, including expansion of the Main Post and alterations in authorized uses of range areas, allowing for off-road activities, and future use of land for a new impact area;
  - Development of new and expanded infrastructure throughout the installation, and increase in the level of test activities;
  - Development of six new specialized areas (four for test operations, and two to support local military training on WSMR); and
  - Establishment of a Land Use and Airspace Strategy Plan and siting process for facilitating future tests and training activities at WSMR.

  This alternative meets the Army's purpose and need to expand capabilities to support future test missions, to allow for new on-the-ground test operations, and some expansion of training activities. It also would provide WSMR with a management framework for planning future mission activities using siting criteria and practices for long-term range sustainability.

- ***Alternative 2 – Implement Alternative 1 Plus Military Unit Stationing and Training Capability.*** In addition to the existing and proposed activities incorporated in the No Action Alternative and

Alternative 1, Alternative 2 would provide for expanded training, including the potential stationing of a HBCT (or comparable unit), with the capability to conduct off-road vehicle training at WSMR in a newly designated Southeast Multi-Use Area. This area would be used both for training and testing maneuvers. Off-road vehicle maneuver training would likely use a combination of WSMR and Fort Bliss training areas. Live-fire training by a HBCT or comparably sized, large military unit would be conducted at Fort Bliss. The main elements of Alternative 2 are:

- All elements of the No Action Alternative and Alternative 1;
- Construction of facilities on the Main Post for a HBCT (or comparable unit), including new Soldier and Family housing, schools, infrastructure, administrative facilities, other garrison support facilities, and expanded utilities; and
- Development of the Southeast Multi-Use Area (120,000 acres) for intensive off-road maneuvers for test and training.

This alternative supports the Army's purpose and need to provide flexibility and to increase capacity for both test and training at WSMR, including future stationing actions. This alternative also provides for physical development of facilities and infrastructure to support a large training unit and for repetitive heavy maneuver training in a designated portion of the installation.

The Army's Preferred Alternative is Alternative 1. Since the recent decision of the Army to not bring a HBCT to WSMR, the Army no longer needs the action to station and train a HBCT at WSMR under Alternative 2. The Army's preference for Alternative 1 best supports continued and future test and training at WSMR, as currently envisioned.

1.7 National Environmental Policy Act and Tiering Process

1.7.1 NATIONAL ENVIRONMENTAL POLICY ACT

Under NEPA, all Federal agencies must consider the potential environmental and socioeconomic consequences in their decision-making process. NEPA is intended to ensure that the environment is protected and enhanced through well-informed and carefully implemented Federal decisions. For this purpose, the CEQ was established by NEPA in order to oversee Federal policies during the process. In support of these goals, the CEQ issued Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act in 1978 (Ref# 006).

The proposed activities addressed by this EIS are considered a major Federal action and thus, must be addressed in accordance with the guidelines established by NEPA and the CEQ. The Army defines its policy and procedures for complying with CEQ regulations in 32 CFR Part 651, "Environmental Analysis of Army Actions."

1.7.1.1 National Environmental Policy Act Methodology

The U.S. Army Environmental Command (AEC) has developed a NEPA Analysis Guidance Manual (Ref# 007) that provides a comprehensive process for preparing NEPA documents and the method for analyzing impacts of Army actions. This analytical process allows a level of consistency in evaluating impacts and comparing impacts across installations to help with Army-wide decision-making. It also advocates a process for focusing analysis on areas where impacts are most likely to occur, considering the type of actions involved in a geographic context. A method described in the NEPA Analysis Guidance Manual was used for early internal "scoping" in order to rate each of the 14 Valued Environmental Components (VECs) typically addressed in Army NEPA analyses. Participants included subject matter experts at WSMR who have extensive knowledge of the various resources on the installation. The areas of air quality, airspace management, cultural resources, and soil erosion were rated "high" in terms of potential impact during internal scoping. The Programmatic EIS for Army Growth and Force Structure Realignment also concluded that the stationing of a HBCT could have potential significant impacts to cultural and water resources at WSMR (Ref# 002). Other issues and resources values that surface during the NEPA process are given the attention warranted to address potential impacts.

Cumulative impacts (see Section 4.19, Cumulative Impacts) are also evaluated to account for impacts that may occur considering all aspects of the Proposed Action in a wider context, both local and regional, and in combination with other major past, present, and future actions in the region. For this EIS, the potential cumulative impacts on socioeconomics (community services and education) and water resources were noted as potentially "high" during the internal scoping process.

1.7.1.2 Tiering Process

CEQ advises agencies to tier environmental documents to eliminate repetition and to focus the decision-making process on the salient issues at each level of review. Tiering is defined as the evaluation of general topics in broader-scope documents (i.e., "programmatic" documents), with subsequent narrowing of scope in subsequent documents (project, activity, or site-specific document). Narrower-scope documents still address broader scope topics, but expand focus on specific issues.

The decision to station a HBCT at WSMR was made pursuant to the *Programmatic EIS for Army Growth and Force Structure Realignment* (Ref# 002). Components of Alternative 1 of this Range-Wide EIS are tiered from the programmatic EIS, to consider site-specific impacts from the personnel changes, construction, operations, and potential training associated with the HBCT (or comparable unit).

This Range-Wide EIS addresses proposed land use changes and expanded capabilities that provide analysis to support current and future test and training activities at WSMR. One key objective of this EIS is to provide a framework and process for tiering analyses of future actions, once they are more fully defined (such as a proposal for a specific test facility, new test article, or launch platform), so that they can focus only on specific resources or issues of concern, thereby reducing the time and effort required to evaluate subsequent proposals and facilitate access to WSMR capabilities by current and future users.

This broad-scope EIS addresses proposed plans and actions with varying degrees of specificity. The Proposed Action includes several overarching land use and activity changes that are presented without specific details, but are analyzed broadly to cover the type of impacts that may result from such activities, and identify the types of measures that can reduce impacts. These actions are considered from a wide perspective, with the EIS providing information on limitations and practices that could be used to avoid significant impacts or, conversely, thresholds that could trigger significant impacts in specific future proposals. Together, the proposed changes comprise a range-wide envelope of development and activity analyzed in a wide-ranging context, such as hydrological basins, regional population, and public service areas; however, in certain cases, the specific impacts of developing particular sites (once defined) is deferred to a subsequent project- or activity-specific environmental analysis, tiered from the broad-scope EIS.

An important outcome of the final EIS will be a screening/decision process for determining the required level of NEPA documentation for future projects. Salient criteria of future proposals will determine whether the action fits under the umbrella of activities and actions analyzed in this EIS. For example, if a future action is the same or essentially similar to those covered in the EIS, no further environmental review may be needed; or in certain cases, a Record of Environmental Consideration (REC) might be prepared, describing the Proposed Action and explaining how the action fits under the umbrella of this

EIS. Other actions may require an Environmental Assessment (EA) or a tiered EIS focusing on resources of concern. The requisite level of analysis would depend on the extent of the action and the degree to which the proposal avoids or reduces potential significant impacts. Appendix A of this EIS provides a decision-making process for tiering future NEPA evaluation from this EIS.

As other actions are proposed in the future, the appropriate NEPA document (REC, EA, or EIS) may incorporate this EIS by reference. In addition, information gained in support of future actions will add to the body of knowledge used in WSMR's environmental decision-making process. In those instances, this EIS will serve as a resource for the preparation of project-specific NEPA documents.

1.8 Scope of the Environmental Impact Statment

This EIS evaluates the potential environmental impacts associated with the following components of the Proposed Action:

- Expansion of the type and/or frequency of testing activities on WSMR and development of range infrastructure to support those testing activities;
- Changes in land use designations;
- Expansion of the Main Post and other built-up areas to support testing, training, and stationing requirements as part of Army Transformation and the Army Campaign Plan;
- Stationing of a HBCT (or comparable unit) at WSMR;
- Development and use of new training ranges and maneuver areas;
- Subsequent amendments and updates to existing plans and management programs to reflect land use changes and expanded activities in the Main Post, Range Centers, and installation; and
- Implementing future actions (both testing and training) that are similar to those described in the Land Use and Airspace Strategy Plan framework and within levels of activities evaluated in the EIS.

The scope of this EIS is limited to the land and airspace shown in Figure 1.2-2. Activities conducted on Fort Bliss in support of WSMR programs, including training of the HBCT, are addressed in the *Final Supplemental Programmatic EIS, Fort Bliss Texas and New Mexico Mission and Master Plan*, 2007 (Ref# 037), which is incorporated by reference.

The 1998 *WSMR Range-Wide EIS* (Ref# 002) evaluated the programs functioning at WSMR at the time of its publication. Many of those (such as missile testing, nuclear, and electromagnetic effects; and high energy laser testing) are still the core workload at the installation. The Proposed Action of this 2009 EIS incorporates the continuation of ongoing activities and expands WSMR capabilities. It focuses on types of activities, land uses, and physical development needed to support the range-wide requirements of all users, rather than on individual programs.

WSMR also leases, owns, or operates from several land parcels. Only those that have recent or current activities are analyzed in this EIS. Specifically, Fort Wingate, operating as a sub-installation, is included to the extent and for purposes previously evaluated in support of missile programs at WSMR. Activities at other sites (i.e., Green River, Wilson Mesa, Abajo Peak, Cold Springs, Utah; Menefee Peak, Colorado; Shoofly, Idaho; El Huerfano, La Mosca Lookout Tower, Rose Peak, Alamo Peak, Alamo Lookout, SAC Peak, and Mule Peak, New Mexico) shown on Figure 1.2-3 have not occurred in recent years, and there are no current plans for WSMR to use these locations differently from current agreements. Similarly, WSMR has no plans to use the newly acquired lands in Mendiburu Ranch differently than they were prior to the change in ownership. Therefore, activities or programs at these locations are included in the No Action and alternatives analyzed in this EIS.

The three alternatives analyzed in this EIS incorporate ongoing and previously NEPA-approved activities at WSMR. Most of these actions are not reflected in the descriptions of the Affected Environment in Chapter 3 because they had not been implemented when data was generated. The previous NEPA analyses of those activities are incorporated by references and not repeated in this EIS. Specifically, the following NEPA documents provide information about ongoing and previously approved activities and are incorporated in this EIS by reference:

- Final Environmental Assessment for the MQ-1 Predator and MQ-9 Reaper Unmanned Aircraft System Second Formal Training Unit Beddown (2009)
- Supplemental Environmental Assessment for Joint Directed Energy Test Site (JDETS) on White Sands Missile Range, New Mexico (2008)
- Final Environmental Assessment—2nd Engineering Battalion Transition, White Sands Missile Range, New Mexico (2007)
- Final Environmental Assessment—Future Combat System Testing Initial Integration Phase Testing (2007)
- Final Programmatic Environmental Impact Statement—Defense Threat Reduction Agency Activities on WSMR, New Mexico (2007)
- Programmatic Environmental Assessment—Directed Energy Test Sites and Operations on WSMR (2007)
- Environmental Assessment—NASA Launch Abort System Test Project at U.S. Army White Sands Missile Range (2007)
- Environmental Assessment—Aeroacoustic Research Complex, White Sands Missile Range, New Mexico (2007)
- Environmental Assessment—Establishment of an Air-to-Ground Helicopter Gunnery Target Set at White Sands Missile Range, New Mexico (2007)
- Environmental Assessment—Proposed Training Ranges, White Sands Missile Range, New Mexico (2006)
- Final Environmental Assessment—Transforming the 49th Fighter Wing's Combat Capability - Holloman AFB (2006)
- Final Environmental Assessment—U.S. Navy Standard Missile Family Testing Program, White Sands Missile Range (2006)
- Environmental Assessment for U.S. Navy Standard Missile Family Testing Program (2006)
- Environmental Assessment—High Energy Laser Systems Test Facility (HELSTF) Enhanced Laser and Range Operations (2005)
- Programmatic Environmental Assessment—Non-Target Unmanned Aerial Vehicle (UAV) Testing on White Sands Missile Range (WSMR), New Mexico (2005)
- Programmatic Environmental Assessment—Surface-to-Surface Testing on White Sands Missile Range, New Mexico (2004)

- Final Supplemental Environmental Impact Statement—Airborne Laser Program, Kirtland AFB, White Sands Missile Range/Holloman AFB, New Mexico, Edwards AFB, Vandenberg AFB, California (2003)
- Supplemental Environmental Assessment for Impact Areas on White Sands Missile Range, New Mexico (2003)
- Environmental Assessment—Liquid Propellant Targets at White Sands Missile Range, New Mexico (2002)
- Environmental Assessment for Lee Impact Area, White Sands Missile Range, New Mexico (2002)
- Final Environmental Assessment—Medium-Range Surface-to-Air Missile Programs at WSMR, New Mexico (2000)
- Environmental Assessment for the Proposed Land Acquisition of Mendiburu Ranch in the Vicinity of White Sands Missile Range (1997)
- PATRIOT Advance Capability-3 (PAC-3) Life-Cycle Environmental Assessment (1997)
- Environmental Assessment for the Theater Missile Defense Hera Target Systems Program (1994)
- Final Environmental Impact Statement for the Aerial Cable Test Capability Project, White Sands Missile Range, New Mexico (1991)

Following the ROD, a number of proposed projects that have been programmatically addressed in this document (described in Chapter 2) would require environmental review should they move forward. These projects may include, but are not limited to:

- North-South Tank Trail Corridor
- Southern Connector Tank Trail Corridor
- Oscura Range Center Expansion
- Stallion Range Center Expansion
- Tank Trails to the Southeast Multi-Use Area
- Future Family Housing Complex and New Schools
- Training Support Center
- Battle Command Training Center
- Build out for a HBCT (or comparable unit)
- Electro-Optical .50 Caliber Range
- Joint Land Attack Defense Netted Sensor System
- Environmental Laboratory Complex
- Joint Urban Research, Development Test &Evaluation (RDT&E) Environmental
- Individual Combat Skills Area
- Local Training Area
- New Impact Areas

WSMR may address many projects through RECs in accordance with 32 CFR Part 651.29.

1.9 Public Involvement

1.9.1 SCOPING

On June 19, 2008, the Army published a Notice of Intent (NOI) in the Federal Register to prepare this EIS. The NOI initiated scoping, during which agencies, organizations, and individuals were invited to submit comments on the scope of the EIS, environmental issues to be addressed, and alternatives to be considered. The formal scoping period ended on August 8, 2008, though the Army continued to accept input to just prior to submission of the EIS in April 2009 (Ref# 008).

Public scoping meetings were held in Las Cruces, Socorro, and Alamogordo, New Mexico; on July 22, 23, and 24, 2008, respectively. Notifications of the scoping meetings were published in local newspapers during the week of July 14, 2008, as shown in Table 1.9-1. Notification letters were mailed to agencies and interest groups on July 18, 2008.

A poster session preceded the formal public scoping meetings. Public information displays and handouts were available providing information to facilitate public comment. During the formal portion of the meetings, the Army presented the purpose and need for the Proposed Action, described the alternatives identified for detailed analysis, and provided an overview of the EIS process and schedule. After the Army's presentation, attendees were invited to give oral comments.

Table 1.9-1. Dates and Publications of Scoping Meeting Notifications

Publication	Publication Date
El Paso Times	Sunday (7/20/2008)
Las Cruces Sun-News	Wednesday (7/16/2008) Saturday (7/19/2008) Sunday (7/20/2008)
Las Cruces Bulletin	Friday (7/18/2008)
El Defensor Chieftain	Wednesday (7/16/2008) Saturday (7/19/2008)
Alamogordo Daily News	Wednesday (7/16/2008) Sunday (7/20/2008)

Sixteen individuals attended the public scoping meetings and no one provided oral comments. Eleven written comments were received during the scoping period (including requests to receive the Draft and Final EIS). Comments focused primarily on the protection of natural and cultural resources, including:

- The Piro-Manso-Tiwa Indian Tribe requested that the EIS evaluate impacts on American Indian burial grounds (cultural resources);
- New Mexico Department of Game and Fish (NMDGF), Mesilla Valley Audubon Society, and USFWS shared concerns and recommendations for the protection of wildlife, protected species, vegetation, and habitat on WSMR (biological resources);
- NMDGF requested that the EIS evaluate cumulative impacts to natural resources and water quality/abundance (cumulative impacts and water resources); and
- Department of Interior, White Sands National Monument, shared concerns regarding impacts to the Monument and visitor tours (cultural resources and recreation).

WSMR met with the New Mexico State Historic Preservation Office (SHPO) in September 2008 to discuss the scope of the EIS and their concerns.

A summary of the scoping period and meetings is provided in Appendix C.

1.9.2 PUBLIC HEARINGS ON THE DRAFT EIS

On May 8, 2009, the Army issued a Notice of Availability (NOA) for the Draft EIS for the Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range. The NOA initiated the public comment period where members of the public (including Federal, State, and local agencies, affected federally recognized Indian tribes, and other interested persons) were invited to comment on the content of the Draft EIS (see Appendix D). As part of the NOA, comments and suggestions were requested to be received within the 45-day public comment period, which was extended by two weeks to July 6 due to technical problems with the WSMR website, limiting access to the Draft EIS via the internet. The NOA stated that public meetings would be announced in advance in local news media.

The NOA announced the release and availability of the Draft EIS. WSMR mailed letters to potential interested parties on May 5, 2009 and on June 2, 2009, a second mailing occurred to announce the extension of the comment period. Appendix D provides the distribution list.

Public comment meetings were held in Alamogordo, Las Cruces, and Socorro, New Mexico; on June 2, 3, and 4, 2009, respectively.

In addition to the NOA published in the *Federal Register*, WSMR published notices in five local newspapers during the weeks of May 4, 2009 and June 1, 2009, as shown in Table 1.9-2. The advertisements announced the availability of the Draft EIS and the public meetings; the June advertisements announced the extension of the comment period by two weeks. The public scoping period ended on July 6, 2009.

Table 1.9-2. Dates and Publications for Advertisements

Publication	Publication Date
El Paso Times	Friday(5/8/09) Wednesday (6/3/09)[1]
Las Cruces Sun-News	Friday (5/8/09) Wednesday (6/3/09)[1]
Las Cruces Bulletin	Friday (5/8/09) Friday (6/5/09)[1]
El Defensor Chieftain	Friday (5/8/09) Wednesday (6/3/09)[1]
Alamogordo Daily News	Friday (5/8/09) Wednesday (6/3/09)[1]

1. Publication of notice for the public comment period extension until July 6, 2009.

Each meeting began with an informal poster session, during which attendees were given informational handouts of the Proposed Action and Alternatives, and were able to view project-related posters. The informal open house was followed by a formal presentation that explained the NEPA process, the Purpose and Need for Agency Action, the Proposed Action and Alternatives, the proposed Land Use and Airspace Strategy Plan, notable impacts of the alternatives, potential mitigation measures, and the ways in which the public could submit comments on the Draft EIS. After the formal presentation, the public was invited to give oral comments. A court reporter was present at each meeting to ensure that anyone who gave verbal comments was recorded and legally transcribed.

Collectively, 15 members of the public attended the public meetings: three in Alamogordo, seven in Las Cruces, and five in Socorro. All attendees were invited to provide comments, either written or oral, on the Draft EIS. Comment sheets were made available for all attendees to provide written comments either at the meeting, or to be faxed or mailed to WSMR. An email address, a postal address, and a fax number were provided. The comment form allowed for individuals to request a copy of the Final EIS (hard copy and/or a CD).

Two members of the public provided oral comments at the three public meetings; ten written comments were received during the comment period. The majority of the commenters were concerned either with the decision not to station a HBCT at WSMR or the protection of natural resources in general.

- The USFWS provided several recommendations for mitigation measures, Best Management Practices (BMPs), and management actions that they would like to be included in the Final EIS.
- White Sands National Monument expressed concerns about several potential issues that could affect the monument including erosion, additional groundwater use, accidental off-road vehicle incursions onto monument land, and the preservation of the monument's viewshed.
- BLM provided several comments primarily concerned with describing BLM-administered lands accurately and addressing the potential impacts to those lands. BLM also expressed concern for impacts to oryx populations and management strategies from a decreased availability of WSMR land for hunting.
- NMDGF provided several comments primarily concerned with protection of vegetation and habitat, White Sands pupfish, migratory birds, and mitigation.

Appendix D provides a summary of the transcripts and responses to public comments received.

1.9.3 NATIVE AMERICAN CONSULTATION

The Draft EIS was send to the Native American Tribes in New Mexico and Texas whom may have an interest in activities at WSMR for their review and comment. The following Tribal Nations received copies of the Draft EIS: the Mescalero Apache, Ysleta del Sur Pueblo, Navajo, Comanche, Kiowa, and the Isleta Pueblo. No comments were received from the Mescalero Apache, Ysleta del Sur Pueblo, Comanche and Kiowa Nations. The Navajo Tribe stated that they had no interest in the region and did not wish to review the EIS. The Isleta Pueblo Tribes' Governor responded that they had no concerns with the Draft EIS.

1.10 Regulatory and Management Framework

1.10.1 REGULATORY FRAMEWORK

WSMR is subject to regulation by several Federal, state, and local agencies pursuant to a number of Federal environmental laws and Executive Orders (E.O.s) as well as Department of the Army Regulations, which are listed in Appendix B (see Table B-1). That table provides a brief description of laws, regulations, orders, and policies that are most relevant to the NEPA process; protection of environmental resources; and mission activities at WSMR.

1.10.2 MANAGEMENT FRAMEWORK

In addition to regulations that govern Federal actions, several plans and procedures are in place that form the foundation for land use management at WSMR and are common to all the alternatives considered in this EIS. Appendix B (see Table B-2) lists and briefly describes the Army and the WSMR regulations and directives that lay the foundation for planning and management of land resources.

The Land Use and Airspace Strategy Plan is appended to the Final EIS. If the plan is adopted in the ROD for this EIS, the plan would incorporate decisions and commitments made in the ROD and become part of the management framework for WSMR. It would incorporate siting considerations, BMPs, and mitigation measures identified through the EIS process. The plan would also describe WSMR's planning process for siting both temporary and permanent activities and facilities. As the Real Property Master Plan (RPMP) focuses on the development of the Main Post, the Land Use and Airspace Strategy Plan would serve as the initial definition of program needs for a future Range Complex Master Plan.

WSMR has an active environmental management program aimed at ensuring that operations, physical development, and test and training activities are performed in compliance with all applicable laws and regulations, and managed to provide a sustainable land base to support national security. WSMR manages installation natural and cultural resources to provide the best possible environment that sustains the military mission. This objective is met by developing plans and programs for land management that maintain, protect, and improve environmental quality, aesthetic values, and ecological relationships. The goals for these initiatives are reduced environmental damage, effective land rehabilitation, reduced costs for land management and environmental compliance, and enhanced land stewardship. Environmental resource management is coordinated with all planning efforts on WSMR, including the RPMP, Integrated Cultural Resources Management Plan (ICRMP) (Ref# 009), Integrated Natural Resources Management Plan (INRMP) (Ref# 074), Integrated Training Area Management (ITAM) Program (Ref# 221), and other compliance plans and agreements. All of these elements facilitate current land and resource management decisions on the installation. The following subsections describe the primary plans and programs that are currently in place.

1.10.2.1 Real Property Master Plan

Army Regulation (AR) 210-20 "Real Property Master Planning for Army Installations" establishes policies for implementing a master planning process on Army installations. The WSMR RPMP serves as a guide for current land use and future physical growth of the installation, focusing primarily on the Main Post area and other selected development areas such as the Stallion Range Center. WSMR strives to provide "continuing support for its RDT&E mission" while "providing for the morale and welfare of the personnel who work and/or live on WSMR." This Master Plan is updated as needed and lays out three major goals for the installation: 1) promote the most efficient and cost effective land use plan; 2) plan and coordinate development to ensure compatible land use growth and change; and 3) enhance and preserve the installation's visual, aesthetic and natural resources.

1.10.2.2 Integrated Natural Resource Management Plan

The Sikes Act (16 USC 670 et seq.) requires U.S. military installations that have significant natural resources prepare and implement an INRMP. Its purpose is to ensure that the natural resources are managed for multiple use, sustainable use, and biological integrity while complying with Federal stewardship requirements and legal mandates. The 18 goals for the installation in the current WSMR INRMP are listed in Appendix B, Table B-3.

1.10.2.3 Integrated Cultural Resource Management Plan

An ICRMP is required by DoD Instruction 4715.3 "Environmental Conservation Program" and AR 200-1 "Environmental Protection and Enhancement". The purpose of this document is to integrate mission activities with cultural resource programs (including historic buildings, artifacts, archeological sites, and sites of sacred or cultural interest to Native Americans) while at the same time complying with Federal law. The foundation for the management of the WSMR cultural resource management is detailed in the Programmatic Memorandum of Agreement (PMOA) established in 1985 between WSMR, the New

Mexico State SHPO, and the Advisory Council on Historic Preservation (Ref# 248). Standard Operating Procedures (SOPs) detailed in the ICRMP specify internal and external coordination procedures that help to ensure compliance with these cultural resources laws and the PMOA.

WSMR is in the process of developing a new Programmatic Agreement (PA) (Ref# 009) to govern installation compliance with Section 106 of the National Historic Preservation Act. Until the PA is completed and executed by all the consulting parties, the 1985 PMOA remains in force and the activities analyzed in the EIS must conform to the procedures outlined in the PMOA and ICRMP. Development of the PA is occurring in parallel with the EIS process, but may not be completed at the same time. The signed PA will incorporate agreements with the SHPO and other consulting parties, along with revised SOPs and goals.

1.10.2.4 Integrated Training Area Management

ITAM is a component of the Army's Sustainable Range Program and is responsible for maintaining Army lands in order to meet its training requirements. The ITAM program's purpose is to achieve optimal sustainable use by implementing a program that includes:

- Training Requirements Integration
- Range and Training Land Assessment
- Land Rehabilitation and Maintenance
- Sustainable Range Awareness.

The ITAM program on WSMR began in 1989 and has evolved and expanded. WSMR recently completed updating the 5-year ITAM and Range and Training Land Assessment plans through 2013, which develop a framework to integrate mission requirements with environmental sustainability. The ITAM plan incorporates all aspects of the four components and provides a roadmap on how to proceed. The Range and Training Land Assessment Monitoring Plan describes a process for inventory and monitoring of the natural resources on the installation. This information is in turn used within an adaptive management framework to assess range condition and promote sustainable use of the natural resources. Continuation of ITAM or a similar mechanism under the Sustainable Range Program is a necessary part of WSMR range management, and is particularly important to WSMR's ability to support and sustain future expansion of testing and training missions.

1.10.2.5 Other Environmental Compliance Plans

WSMR maintains a number of other various compliance plans. Key plans are described in Chapter 3, Existing Environment, within their respective resource sections.

1.11 Environmental Impact Statement Organization

This EIS is organized as follows:

- Chapter 1 provides background information about WSMR, describes the purpose and need for the Proposed Action, provides an overview of the alternatives under consideration, outlines the scope of the EIS, and describes the regulatory requirements governing Army planning and NEPA.
- Chapter 2 describes the process for defining alternatives analyzed in the EIS and describes the key components of each alternative in detail.

- Chapter 3 describes the existing environmental conditions on WSMR and the potentially affected environment.
- Chapter 4 describes the potential impacts and consequences of implementing the alternatives described in Chapter 2, when compared to existing conditions in Chapter 3. Chapter 4 also includes addressing cumulative impacts as well as potential mitigation measures associated with each alternative.
- Chapters 5, 6, and 7 provide a list of preparers of the EIS, the distribution list for the EIS, and a list of references used to prepare the EIS.
- Chapters 8, 9, and 10 provide a list of agencies and persons consulted during preparation of the EIS, a list of acronyms used in the EIS, and an index.

Appendices to the EIS include:

- Appendix A is the current draft Proposed WSMR Land Use and Airspace Strategy Plan;
- Appendix B provides a list of environmental statutes, regulations, and E.O.s relevant to the Proposed Action;
- Appendix C provides the Public Scoping Summary (includes NOI, Distribution List, Scoping Letters, Affidavits of Publication, Comments Received [public and agency comments], and Scoping Meeting Transcripts);
- Appendix D provides the Public Comment Summary;
- Appendix E provides a copy of the Final Biological Assessment (BA); and
- Appendix F provides lists of major vegetation map units and sensitive species found on WSMR.

1.12 Review of the Draft Environmental Impact Statement

The following is a summary of major changes made to this EIS since the issuance of the Draft EIS due to changes in the project alternatives, new information becoming available, the need to revise errors in the Draft EIS, and comments received on the Draft EIS.

<u>Chapter 1, Purpose and Need for the Proposed Action</u>:

- Section 1.1, "Introduction": The introduction was revised to indicate the Army's recent decision not to station a HBCT at WSMR. Also, this section was revised to state that the stationing of a HBCT at WSMR has been eliminated from Alternative 1 and the analysis has been moved entirely to Alternative 2, which would allow flexibility in terms of environmental analysis should rapidly changing DoD needs ultimately result in the stationing of a HBCT (or comparable unit) at WSMR in the future. As applicable, this change in Alternatives 1 and 2 has been reflected throughout the EIS. No other changes in the action alternatives have occurred since the publication of the Draft EIS.
- Section 1.2 "Background": Section 1.2.2 "WSMR Mission" was updated to indicate a recent DoD decision to change the name of the program "Future Combat Systems (FCS)" to "Brigade Combat Team (BCT) Modernization". As applicable throughout the EIS, the term FCS was changed to BCT Modernization.
- Throughout the EIS, Alternative 1 was named "Implement Land Use Changes and Enhanced Test Capabilities" and Alternative 2 was named "Implement Alternative 1 Plus Military Unit Stationing and Training Capability". Section 1.6 "Decisions to be Made" was updated to include the changes to Alternatives 1 and 2 and to indicate that the Army's Preferred Alternative is

Alternative 1. Section 2.7 "Preferred Alternative and Environmentally Preferred Alternative" is a new section that was added in the Final EIS to describe the selection of Alternative 1 as WSMR's Preferred Alternative.

- Section 1.9 "Public Involvement": Section 1.9.2 "Public Hearings on the Draft Environmental Impact Statement" is a new section in the Final EIS describing the public comment period on the Draft EIS.

Chapter 2, Description of the Proposed Action and Alternatives:

- Section 2.3 "Alternative 1": This section was updated to reflect the removal of the stationing of a HBCT (or comparable unit) from Alternative 1 as compared to the Draft EIS. Section 2.3 Alternative 1, Table 2.3-2 "Changes in Activities at WSMR under Alternative 1" was updated to indicate that for Off-Road Vehicle Use (other) "As many as 65 vehicles may operate concurrently…" as compared to the Draft EIS, which stated "As many as 32 vehicles may operate annually…".
- Section 2.3 "Alternative 1": Section 2.3.1.3 "Infrastructure and Facilities Construction" was updated to remove the discussion of HBCT facilities and include revised estimates of land area needs for new range center infrastructure, utility, and tank trail projects. Section 2.3.1.4.2 was revised to state that one site for the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System would be located on WSMR with potentially two additional sites in the region.
- Personnel numbers associated with Alternative 1 and 2 within Chapter 2 and the rest of the EIS were updated and rounded to the nearest 10.
- Section 2.5 "Measures Incorporated in the Alternatives to Reduce Adverse Impacts": Table 2.5-1 "WSMR Standard Procedures and Requirements for Range Users" was updated with an additional measure under Land Use and Aesthetics - Infrastructure to indicate that WSMR would continue to coordinate with White Sands National Monument on new projects within the viewshed of the monument that could affect its aesthetic value. The measure under Wildland Fire was deleted and replaced with "All wildfires shall be reported immediately to the WSMR Fire Department."

Chapter 3, Affected Environment:

- Section 3.2 "Land Use and Aesthetics": Section 3.2.4.3 "Bureau of Land Management" was updated with additional information regarding the Organ/Franklin Mountains Area of Critical Environmental Concern. Figure 3.2-2 was updated to show additional Wilderness Study Areas in the Organ/Franklin Mountains Area of Critical Environmental Concern. Section 3.2.5.1.8, "Dripping Springs Natural Area, Aguirre Springs Campground, and Organ Mountains and Organ Needles Wilderness Study Areas" was updated to include the Organ Mountains and Organ Needles Wilderness Study Areas.
- Section 3.5 "Cultural Resources": Table 3.5-3 "Geologic Time Scale" was updated with more accurate information regarding the geologic time scale.
- Section 3.7 "Biological Resources": Section 3.7.5 "Sensitive, Threatened, and Endangered Species" was updated with additional information regarding the southwestern willow flycatcher. Figure 3.7-2 "Special Natural Areas on WSMR" was updated to reflect Southwestern Willow Flycatcher Constraint Area data. Figure 3.7-3A "Wetlands and Water Features" was updated with new stream data near Salt Creek and labeling for Malpais Spring and Salt Springs were switched. Figure 3.7-3B was modified to reflect revisions made to the tank trail alignment around White Sands National Monument.

- Section 3.8 "Water Resources": Section 3.8.2.3 "WSMR Groundwater Resources" was updated based on the 2009 Draft Potable Water Resources Report.
- Section 3.11 "Hazardous Materials and Hazardous Wastes": Section 3.11.4 "Solid Waste Management and Recycling" was updated with additional information regarding the Otero-Lincoln County Regional Landfill. The annual amounts of recycled material were updated
- Section 3.12 "Facilities and Infrastructure": Section 3.12.2.1 "Main Post" was updated to include information from the April 2009 WSMR potable water, wastewater, and stormwater system reports.
- Section 3.13 "Transportation": Section 3.13.3.3 "Main Post Roadways and Parking" was updated with information from an April 2009 WSMR traffic study.

Chapter 4, Environmental and Socioeconomic Consequences:

- Chapter 4 "Environmental and Socioeconomic Consequences" was updated throughout each resource area as a result of moving the analysis of the stationing of a HBCT (or a comparable unit) from Alternative 1 to Alternative 2. New sections describing Heavy Brigade Combat Team Stationing and Main Post and Population Effects were added under Alternative 2 throughout Chapter 4. In addition, each mitigation section was updated with subheadings separating measures that would be associated with Alternative 1 with those of Alternative 2.
- Section 4.2 "Land Use and Aesthetics": Alternative 1, Section 4.2.3.1.1.1 "Conversion of Land from Primary Test Zone to Augmented Test Zone" was updated to indicate that vehicle tracks would leave visible scars on the land, which may cause minor impacts to the visual environment. Section 4.2.3.1.3 "Range Infrastructure" was updated to state that if, following final siting designs, the proposed North-South tank trail had to cross either White Sands National Monument or San Andres National Wildlife Refuge land, WSMR would enter into negotiations with the current landowner regarding acquisition of the land in question.
- Section 4.4 "Air Quality" was revised to reflect the revised population and infrastructure attributes of Alternatives 1 and 2, based on the change to move HBCT-related infrastructure and population to Alternative 2. Table 4.4-6 "Estimates of Construction-Related Emissions for Alternative 1" was revised to include estimated emissions for tank trail construction." Section 4.4.5.1 "Potential Management Practices" revised the bullet on dust suppressants to "Dust suppressants should be used to control dust emissions when possible. Contact Environmental Compliance for guidance on the correct dust palliative for the specific operation." "Measures for Reducing Impacts", Section 4.4.5.3.1 "Alternative 1" was updated with revised mitigation measures. Section 4.5 "Cultural Resources": "Mitigation Measures", Section 4.5.5.3.2 "Alternative 2" was updated with additional information on mitigation measures.
- Section 4.6 "Earth Sciences": "Alternative 1", Section 4.6.3.1.4.6 "Local Training Area" was revised to indicate a range of potential impact characterizations from minor to moderate as a result of the use of the Local Training Area. Section 4.6.5.3 "Mitigation Measures" was updated with additional measures related to soil conservation.
- Section 4.7 "Biological Resources": "Alternative 1", Section 4.7.3.1.2 "Range Activities and Levels of Use" was updated with revised information on the WSMR hunting program and oryx population control. Alternative 1, Section 4.7.3.1.2.1 "Ground Operations" includes a statement that the US Fish and Wildlife Service has concurred with the determinations in the Final Biological Assessment. Alternative 1, Section 4.7.3.1.3 "Range Infrastructure" was updated with revised information on the siting of the proposed North-South tank trail and the impact potential on White Sands Pupfish Limited-Use Habitat. Alternative 2, Section 4.7.4.1.1.3 "Impacts to Sensitive, Threatened and Endangered Species" was updated with information on potential

impacts to the southwestern willow flycatcher. Section 4.7.5.2 "Recommended Management Actions" was updated with an additional action related to the protection of sensitive grassland habitats. "Measures for Reducing Impacts", Section 4.7.5.3 was updated with additional information on mitigation measures (for vegetation and White Sands pupfish impacts, Integrated Natural Resources Management Plan updates, and resources for monitoring and mitigation implementation).

- Section 4.8 "Water Resources": Section 4.8.5.1 "Potential Management Practices" (under the Infrastructure heading) was updated with an additional practice regarding the design of roads that cross arroyos. "Mitigation Measures", Section 4.8.5.3.1 "Alternative 1" was updated with an additional mitigation measure concerning coordination with White Sands National Monument on projects potentially to prevent flooding events from washing unnatural debris onto monument land.
- Section 4.11 "Hazardous Materials and Hazardous Waste": No Action Alternative, Section 4.11.2.2 "Main Post and Population Effects", was updated with a revised estimate of waste receipt by the Otero-Lincoln County Regional Landfill. Section 4.11.4.1.1 "Construction" was updated with a revised estimate of waste receipt by the Otero-Lincoln County Landfill. Also, additional information about proposed facilities that would store hazardous materials was included., Section 4.11.4.1.2 "Main Post and Population Effects" was updated with revised estimates of WSMR domestic waste generation and the impact assessment to the Otero-Lincoln County Regional Landfill was revised to moderate (from significant in the Draft EIS).
- Section 4.12 "Facilities and Infrastructure": This section was updated throughout, as applicable, to include the results of a series of recent preliminary studies on WSMR's utilities infrastructure. Section 4.12.5 "Measures for Reducing Impacts" and Section 4.12.5.3 "Mitigation Measures" was updated to remove the discussion of a potential desalination plant as a recent water resources analyses has deemed one would not be necessary. The mitigation measure for revising the digging permit process relative to field activities was moved to Section 4.12.5.2 "Recommended Management Actions".
- Section 4.13 "Transportation": Text relating to the previously proposed rail spur between Fort Bliss and WSMR was deleted.
- Section 4.16 "Energy": Energy use associated with Alternatives 1 and 2 was updated with revised calculations of estimated energy use based on revised population numbers due to the move of the HBCT stationing to Alternative 2.
- Section 4.19 "Cumulative Effects": Cumulative effects was updated throughout to reflect the changes in Alternatives 1 and 2. Unless otherwise noted, the analyses presented in the Draft EIS have remained the same and text has been moved from Alternative 1 to Alternative 2 sections as applicable. Table 4.19-1 "Past, Present, and Future Actions" was revised with additional activities. Section 4.19.2.3 "Air Quality", Section 4.19.2.3.2 "Greenhouse Gas Emissions" is a new section in the Final EIS, which describes potential cumulative impacts of WSMR's projected greenhouse gas emissions under Alternatives 1 and 2.
- Section 4.20 "Mitigation Summary": Table 4.20-1 Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative was updated based on the revised analyses throughout the various resource sections of Chapter 4.

Appendix A, Land Use and Airspace Strategy Plan:

- General: throughout Appendix A text was updated to indicate a recent DoD decision to change the name of the program “Future Combat Systems (FCS)” to “Brigade Combat Team (BCT) Modernization”.
- Chapter 4 “Current Land Use”: Section 4.3.2 was updated throughout to reflect recent sighting of the southwestern willow flycatcher habitat and a new constrained area.
- Chapter 5 “Future Land Use”: Section 5.1 “Input to Future Vision” was updated to remove text that was duplicative. Table 5-1 “Future Capabilities - Land and Airspace Requirements” was updated to indicate that the capability "hypersonic flight/projectiles originating off-range" is "new" not "existing" as was stated in the Draft EIS.
- Chapter 5 Future Land Use, Section 5.2 Future Land Use Map, Figure 5-1 Future Land Use in the LUASP Focus Area and Figure 5-3 Proposed Specialized Area- Southeast Multi-Use Area were updated to show a revised alignment for the proposed tank trail.
- Chapter 6 “LUASP Implementation”: Figure 6-1 “WSMR Environmental Review Process” was updated to illustrate a revised process. Table 6-3 “WSMR Standard Procedures and Requirements for Range Users” was updated with revised procedures and requirements. Table 6-4 “Activities Assessed in the Range-Wide EIS” is a new table describing activities assessed in the Final EIS and activities requiring further environmental review. Section 6.2 “Review, Approval and Scheduling Process” was updated with revised information on WSMR's project review and approval process.

Other Appendices:

- Appendix B “WSMR Environmental Review Process Guide” was removed in the Final EIS and applicable portions related to future NEPA tiering have been incorporated into Appendix A Land Use and Airspace Strategy Plan. Appendices C through G of the Draft EIS were re-lettered B through F, respectively.
- Appendix D “Public Comment Summary” was completed with information concerning the public comment period on the Draft EIS.
- Appendix E “Draft Biological Assessment” is now the “Final Biological Assessment”. The Final Biological Assessment was updated with new information, particularly with respect to the recent observation of the federally endangered southwestern willow flycatcher at WSMR. The US Fish and Wildlife Service concurrence letter was added to this appendix.
- Appendix G “WSMR Major Vegetation Map Units and Sensitive Species” was updated to include the recent observation of a federally endangered southwestern willow flycatcher at WSMR.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

As stated in Section 1.3, the Army's Proposed Action is to augment its capabilities at WSMR to support future testing and expanded training missions. To accomplish this, the Army proposes changes to land use on WSMR to allow expanded off-road maneuvering. The Proposed Action also includes land use changes to expand built-up areas for housing and community functions, infrastructure, mission support, and administrative facilities to support a HBCT (or comparable unit) at WSMR in the future. The Proposed Action would result in adoption of a flexible, capabilities-based Land Use and Airspace Strategy Plan to accommodate rapidly evolving customer needs, support current and future mission activities, support test and training efforts from individual components up through major joint and multinational programs.

This chapter describes the alternatives considered in detail in this EIS to achieve the Proposed Action. It includes the No Action Alternative, Alternative 1, and Alternative 2, as well as discussions of measures incorporated to reduce adverse impacts, alternatives considered and dismissed from detailed studies in this EIS, and identification of the Preferred Alternative and Environmentally Preferred Alternative.

The basic elements of the three alternatives include:

<u>No Action Alternative:</u>

- Current test capabilities and existing land use designations at current levels of operations;
- Continued stationing of the EN BN on WSMR with training on Fort Bliss, which would result in approximately 700 new Soldiers and approximately 1,200 Family members residing on-post and in surrounding communities;
- Continued expansion of the Main Post by 70 acres and construction of 310,000 s.f. of new facilities on the Main Post to support the EN BN, FCS (now BCT Modernization), and other test programs; and
- Initial testing for the BCT Modernization program in the southeast part of WSMR and other ongoing tenant programs.

<u>Alternative 1, Implement Land Use Changes and Enhanced Test Capabilities (Preferred Alternative)</u>:

- All elements of No Action Alternative;
- Approval of proposed land use changes, including expansion of the Main Post and alterations in authorized uses of range areas, allowing for off-road vehicle use for test maneuvers;
- Development of new and expanded infrastructure throughout the installation, and increase in the level of test activities;
- Development of six new specialized areas (four for test operations, and two to support military training); and
- Establishment of a Land Use and Airspace Strategy Plan and siting process for facilitating future tests and training activities at WSMR.

Alternative 2, Implement Alternative 1 Plus Military Unit Stationing and Training Capability:

- All elements of Alternative 1 and the No Action Alternative;
- Construction of facilities on the Main Post for a HBCT (or comparable unit) within a 300-acre Future Development Area, including new Soldier and family housing, schools, infrastructure, administrative facilities, other garrison support facilities, and expanded utilities; and
- Development of the Southeast Multi-Use Area (120,000 acres) for intensive off-road maneuver for test and training.

2.2 No Action Alternative

The No Action Alternative includes on-going and previously approved (under the NEPA process) testing, training, and infrastructure/facility construction activities at WSMR. As noted in Section 1.8, this EIS incorporates the NEPA documentation for these actions by reference. The No Action Alternative differs from existing conditions and operations at WSMR presented in Chapter 3, in that it includes actions that have been evaluated and approved recently, or are underway but not fully implemented. In particular, the stationing of the EN BN at WSMR began with the first Soldiers arriving in Summer 2008; however, the full complement of Soldiers and their Families would not arrive until 2010. Therefore, the 2007 and 2008 baseline environmental and socioeconomic data at WSMR do not reflect the full extent of the projected population and mission change. Similarly, the transformation of the 49th Fighter Wing at Holloman AFB is underway, but as of yet, the full fleet of F-22A aircraft have not yet arrived at Holloman AFB nor begun training on WSMR.

To provide a meaningful comparison of alternatives, the No Action analysis in this EIS accounts for these changes occurring under the No Action Alternative. The assessment of the No Action Alternative summarizes the combined effects of these projects as they are scheduled to occur. For example, the 2007 published air emission reports do not reflect the planned EN BN facilities or mission elements. Consequently, the baseline under the No Action Alternative for air quality (Section 4.4.2) includes extrapolated air emission values for the year 2013 (that reflects the full arrival of the EN BN) in order to compare the differences among the alternatives more accurately.

2.2.1 RANGE CAPABILITIES AND USE

2.2.1.1 Range Land Use

Under the No Action Alternative, WSMR would continue to use its land and airspace resources as it does currently. WSMR has developed a Land Use Classification system to assist in range[1] use planning (see Appendix A). The classifications primarily reflect the administrative status of land areas and overlying airspace and the associated limitations on use. Table 2.2-1 lists 17 discrete Land Use Classifications involving various combinations of land status and airspace designation at WSMR**.** Figure 2.2-1 shows the locations of these Land Use Classifications.

WSMR employs a multi-disciplinary process to review and approve specific programs and activities within each land use classification. This process includes safety and environmental reviews. Range sustainability is a critical factor in preserving WSMR's testing and training capabilities and assuring military readiness for the Army. The WSMR Environmental Division in coordination with WSMR's ITAM Program (see Section 1.10.2) identifies requirements, BMPs, and conditions for range activities.

[1] The word "Range" may be part of a name, in which case it is capitalized as in "White Sands Missile Range", referring to the entire installation, It may also refer to a smaller discrete area within the installation that is used for a specific purpose, but referred to generically, such as a "weapons firing range" or "bombing range", in which case it is not capitalized. Similarly, it may be used as an adjective, as in the case noted above, to refer to activities and uses on a range (either of the above examples). At WSMR, a distinction is also made between the Main Post and areas outside the Main Post that are referred to as "the range".

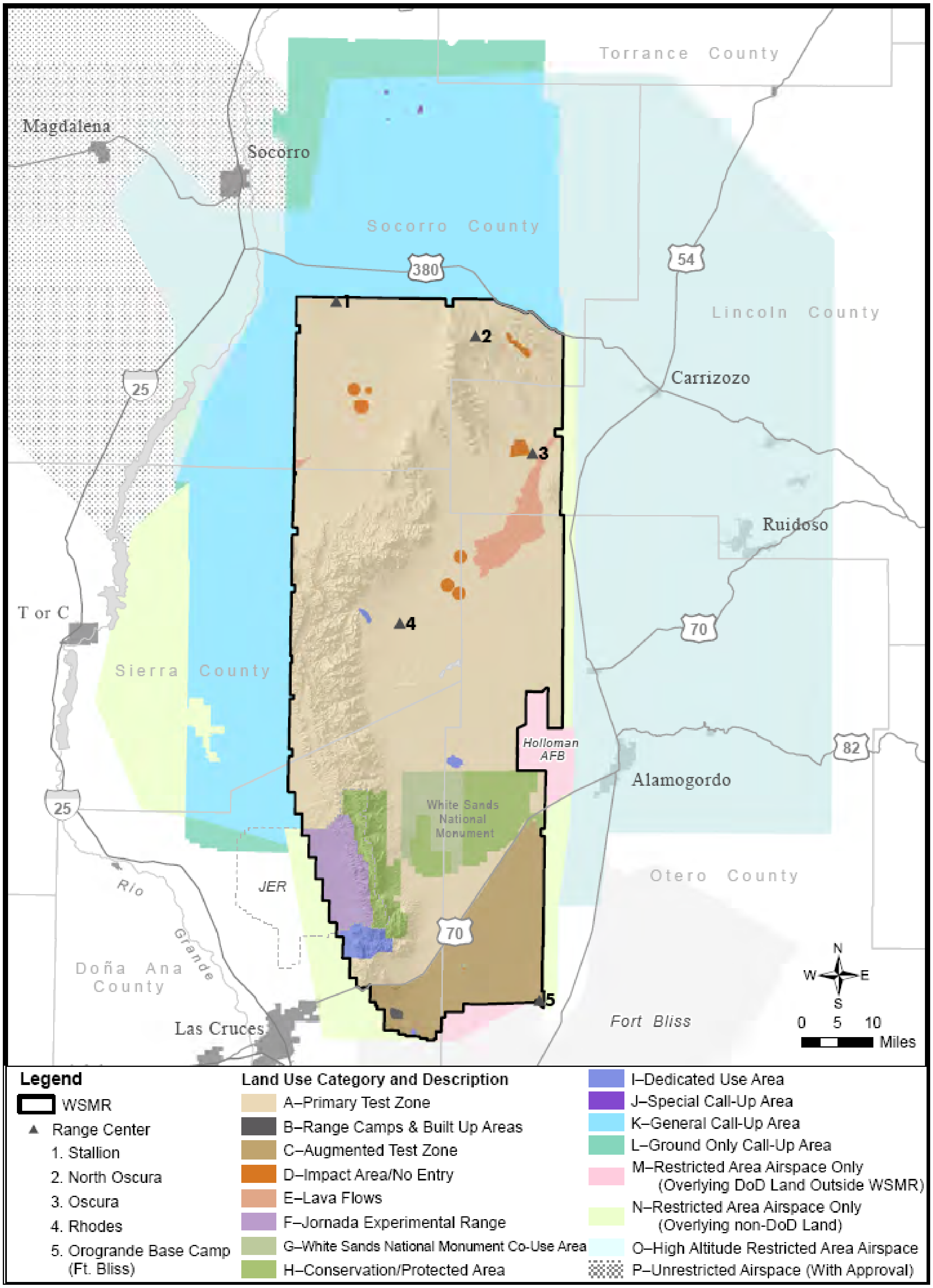


Figure 2.2-1. Current Land Use Classifications

Table 2.2-1. Land Use Classifications at the White Sands Missile Range

Land Use Classification	Title	Description
A	Primary Test Zone	WSMR land used to support a variety of test and management activities; approved for lightweight off-road vehicle use; divided into sub-areas for planning purposes, may include hazardous activities with scheduled deconfliction of other uses.
B	Range Centers and Built-Up Areas	Includes Main Post and Stallion, Rhodes Canyon, Oscura, North Oscura Range Centers, and Orogrande Base Camp; physical development of the Main Post is addressed under a separate planning process.
C	Augmented Test Zone	Same uses as classification A, plus off-road activity by heavier tracked and wheeled vehicles, subject to archaeological survey and environmental approval. Portions may be excluded from use for environmental conditions such as slope, soil type, habitat sensitivity, or presence of cultural sites.
D	Impact Area	Active impact area with Unexploded Ordnance (UXO) hazard. Entry limited to Explosive Ordnance Disposal (EOD) or approved personnel.
E	Lava Flows	Uses limited by geologic context; not suitable for heavy vehicles.
F	Jornada Experimental Range	Uses governed by MOU with the U. S. Department of Agriculture for co-use; WSMR use as safety fan area for conducting testing mission. WSMR uses include fire protection, clearing mission-related debris and removal of UXO as needed, and scheduled evacuations for test missions. MOU may be revised based on WSMR mission needs and consultation process. JER uses primarily related to environmental stewardship, agricultural research, and land management. Both parties may construct facilities and structures, roads, and infrastructure with mutual review; but WSMR has mission priority.
G	White Sands National Monument Co-Use Area	Uses governed by MOA and Interagency Agreement; military and test uses included temporary location of mobile instrumentation on existing roads, removal of debris, duds and UXO. New test-related development discouraged, and no planned (test) impacts permitted; WSMR adheres to National Park Service regulations; access by Monument personnel allowed except during missile test activity or for national security purposes.
H	Conservation/Protected Area	Areas off-limits to ground activity; includes SANWR, White Sands National Monument (excluding WSMR Co-Use area-see Classification G). Access and use restricted by MOUs and agreements.
I	Dedicated Use Area	Within WSMR boundary, reserved for exclusive use of one user. Includes NASA WSTF, National Radar Test Facility, Nuclear Effects complex, and Radar Cross Section Advanced Measurement System site.
J	Special Call-Up Area (within Restricted Area airspace)	Periodic evacuation during missile firings; limited ground use such as launch sites and impact areas subject to special agreements with land owners.

Table 2.2-1. Land Use Classifications at the White Sands Missile Range (continued)

Land Use Classification	Title	Description
K	General Call-Up Area (within Restricted Area airspace)	Periodic evacuation during missile firings; subject to agreements with landowners.
L	Ground Only Call-Up Area (outside Restricted Area airspace)	Periodic evacuation during missile firings subject to agreements with landowners. No surface use.
M	Restricted Area Airspace Only (overlying DoD land outside WSMR and call-up areas – from surface)	Airspace use in accordance with Federal Aviation Administration (FAA) regulations, by Notice to Airmen (NOTAM). WSMR conducts weapons firings using facilities at Holloman AFB and Fort Bliss following procedures, approvals, and restrictions of those installations.
N	Restricted Area Airspace Only (overlying non-DoD land and outside call-up areas – from surface)	Airspace use only, in accordance with FAA regulations, by NOTAM. No surface use.
O	High Altitude Restricted Area Airspace (outside DoD land and call-up areas)	Airspace use only above Flight Level 240, in accordance with FAA regulations, by NOTAM.
P	Unrestricted Airspace (with approval)	Intermittent airspace use, in accordance with FAA regulations, for weapons fired from off-range.
Q	Non-Contiguous WSMR Land	Includes areas such as Green River, Fort Wingate, and leased areas that contain instrumentation sites.

The specific measures required of individual missions and activities depend on the nature, intensity, timing, and geographic location of the proposed activity. The Land Use and Airspace Strategy Plan (Appendix A) describes the implementation of the activity planning process in more detail.

2.2.1.2 Range Activities and Level of Use

As a component of the MRTFB, WSMR's primary resources are its extensive land area and airspace (see Section 1.2), coupled with specialized facilities, installation instrumentation, installation infrastructure, and technical support services. These resources provide capabilities to support a variety of test mission activities focused on RDT&E, with limited training missions. The WSMR Capabilities Handbook (Ref# 126), the WSMR 1998 Rangewide EIS (Ref# 001), and various environmental documents prepared for test programs describe the wide spectrum of physical assets, facilities, instrumentation, and services available on WSMR.

Historically, WSMR has been a test range, focusing on short to extended range missile programs (involving use of specialized areas, surface and airborne weapons firing, with both temporary surface and Airspace Danger Zones). WSMR has also supported operations at specialized facilities and test beds[2], such as electromagnetic radiation, nuclear effects, and directed energy testing. Currently, intermittent off-road uses to support testing are limited to areas south of US 70. WSMR additionally supports Air Force

[2] A test bed is a complex of facilities that provide a capability to support specific types of tests.

training operations using restricted airspace and bombing ranges on WSMR. More recently, WSMR has supported on-the-ground and combat skills training on discrete training sites.

Both hazardous and non-hazardous activities occur daily at WSMR. Hazardous activities are activities that can pose a safety hazard to personnel and include weapons firing, bomb drops, hazardous lasers, and similar operations. Most activities are non-hazardous, involving installation management, test setup, calibration of equipment and communication systems, and "dry runs". All hazardous activities performed on WSMR are subject to applicable regulations, review, and approval. WSMR plans test events carefully to meet requisite ground and flight safety criteria. Radio frequency (RF) operations are coordinated, and applicable frequency assignments and limitations are established prior to use.

Any new test or training proposal has a Range Sponsor who is the point of contact for a process involving planning, review, and coordination. The sponsor assists the proponent with describing and planning all aspects of the proposal so that all activities comply with WSMR procedures and regulations. Depending on the mission, this process may include a safety analysis, flight termination system planning, spectrum management, hazardous materials and waste management planning, construction and siting review, and environmental review.

Table 2.2-2. Activity Categories

Activity Category	Description
On-Road Vehicle Use	Travel on established roads and trails (both paved and unpaved) by wheeled and/or tracked vehicles within the design limitations of the roadway; may include parking of vehicles along shoulders or prepared surfaces (e.g., gravel, asphalt pad).
Off-Road Vehicle Use (lightweight)[3]	Off-road vehicle use for test, training, data acquisition, range management, or recovery operations involving vehicles with minimal environmental impact. Limited to vehicles with maximum loaded weight of 1,500 pounds; speed limited to maximum of 25 miles per hour.
Off-Road Vehicle Use (other)	Manned or unmanned off-road vehicle use involving either wheeled or tracked vehicles (greater than 1,500 pounds and over 25 miles per hour) for test, training, data acquisition, range management, or recovery operations.
Dismounted Operations	Pedestrian activities such as foot Soldier maneuvers, personnel in field for test set-up and breakdown, environmental conservation actions, recovery operations – without digging.
Field Operations	Dispersed activities (generally on foot or all-terrain vehicles) that may involve ground disturbance, for example, digging to place sensors, digging foxholes, bivouacking, post mission retrieval of weapons debris (outside of impact areas). Portions may be excluded from use due to environmental or other constraints such as slope, soil type, habitat sensitivity, cultural sites, or UXO hazards.
Surface Weapons Firing (surface-to-surface, surface-to-air)	Firing/release of live or inert munitions or countermeasures. Includes use of direct and indirect fire weapons both at discrete firing ranges, or firing from fixed or moving platforms on the ground into a designated impact area. Includes use of munitions (bombs, grenades, and artillery), missiles, rockets, approved chemical stimulants, and smoke and obscurants. Firing can be accomplished via a fixed, mobile, or temporary launch site.

3 "Lightweight", as defined, has been used for the purposes of this EIS and planning at WSMR.

Table 2.2-2. Activity Categories (continued)

Activity Category	Description
Airborne Weapons/Munitions Release (with evacuation)	Firing weapons (munitions, missiles) from airborne platform such as fixed or rotary wing aircraft, balloon, rocket, unmanned air vehicles/air systems (UAS), or spacecraft at air or ground targets. Also includes carrying and release of air-launched targets, airdrop of sensors/equipment from air vehicles. Requires underlying land to be evacuated.
Airborne Weapons/Munitions Release (without evacuation)	Release from airborne platform of approved chaff and flare types, balloons, specified smoke and obscurants, and other weapons or munitions not requiring evacuation of underlying land. Includes carrying of weapons but not in armed mode.
Directed Energy Systems	Activities involving use of non-ionizing RF radiation including directed energy threats [lasers, high-powered microwave, electromagnetic spectrum (to include wide-band, ultra wide band and narrow band RF sources)]; unconfined use of directed energy weapons, devices, and countermeasures; requiring spectrum management. Uses may include tracking systems and radars, threat systems and jamming (including global positioning system [GPS] bands). Includes ground-based or air platforms such as air-to-air airborne laser (ABL), and air-to-ground advanced tactical laser (ATL). Includes operations at indoor (confined) and outdoor directed energy test beds.
Instrumentation and Communication Systems	Use of electromagnetic and other systems (emitters, radars, microwave equipment, target control, telemetry, optical tracking, communication systems) that are non-hazardous due to either power output or distance; simulated target acquisition; signal intelligence operations that support mission activities.
Weapons Impact	Use of targets for munitions impact with potential for safety hazard during impact events and from UXO. Confined to specified areas. This category includes removal of all hazardous debris either immediately after mission or on periodic clean-up schedule. Includes Phase II[4] and Phase I[5] Weapons Impact Target sites. Limited access only for persons with requisite training in the hazards of UXO.
Surface Danger Zone	Creation of safety hazard within specified safety footprint during use requiring evacuation of personnel on the ground. May be from ground-based (e.g., surface-to-surface or surface-to-air missile firing or other munitions) or airborne (air-to-ground bombing) activity.
Airspace Danger Zone	Creation of safety hazard to non-participating aircraft requiring Restricted Area airspace. Hazard may be created by ground-based or airborne weapon/system. Assumes no surface hazard but may be combined with Surface Danger Zone (SDZ) if surface hazard also exists.
Air Vehicle Operations	Airspace use by fixed wing, rotary, UAS, full and sub-scale drones, space vehicles, or balloons requiring special-use airspace.

4 Phase II impact areas are designated as Warhead Impact Target areas and are specifically designed for testing tactical configuration submunitions where the fusing system will detonate the lethal mechanism as intended in the productive configuration design. The submunitions tested in these impact areas are lethal (live). Recovery or any type of handling is normally not allowed, with dud munitions being exploded in place. These areas are maintained in a bare ground (bladed) condition. The Phase II impact areas are also used to conduct insensitive munitions testing in accordance with MIL-STD-2105 on special items, warheads with multi-cargo lethal payloads, smart munitions, or munitions exceeding specified total explosive weight limits.

5 Phase I impact areas are used exclusively to test submunitions that have live detonators in the fusing system, but contain an inert main charge, telemetry-type-submunitions, totally inert submunitions with no detonators in the fusing system, or mass model type submunitions. The submunitions tested in these impact areas are non-lethal; recovery and analysis are allowed. These areas are generally maintained in a mowed grassland condition.

Safety analysis considers any hazards associated with the mission and defines the size of any area that needs to be cleared of non-participating persons and aircraft. The spectrum management process evaluates potential conflicts between wavebands (and power levels) used by the test mission with those used by WSMR range control, other users on the installation, and commercial and public wavebands and uses. Areas approved for mission activities may be limited, if there are ground safety concerns (such as UXO hazards) or environmental constraints. For example, critical protected habitat and cultural and archaeological sites are generally off-limits to surface activities. Restrictions may also apply to reduce dust or emissions generated by mission activities. The geographic extent of particular constraints may change over time, based on new information or naturally occurring conditions.

For areas not managed by WSMR (including the non-DoD inholdings), only activities that are approved through existing agreements are specified in Table 2.2-3. These areas, such as Holloman AFB, support a wide variety of activities that are available to WSMR through appropriate coordination and permissions. The table also indicates what land use areas allow development of facilities and Specialized Areas to support mission activities on WSMR.

Table 2.2-3. Activity Categories by Land Use Classification

Land Use Classification	**On-Road Vehicle Use**	**Off-Road Vehicle Use (lightweight**	**Off-Road Vehicle Use (other)**	**Dismounted Operations**	**Field Operations**	**Surface Weapons Firing**	**Airborne Weapons Release (with evacuation)**	**Airborne Weapons Release (without evacuation)**	**Directed Energy Systems**	**Instrumentation and Communication Systems**	**Weapons Impact**	**Surface Danger Zone**	**Airspace Danger Zone**	**Air Vehicle Operations**
A-Primary Test Zone[1,2]	●	●		●	●	●	●	●	●	●	●	●	●	●
B – Range Centers and Built-Up Areas[1,2]	●	●		●	●			●	●	●		●	●	●
C – Augmented Test Zone[1,2]	●	●	●	●	●	●	●	●	●	●	●	●	●	●
D – Impact Area							●	●		●	●	●	●	●
E – Lava Flows		●		●	●		●	●	●	●		●	●	●
F – Jornada Experimental Range[1]	●			●	●		●	●	●	●		●	●	●
G – White Sands National Monument Co-Use Area							●	●		●		●	●	●
H – Conservation /Protected Area							●	●	●	●		●	●	●
I – Dedicated Use Area[1,2]	●						●	●		●		●	●	●

Table 2.2-3. Activity Categories by Land Use Classification (continued)

Land Use Classification	On-Road Vehicle Use	Off-Road Vehicle Use (lightweight	Off-Road Vehicle Use (other)	Dismounted Operations	Field Operations	Surface Weapons Firing	Airborne Weapons Release (with evacuation)	Airborne Weapons Release (without evacuation)	Directed Energy Systems	Instrumentation and Communication Systems	Weapons Impact	Surface Danger Zone	Airspace Danger Zone	Air Vehicle Operations
J – Special Call-Up Area (within Restricted Area airspace) [1,2]	●	●		●	●	●		●	●	●	●	●	●	●
K – General Call-Up Area (within Restricted Area airspace)	●							●				●	●	●
L – Ground Only Call-Up Area (outside Restricted Area airspace)	●											●		
M – Restricted Area Airspace Only (overlying DoD land outside WSMR and call-up areas – from surface)						●		●		●		●	●	●
N- Restricted Area Airspace Only (overlying non-DoD land and outside call-up areas – from surface)								●					●	●
O – High Altitude Restricted Area Airspace (outside DoD land and call-up areas)								●					●	●
P – Unrestricted Airspace (with approval)													●	
Q – Non-Contiguous WSMR Land[1]	●					●				●		●		

1. Development of mission support facilities allowed with coordination and siting approval.
2. Development of Specialized Areas allowed with coordination and siting approval.

2.2.1.2.1 Level of Use

Hot Missions. "Hot" missions on WSMR are potentially hazardous events that require evacuation of personnel and all non-participants during the period of the event. This generally involves both surface areas and airspace and encompasses a variety of Activity Categories. WSMR scheduling and utilization data account for approximately 3,200 to 4,300 test events (or missions) annually, in recent years (see Table 2.2-4). Between 2003 and 2008, hot missions comprised between five to twelve percent of the test workload.

Table 2.2-4. Numbers of Missions

Missions	2003	2004	2005	2006	2007	2008
Hot Missions - Missile/Rocket Firings						
Air-to-Air	16	13	16	17	10	9
Air-to-Surface	13	3	7	6	2	10
Surface-to-Air	11	14	25	24	18	32
Surface-to-Surface	43	51	45	45	60	40
Other Hot Missions						
Laser Testing/Directed Energy	46	96	124	39	72	194
Bomb Drops	26	3	27	24	34	29
Explosions	22	17	9	13	7	9
Gun	23	5	4	2	3	5
Sled Track[1]	16	6	14	19	18	21
Countermeasures	13	0	14	0	30	11
Total Hot Missions	**229**	**208**	**285**	**189**	**254**	**360**
Non-Hot Missions[2]	**2,790**	**3,368**	**3,896**	**3,308**	**3,181**	**2,575**
Other[3]	187	121	89	81	106	85
Total All Missions	**3,206**	**3,697**	**4,270**	**3,578**	**3,541**	**3,020**

1. Located on Holloman AFB but a portion of the safety footprint is on WSMR.
2. Examples include Ground Checks, Aerial Cable, Communication Checks, UAS flights, etc.
3. Examples include Tours, Hunts, Prescribed burns, etc.

Source: Ref# 051

Non-Hot Missions. **"**Non-hot" missions include a wide variety of activities, such as ground checks, communication checks, aerial cable missions, BCT Modernization test events, soldier training, and UAS flights, for example. Non-hot missions in 2008 accounted for approximately 2,600 events or 85 percent of the scheduled missions on the range.

Table 2.2-5 summarizes the current level of use for selected Activity Categories that have a hazardous component.

Table 2.2-5. Level of Use by Activity Category under the No Action Alternative

Mission Type[1]	2003	2004	2005	2006	2007	2008
Surface Weapons Firing[2]	112	87	97	84	118	97
Airborne with evacuation[3]	55	19	60	47	46	48
Directed Energy (includes laser)	46	96	124	39	72	194
Weapons Impact[4]	127	79	92	90	115	93
Surface Danger Zone[5]	213	202	271	170	236	339
Airspace Danger Zone[6]	191	185	262	157	229	330
Highway roadblocks (annual)	ND	ND	ND	ND	32	ND

1. Table only includes Activity Categories for which the level of use is quantifiable.
2. Includes Surface-to-Air, Surface-to-Surface, Gun, Explosions, and Countermeasures.
3. Includes Air-to-Air, Air-to-Surface, and Bomb Drops.
4. Includes Air-to-Surface, Surface-to-Surface, Bomb Drops, Gun, Explosions.
5. Includes Air-to-Surface, Surface-to-Surface, Air-to-Air, Surface-to-Air, Directed Energy, Counter Measures, Bomb Drops, Gun, Explosions.
6. Includes Air-to-Surface, Surface-to-Surface, Air-to-Air, Surface-to-Air, Directed Energy, Counter Measures, Bomb Drops, Gun.

ND - Data not available.

Highway Closures. WSMR established a MOU with the New Mexico Department of Transportation (DOT) to allow closure of selected highways affected during particular missions (Ref# 161). The agreement allows for road closures up to an hour in duration on US 54 and US 70 (and no longer than 80 minutes in an emergency) and up to two hours in duration on US 380. WSMR is required to provide notice to the DOT district engineer at least 48 hours prior to setting up roadblocks. During Fiscal Year (FY) 2007, 32 highway closures occurred (22 on US 70 and 10 on US 380).

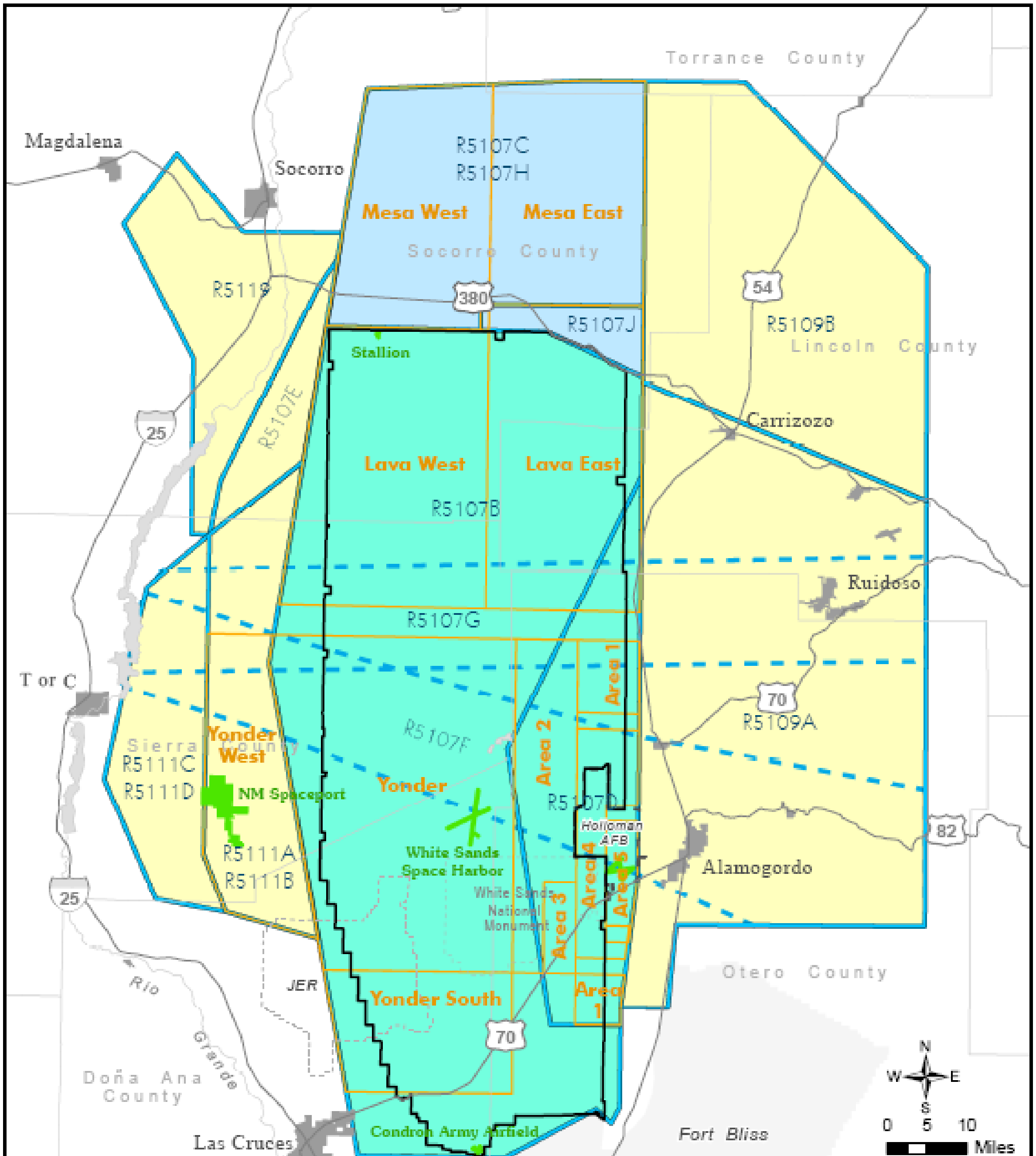
Evacuation Areas. WSMR has agreements with surrounding landowners to allow evacuation when a test may cause unsafe conditions on the ground. These contracts, in general, allow evacuation for periods of 12 hours, with at least 48 hours between consecutive evacuation periods. No evacuations may occur during the cattle shipping period (October 15 through November 15) or on a holiday and the preceding day. Evacuations are scheduled at least 30 days prior to the event. There are four designated evacuation (or call-up) areas: FIX, A-350, ABRES 4A, and ABRES 4A Extension. The number of evacuations is limited to 25 per year per evacuation area, with no more than six in a month (the limit was exceeded in A-350 and ABRES 4A in 2006). Table 2.2-6 summarizes the number of evacuations each year between 2001 and 2006. There have been an average of 47 evacuations per year, with the highest number, 93 evacuations, occurring in 2006.

Table 2.2-6. Call-up Area Evacuations, 2001 to 2006

Area	2001	2002	2003	2004	2005	2006	6-year Average
FIX	8	19	6	11	13	22	13
A-350	8	13	7	11	19	28	14
ABRES 4A	8	14	7	7	17	26	13
ABRES 4A Ext.	3	6	5	4	4	17	7
Total	**27**	**52**	**25**	**33**	**53**	**93**	**47**

Source: Ref# 010, 011

Figure 2.2-2 shows the Restricted Areas used by WSMR and the operational limits of each. For these areas, the Commanding General, WSMR, is the designated using agency, and the FAA, Albuquerque, is the controlling agency. The U.S. Air Force 49th Fighter Wing operates a Radar Approach Control facility and monitors WSMR airspace. In most cases, there is a "parent" airspace extending from the surface to



Legend

- Airfield
- WSMR
- ACC Training Area
- Restricted Airspace Boundary
  - Continuous
  - Continuous Mon-Fri, Other Times By NOTAM
  - By NOTAM

Restricted Airspace Altitudes (Feet Above MSL)

R5107B	Surface to Unlimited	R5107J	Surface to 9,000
R5107C	9,000 to Unlimited	R5109A	24,000 to Unlimited
R5107D	Surface to 22,000	R5109B	24,000 to Unlimited
R5107E	Surface to Unlimited	R5111A	13,000 to Unlimited
R5107F*	24,000 to 45,000	R5111B	Surface to 13,000
R5107G*	24,000 to 45,000	R5111C	13,000 to Unlimited
R5107H	Surface to 9,000	R5111D	Surface to 13,000
*Commercial Aircraft Corridor		R5119	35,000 to Unlimited

By NOTAM: By Notice to Airmen

Figure 2.2-2. WSMR Restricted Airspace

infinity, and within it are layers of airspace blocks dividing the parent airspace into smaller components. This allows the flexibility to schedule airspace for low or high altitude activities simultaneously, when they are compatible. The Air Force uses the Air Combat Command Training Areas for training operations. Under the No Action Alternative, the 49th Fighter Wing is transitioning from F-117 aircraft to the F-22A.

2.2.1.3 Infrastructure and Facilities Construction

WSMR is highly developed with facilities and infrastructure to support its mission, concentrated in the Main Post, and also dispersed throughout the installation. The Main Post has almost 2.7 million square feet of functional space, with a similar amount distributed throughout the range. Examples of supporting equipment and infrastructure include instrumentation sites, roads, communication networks, missile assembly buildings, laboratories, blockhouses, and water and power sources. Roads and pavements (either paved or durable gravel-surfaced) cover over 7,000 acres throughout the installation. Table 2.2-7 presents physical development under the No Action Alternative. This includes previously approved construction and ground disturbance associated with ongoing actions at WSMR, including construction on the Main Post Area, at other built-up areas, infrastructure extending into WSMR range areas, and other projects on sites throughout the WSMR Range. The estimates in the table reflect the development of facilities for the EN BN and recent decisions regarding development of new test and training facilities on the installation. Recent NEPA documents have assessed the impacts of construction for these projects (see Section 1.8).

Table 2.2-7. Development under the No Action Alternative

Project	New construction (s.f.)	New pavement (acres)	Area Disturbed (acres)
Main Post (built-up areas)	967,000	21	120
EN BN (core facilities)[1]	310,000	13	70
Other Development[1,2]	345,000	1	10
Family Housing[1]	312,000	7	40
Infrastructure (range-wide)	19,000	48	80
Range Projects (Specialized Areas)	77,000	5	20
Total	**1,063,000**	**74**	**220**

1. The combined values for these facilities make up the Main Post totals.
2. Other facilities on the Main Post to support the arrival of the EN BN and Family members.

In a typical year, the installation implements Military Construction projects (both major and minor), demolition projects, family housing regeneration, and an array of infrastructure-related projects for water systems, anti-terrorism/force protection (AT/FP), roads, trails and sidewalks, gas lines, street lighting, and signage. Ongoing programmed construction activities at WSMR include administrative offices, housing, vehicle parking and maintenance, equipment storage, recreational centers, shopping, roads, and other infrastructure required to meet the administrative and readiness requirements of new Army units while supporting a high quality of life for Soldiers and Families.

The EN BN enclave would occupy a site of approximately 70 acres on the southeast edge of the existing Main Post (shown in Figure 2.2-3). The EN BN is allocated approximately 310,000 s.f. of new facilities, as well as a new 20,000-gallon Jet Propellant (JP)-8 petroleum storage tank and a two- to four-bay vehicle wash rack. Several smaller construction projects to renovate and refurbish existing facilities would provide interim facilities while the main enclave is built out.

The current barracks space (67 rooms) is 85 percent occupied. Construction for the EN BN would provide 296 barrack spaces. Planned renovation of 66 three-bedroom units would provide additional space for single Soldiers. For Families, WSMR has 346 older units and has recently constructed 48 new units. An additional 156 new family housing units are currently programmed for construction over the next year or two, bringing the total number of housing units to 550.

New infrastructure projects include widening of War Road between the Main Post and the Fort Bliss boundary, improvements to the Access Control Points (Las Cruces and El Paso gates), and construction of approximately nine miles of tank trails with several new tank crossings for future test operations.

2.2.1.4 Specialized Areas

Throughout WSMR, there are several locations used for specific purposes and these generally have associated facilities. Currently, there are 58 Specialized Areas, comprising about 257,000 acres. When in use, the surface area of any particular Specialized Area is not available to other users. The area may activate a safety buffer for hazardous activities. When not in use, or when activities are not hazardous, most Specialized Areas can be used for a variety of other compatible activities.

Table 2.2-1 indicates what Land Use Classifications allow for the development of facilities, infrastructure and Specialized Areas that support WSMR's missions. A few projects are underway on the operational range (outside the Main Post area and Range Centers) over the next year. Details of projects are provided in ongoing and recently approved EAs and RECs. Approximately 77,000 s.f. of development would occur, mostly within the complex of facilities along Range Road 2 (also known as Nike Road), with new missile support sites at selected locations on the range.

2.2.2 EQUIPMENT AND VEHICLES

Equipment levels at WSMR would increase over current levels under the No Action Alternative, primarily as a result of the stationing of the EN BN (see Table 2.2-8). With training occurring on Fort Bliss, these vehicles would travel on WSMR installation roads and tank trails, primarily between the Main Post and Doña Ana Range, using Range Road 1 and War Highway (the extension of Range Road 1 on Fort Bliss), as well as the existing tank trail to the west of War Highway.

Table 2.2-8. Estimated Ground Equipment Levels at WSMR under the No Action Alternative

Type of Equipment	FY 2007	FY 2008[1]	FY 2009	FY 2010[2]	FY 2011	FY 2012
Wheeled Vehicles	1,340	1,449	1,449	1,487	1,487	1,487
Tracked Vehicles	12	97	97	141	141	141
Generator Sets	567	600	600	606	606	606
Non-Tactical/General Services Administration	1,665	1,665	1,665	1,665	1,665	1,665

1. Addition of an EN BN to WSMR.
2. Assumed as the addition of two additional Companies to the EN BN.

Currently, there are test programs using small UASs and subscale and full-sized drones. Most of the full-sized drones originate out of Holloman AFB. Currently, QF-4 drones are used for full-scale targets, but

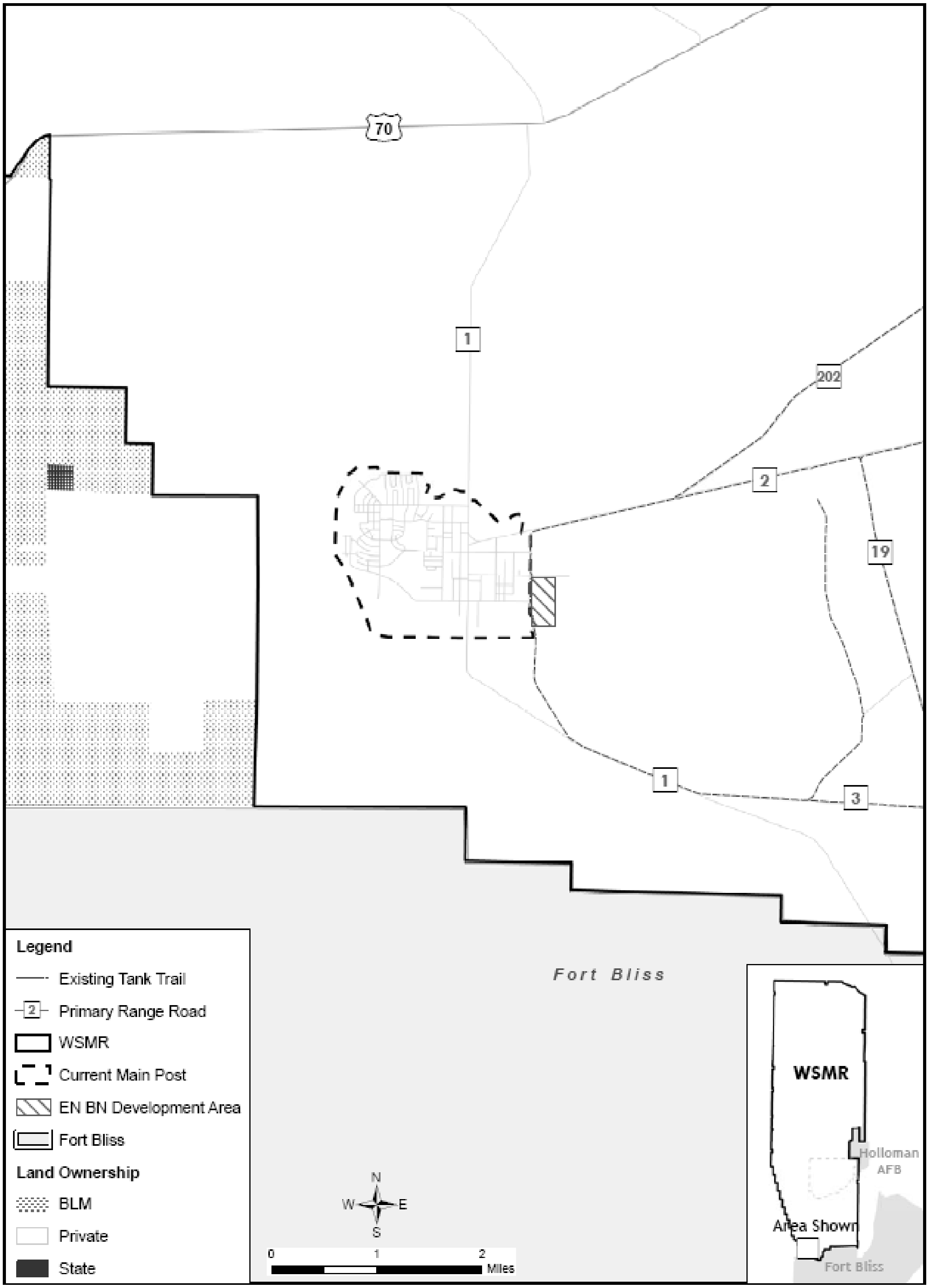


Figure 2.2-3. Location of Engineering Battalion Enclave on Main Post, No Action Alternative

as the inventory goes down, the Air Force is transitioning to modified QF-16 models (reconfigured without halon or hydrazine systems). Small UASs (approximately the size of a remotely operated model airplane) use installation roads and small field sites for takeoff and landing.

2.2.3 PERSONNEL

Preapproved actions at WSMR will result in an increase of more than 1,300 personnel between FY 2007 and FY 2013. This includes arrival of the EN BN, with about 700 personnel (585 in FY 2008 and 124 in FY 2010), an increase of about 70 garrison staff, an estimated increase of almost 200 test-related personnel (both government and civilian contractor), and a possible gradual increase in Soldiers conducting qualification training by 400 between FY 2008 and FY 2012. In addition, approximately 960 Family members will accompany Soldiers of the EN BN. Table 2.2-9 shows that total assigned personnel are projected to increase from approximately 6,100 in FY 2006 to approximately 7,700 by FY 2012, with the number of military Family members almost tripling from less than 600 to more than 1,500 (with an estimated 660 households and almost 900 school-aged children). Currently, there are 270 Families residing on WSMR with approximately 800 on-post residents. Of these, 128 are military Families and 142 are DoD civilians and contract civilian Families.

Table 2.2-9. Personnel and Military Dependents under the No Action Alternative

	FY 2006[1]	FY 2007	FY 2008[2]	FY 2009	FY 2010[3]	FY 2011	FY 2012	FY 2013
Total Assigned Military	420	440	1,020	1,020	1,150	1,150	1,150	1,150
Military Students (Soldiers)	200	400	400	500	600	700	800	800
Government Civilians[4]	3,010	3,010	3,080	3,090	3,130	3,140	3,140	3,140
Contract Civilians[4]	2,500	2,500	2,520	2,590	2,610	2,630	2,630	2,630
Total Post Personnel	**6,130**	**6,350**	**7,020**	**7,200**	**7,490**	**7,620**	**7,720**	**7,720**
Military Dependents	560	580	1,370	1,370	1,540	1,540	1,540	1,540

1. From WSMR Installation Population Summary, dated October 2007.
2. EN BN receives 1st tranche of 585 soldiers in FY08.
3. EN BN receives 2nd tranche of 124 soldiers in FY10.
4. For analysis, civilian numbers include some increase for future test mission operations and programs, and increased civilian personnel for post support functions associated with EN BN.

2.3 Alternative 1, Implement Land Use Changes and Enhanced Test Capabilities (Preferred Alternative)

Alternative 1 would change land use at WSMR and expand testing and training capabilities to support new and evolving test requirements throughout the installation, including providing limited capability for the EN BN within specialized areas (Section 2.3.1.4). If selected, this alternative would result in:

- Changes in land use to allow off-road vehicle use to support test operations on an additional 1.6 million acres for a total of 1.8 million acres;
- Expansion of land designated as built-up areas for future development around Main Post and Range Centers;
- Expansion of current test operations, such as missile firing, directed energy weapons, off road maneuvering for tests, and support for next generation programs using the full extent of WSMR land and airspace resources;
- Overall increase in test-related ground and airspace operations during the next five years;
- Development of infrastructure throughout WSMR to support future tests and training, including reconstruction of 75 miles of existing tank trails, construction of a new 150-mile tank trail system

to link the north and south range, 20 miles of connector tank trails to Fort Bliss, Range Center expansions, and construction of utilities and communication infrastructure; and

- Development of new Mission Support Facilities and six new Specialized Areas for test and training purposes.
- Under Alternative 1, all ongoing and previously approved activities described under the No Action Alternative would continue. Alternative 1 is WSMR's and the Army's Preferred Alternative, as described in Section 2.7.

2.3.1 RANGE CAPABILITIES AND USE

2.3.1.1 Range Land Use

Under Alternative 1, over 1.6 million acres of Primary Test Zone (Land Use Classification A) would be converted to Augmented Test Zone (Land Use Classification C) allowing for intermittent off-road vehicle use. About 7,000 acres would be designated as built-up areas (Land Use Classification B) that could be developed over time. Approximately 2,000 acres may be converted to Impact Area (Land Use Classification D), but no specific sites have been identified. Table 2.3-1 lists the changes in land use under Alternative 1 relative to the No Action Alternative, and Figure 2.3-1 shows the changes in land use for Alternative 1. No changes in area for Land Use Classifications E through P are proposed.

Table 2.3-1. Changes in Land Use Classifications for WSMR under Alternative 1

Land Use Classification	Title	Acreage		
		No Action Alternative	Alternative 1	Change
A	Primary Test Zone	1,635,000	8,000	-1,627,000
B	Range Centers and Built-Up Areas[1]	2,000	8,500	+7,000
C	Augmented Test Zone	207,200	1,825,200	+1,618,000
D	Impact Area	15,400	17,400	+2,000

1. Includes 460 acres at Stallion Range Center.

A - Primary Test Zone. Most of the primary test zone would convert to Augmented Test Zone (Land Use C) expanding the overall range of activities to include off-road vehicle uses to support new test missions or similar activities.

B - Range Centers and Built-Up Areas. Expansion of built-up areas by 7,000 acres, primarily in areas adjacent to the Main Post (6,600 acres), would allow for future development for a HBCT (or comparable unit) and other projects to support increased personnel and activities on the installation. It would also provide a buffer between cantonment areas and range activities, allowing for planning review and control of uses to address compatibility issues. The Master Planning review process for non-range lands would apply to these expanded areas (see Figure 2.3-2). Siting of facilities within the larger Main Post would follow the Army's recommended guidelines in AR 210-20 "Real Property Master Planning for Army Installations".

Larger joint battlefield test scenarios would use up-range support areas for vehicle and equipment fueling and maintenance facilities; Soldier and test participant billeting; and storage for munitions, equipment, and supplies. For analysis purposes, it is assumed that Stallion Range Center may develop approximately 200 additional acres of infill development and one or two other range centers, such as Oscura, could each expand by approximately 100 acres to support test requirements.

C - Augmented Test Zone. The Augmented Test Zone would expand to over 1.8 million acres, extending throughout the installation, though restrictions and conditions would apply based on management priorities and constraints. Uses would be coordinated with the WSMR Environmental Division to identify any general or specific measures required to reduce adverse environmental impacts, in accordance with WSMR plans, permits, and regulations. BCT Modernization is the primary user for this capability in the near term, though other users and programs could have similar needs in the future.

D - Impact Area. Impact areas may expand by approximately 2,000 acres, similar to the existing Warhead Impact Target areas. This could only occur in compliance with the Army's regulations and process for approving new dudded ranges. Selection of suitable sites would require deconfliction with operational, environmental, and jurisdictional constraints. New areas would be cleared, graded, and undergo periodic cleanup and removal of debris and UXO. Figure 2.3-1 only shows the location of existing Impact Areas on WSMR since the future sites are not yet identified.

A new concept of using selected sites temporarily for single-use impact areas is also proposed. Operating procedures would require removal of all test debris upon completion of the test event. After this occasional use, the site would revert to Land Use Classification C. Users would comply with all general and any specially required measures to minimize both short-term and long-term impacts.

2.3.1.2 Range Activities and Level of Use

2.3.1.2.1 Range Activities

WSMR proposes to expand range capabilities to support the future test needs of current and new users, and support faster fielding of equipment and technology to deployed Soldiers. These capabilities range in specificity from broad trends and concepts for future testing to specific programs planned for the near term. Table 2.3-2 provides a summary of additional changes in activities projected under Alternative 1.

For the purpose of analysis and describing future levels of activity, the EIS uses BCT Modernization testing as a model for future Army modernization test requirements. WSMR proposes to provide additional capability to conduct more off-road vehicle activity, using a variety of wheeled and tracked vehicles and equipment. Future tests are expected to involve both scripted (vehicles following specific, predefined routes) and unscripted (free-flowing, not predefined movements) activities. Under this alternative, WSMR would allow off-road vehicle activities throughout Land Use Classification C, with appropriate coordination and approval.

This capability requires land for Soldiers and vehicles to maneuver freely using heavy wheeled and tracked vehicles, both manned and unmanned. Test events would require a range of terrain and geophysical conditions, with operational areas sized for flexibility (some areas at least six by six miles [approximately 25,000 acres]). This allows areas of operation spreading out over great distances (at least 90 miles) to test networking and battlefield integration of various components and systems over long distances.

The Limited User Tests for the initial phase of BCT Modernization testing at WSMR are representative of typical test events and is used as a basis for the analysis of ground maneuvers in this EIS. These events could vary in frequency and take place on the installation at dispersed locations concurrently. Individual tests could involve bringing in up to 600 persons (primarily civilian contractors) on a temporary basis for the duration of the test. As tests are proposed to become more frequent, and with the addition of other programs, WSMR may have a relatively constant temporary population of about 600 personnel, compared to intermittent surges during tests currently.

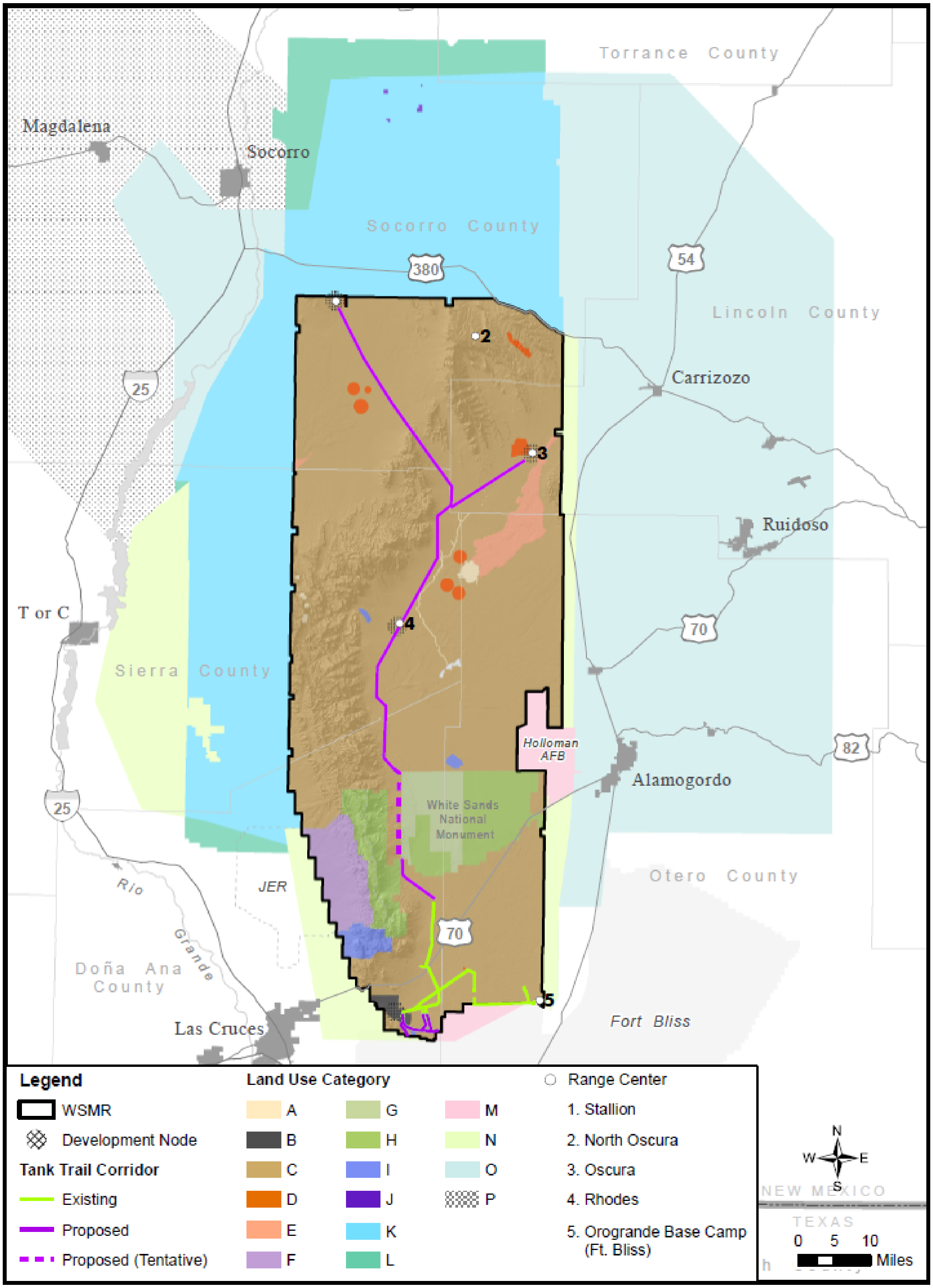


Figure 2.3-1. Future Land Use under Alternative 1

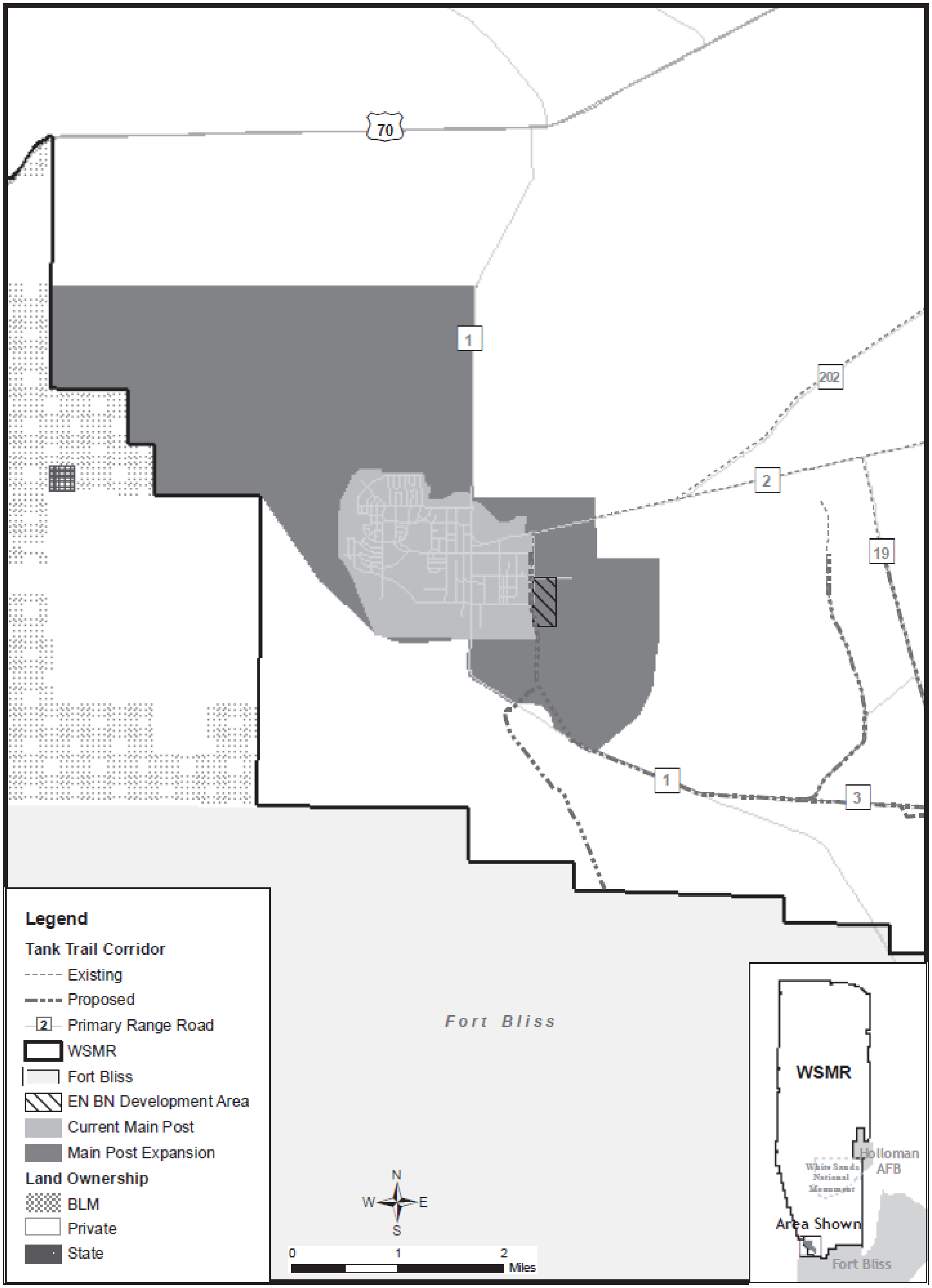


Figure 2.3-2. Proposed Main Post Expansion under Alternative 1

BCT Modernization and future similar test programs use a "Soldier participant" to involve ultimate user in the system's development. This role is performed by the Army Evaluation Task Force stationed at Fort Bliss. During the fielding phase of test programs, the Soldier test participant role would evolve into a Soldier-student training role as units rotate through to learn how to use the new systems. Their activities would replicate all those undertaken during the test phase as they practice with each component of the system. The combat concepts and activities of the future fighting force are similar to typical Infantry Brigade Combat Team (IBCT) functions, with foot Soldiers supported by light to heavy equipment.

Table 2.3-2. Changes in Activities at WSMR under Alternative 1

Activity	Description
On-Road Vehicle Use	On-road vehicle use would increase due to a gradual increase in testing activity and training (for example, transporting Soldiers and equipment between WSMR and Fort Bliss training ranges, and daily commuting and traffic on and around the Main Post from additional personnel).
Off-Road Vehicle Use (lightweight)[1]	This activity is limited to vehicles with a maximum loaded weight of 1,500 pounds or less; speed limited to a maximum of 25 miles per hour (for example, lightweight robotic test articles). These vehicles could operate throughout the Augmented Test Zone (Land Use Classification C), including approved locations in mountainous areas. These operations would avoid areas with environmental constraints. EOD recovery efforts could increase using All Terrain Vehicle (ATV) to access dispersed (usually remote) recovery sites throughout the installation.
Off-Road Vehicle Use (other)	Vehicles used would weigh greater than 1,500 pounds; speed potentially greater than 25 miles per hour in the Augmented Test Zone (Land Use Classification C). Users would perform off-road operations using a variety of test and support vehicles, including wheeled and tracked types and in-field combat scenarios. Various sized operating areas throughout the installation may be used. Limited excursions (mostly pre-scripted) into mountainous terrain would occur. As many as 65 vehicles may operate concurrently in areas between 5,000 acres to 60,000 acres.
Dismounted Operations	Alternative 1 may involve substantial increase in dismounted operations, particularly in the terrain areas in the upper range to support BCT Modernization test events (up to 500 Soldiers for one or two weeks using up to 1,000-acre operational nodes). Range management and recovery efforts would also increase by at least 25 percent over current levels.
Field Operations	Additional test missions would increase activities for test set up and tear down, and retrieval of debris, as well as EOD removal operations. Test and training activities (e.g., Special Operations, Warrior Transition Course), may involve digging of trenches, constructing earthen berms, bivouac, use and set up of temporary camps with as many as 500 Soldiers for 24-hour periods, and limited EN BN operations to perform operations and maintenance (O&M) projects for WSMR.
Surface Weapons Firing	Surface weapons firing is projected to increase by about 25 percent over FY 2007 levels for various ongoing and new programs, for example, medium extended air defense system (MEADS), Navy missile and extended gunnery firing, and ongoing missile programs firing weapons from fixed and mobile locations on the ground.
Airborne Weapons/Munitions Releases (with evacuation)	Increased hazardous airborne weapons/munitions releases would involve new ATL and ABL operations and joint battlefield air operations. Live-fire air combat training would use specialized bombing and gunnery sites. An increase of 25 percent over FY 2007 levels is projected.
Airborne Weapons/Munitions Releases (without evacuation)	An increase in non-hazardous airborne weapons/munitions releases would include UAS operations and "non-hot" air operations for tests and training purposes. An increase of 25 percent over FY 2007 levels is projected.

Table 2.3-2. Changes in Activities at WSMR under Alternative 1 (continued)

Activity	Description
Directed Energy Systems	Directed energy system tests are projected to increase substantially. Most future tests are expected to be similar to existing missions, but some changes in technology (with solid propellants) and an increase in dynamic platforms may occur. Operations would occur with existing surface and restricted airspace boundaries and agreements. Flight and safety aspects are managed through test planning and built-in systems, which control lasing within WSMR airspace and land boundaries. An increase to four times the FY 2007 levels for directed energy activities is projected.
Instrumentation and Communication Systems	Use of non-hazardous instrumentation and communication systems may increase as test levels increase.
Weapons Impact	Use of existing weapons impact areas may increase (up to 25 percent). Development of new Warhead Impact Target (WIT) areas would need to undergo Army planning and approval process.
Surface Danger Zone Activities	Utilization of SDZs would increase as test activities increased. The mid-range area would continue to have the heaviest utilization for "hot" test mission events.
Airspace Danger Zone	An increase in hazardous Airspace Danger Zone activity of 25 percent is projected.
Air Vehicle Operations	An increase in non-hazardous air vehicle operations would include Air Force flight operations and UAS activity in WSMR restricted airspace.

1. "Lightweight", as defined, has been used for the purposes of this EIS and planning at WSMR.

For the purposes of analysis in this EIS, the following assumptions apply. Test maneuvers would occur only within Land Use Classification C (Augmented Test Zone), an area composed of approximately 1,830,000 acres shown in Figure 2.3-3. Off-road activities in the Augmented Test Zone would require coordination and review with the WSMR Environmental Division, and may require surveys and approvals as described in Section 2.5. Figure 2.3-3 shows areas with constraints (either environmental or operational) that impose more restrictions on off-road and other activities. Constraints currently identified by WSMR are further described in the Land Use and Airspace Strategy Plan (Appendix A), and include a wide range of resources or conditions that might limit operations. Limitations on use vary depending on the particular resource or condition and may change over time with new information. For example, WSMR would not allow off-road activity in Todsen's Pennyroyal habitat, or within a half-mile of known sites, although lightweight robotic vehicles may be allowed within approved locations after a more thorough site review. The important concept is that WSMR's Environmental Division would coordinate with users to select suitable sites for activities and identify limitations or measures that would apply to specific test events. The constrained area shown on Figure 2.3-3 comprises about 750,000 acres. The remainder (or least constrained land) amounts to 1,080,000 acres.

The following summarizes the amount of off-road activity estimated for a typical BCT modernization test program each year. There could be about 12 test events per year averaging about five days per event. The largest event may involve up to 65 vehicles (comprised of a mixture of wheeled and tracked vehicles) operating for periods of 14 days, using an operational area of about 62,000 acres. If every event were assigned to a different operational area, up to 390,000 acres of unconstrained area of land would be used during any given year, or 36 percent of Land Use Classification C. Based on estimated off-road activity using simulated events up to battalion-size, the estimated actual disturbance footprint caused by the vehicle wheels and tracks is estimated at about 14,800 acres per year. This area of disturbance represents about 1.4 percent of the least constrained land in the Augmented Test Zone, and less than one percent of the entire Augmented Test Zone.

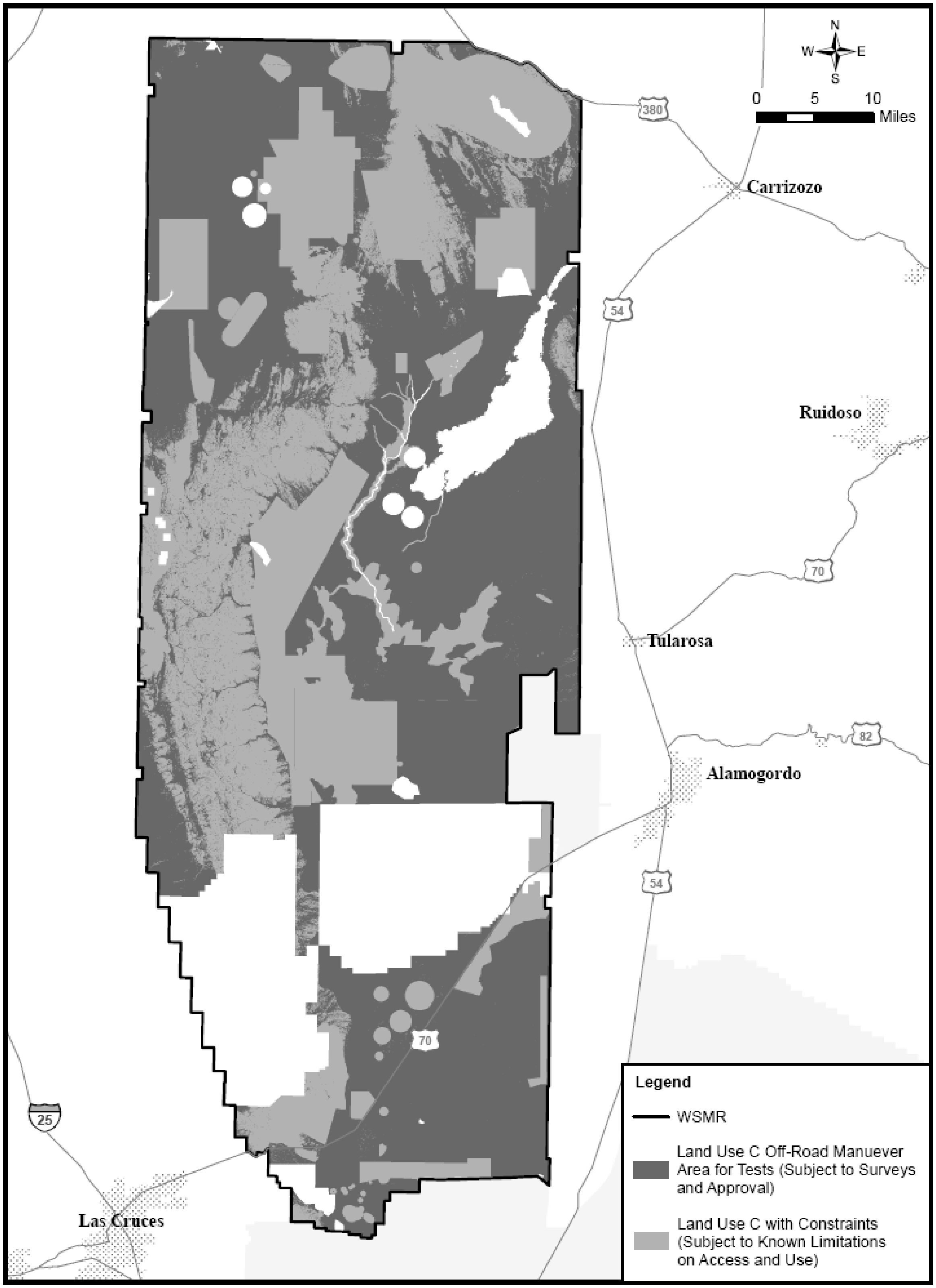


Figure 2.3-3. Land Use C, Augmented Test Zone

Pedestrian and field operations for test programs may involve up to 500 Soldier participants (stationed at Fort Bliss or WSMR) operating in small nodes (approximately 1,000 acres in size) at up to four locations on WSMR at the same time.

Under Alternative 1, there may be a 25 percent increase in helicopter and fixed-wing equipment at WSMR to support range management activities. Operations would be similar to those currently performed and staged from WSMR airfields, Holloman AFB, or other nearby airfields. WSMR personnel expect that UASs would perform some range maintenance tasks, such as surveillance of and identification of missile impact sites and debris areas in the future.

2.3.1.2.2 Surface Uses

Table 2.3-3 summarizes past and projected mission activity for Alternative 1, including hot missions that require associated highway closure and off-range evacuations.

Table 2.3-3. Level of Use by Activity under Alternative 1

Missions	2003	2004	2005	2006	2007	2008	2013[4]
Hot Missions - Missile/Rocket Firings							
Air-to-Air	16	13	16	17	10	9	13
Air-to-Surface	13	3	7	6	2	10	3
Surface-to-Air	11	14	25	24	18	32	23
Surface-to-Surface	43	51	45	45	60	40	75
Other Hot Missions							
Laser Testing/Directed Energy	46	96	124	39	72	194	288
Bomb Drops	26	3	27	24	34	29	43
Explosions	22	17	9	13	7	9	9
Gun	23	5	4	2	3	5	4
Sled Track[1]	16	6	14	19	18	21	23
Countermeasures	13	0	14	0	30	11	38
Total Hot Missions	**229**	**208**	**285**	**189**	**254**	**360**	**519**
Non-Hot Missions[2]	2,790	3,368	3,896	3,308	3,181	2,575	12,724
Other[3]	187	121	89	81	106	85	424
Off-road maneuver (km^2/year)	NA	NA	NA	NA	NA	NA	59
Total All Missions	**3,206**	**3,697**	**4,270**	**3,578**	**3,541**	**3,020**	**13,207**

1. Located on Holloman AFB but a portion of the safety footprint is on WSMR.
2. Examples include Ground Checks, Aerial Cable, Communication Checks, UAS flights, etc.
3. Examples include Tours, Hunts, Prescribed burns, etc.
4. Based on a four-fold increase from 2007 for Laser Testing/Directed Energy and Non-Hot Missions and a 25 percent increase from 2007 for all other hot missions by 2013.

A total of 360 "hot" missions (hazardous activities that must be avoided by other, non-participating activities) were conducted in FY 2008. Fifty-four percent were laser missions and 25 percent were missile and rocket firing missions, the next highest category. Historically, the number of hot missions has varied from year to year, depending on funding and other factors such as equipment or weather difficulties. Range utilization data for 2008 indicated a significant upward trend from 2007 in directed energy activities. Based on this trend, directed energy missions are projected to increase fourfold between FY 2008 to FY 2013 under Alternative 1. Other hot mission events and hours across all other categories are expected to increase by 25 percent over 2007 levels during this same period.

Non-hot missions in FY 2008 totaled just under 2,600 events. There is a trend for non-hot activities to increase substantially; therefore, WSMR anticipates that non-hot missions also would quadruple between

FY 2007 and FY 2013 under Alternative 1. This reflects a projected increase in ground and communication checks for test missions, EN BN training, increased testing programs similar to BCT Modernization, and an increase in qualification training for programs such as WTC soldier qualification training.

Highway Closures. Closures on US Highway 70, 54, and 380 could more than double from 2007 levels by 2013 under Alternative 1 but would remain within the notification and duration terms in the MOU with the New Mexico State Highway Department. This could increase annual closures to 44 occurring on US 70 and 25 occurring on US 380.

Evacuations. Evacuations of call-up areas could increase as much as 25 percent above FY 2007 levels. Evacuations would comply with the terms of current agreements, with no more than 25 per year in any portion of the call-up areas. This number of evacuations is within the range of variation for previous years.

2.3.1.2.3 Airspace Use

Airspace use for test and training programs may increase by 25 percent. Hot missions requiring temporary evacuations of surface areas and/or airspace currently comprise approximately 3 to 4 percent of WSMR's activity; this proportion is likely to remain the same in the future as all activities increase, including those that are non-hazardous. Increasing participation of UASs and other aircraft in tests (as test articles, targets, or support functions) would increase sortie levels in Restricted Areas. UAS flight operations would be conducted in accordance with AR 95-23 Unmanned Aerial Vehicle Flight Regulations, FAA Order 7610.4J "Special Military Operations," and Fort Bliss/WSMR Range Control Air Restrictions.

Future tests would likely involve more UASs, ranging in size from lightweight models to full-sized drones of current aircraft models. UASs could include both developmental-stage test models and certified vehicles that are part of the operational inventory. Some aircraft, such as the Joint Unmanned Combat Air Systems (J-UCAS) (for example, the X-45A) may perform an offensive role in battlefield test scenarios, including the use of weapons or deployment of countermeasures in test missions. Test operations would occur in restricted airspace over DoD land. Use of UASs for non-hazardous operations outside of restricted airspace would conform to all FAA requirements. Holloman AFB would continue to perform most tests involving UASs, including test support roles, using the fleet of drones stationed at the base.

2.3.1.3 Infrastructure and Facilities Construction

Infrastructure includes all the instrumentation, utilities, roads, and communications systems that support range users. Examples of projects include new fiber optics systems, additional instrumentation (both fixed and mobile), and new field support nodes at Range Centers, including Stallion Range Center. Developing approximately 170 miles of new tank trail corridors (mostly parallel to existing installation roads, shown schematically on see Figure 2.3-1) would facilitate movement of test vehicles throughout the installation for joint battlefield operations. Future developments may also include rail spurs to link Range Centers (such as Oscura and Tularosa) to an existing rail corridor east of WSMR. When the Army needs to implement these projects, alignments would undergo further feasibility and siting evaluation. This would involve coordination, negotiations, and agreements, as needed, with other land management agencies, and would be subject to future environmental review.

A preliminary list of improvements that could serve multiple users and overall installation functioning (rather than a specific location or program) includes:

- Expanded Range Center facilities for dining, billeting, and maintenance for major test missions
- North-South Tank Trail corridor (approximately 150 miles connecting south to north range, parallel to Range Road 7)
- Southern Connector Tank Trail corridor (approximately 20 miles south of the Main Post for connecting to Fort Bliss tank trails)
- Hardened tank crossings (over selected installation roads, and US 70)
- Additional instrumentation sites (one-acre sites throughout the installation as needed)
- Expanded communication networks (300 miles of buried fiber optic cable)
- Range road improvements and upgrades
- Ammunition Holding Area z
- Road maintenance/improvements throughout the installation (minimal work outside existing roadbeds)
- Uprange Medical Evacuation Facility
- Oscura Range Center expansion (10 acres)
- Stallion Range Center expansion (up to 50 acres)
- Existing tank trail improvements

These improvements would provide better access, field support, infrastructure, and instrumentation throughout the installation. Most of these projects are not programmed and have no proposed sites. These projects would undergo a siting approval process to avoid sensitive resources and operational conflicts with other installation users and development. Therefore, they are addressed programmatically in this EIS and would require further review and analysis when they are better defined. New range center infrastructure, utility, and tank trail projects would use approximately 530 acres of land throughout the range, disturbing 980 acres of land during construction. In addition, six new specialized areas would be developed to support specific testing and training requirements (Section 2.3.1.4). Table 2.3-4 summarizes the estimated construction and ground disturbance associated with Alternative 1.

Table 2.3-4. Estimated Construction and Ground Disturbance under Alternative 1

Project	New construction (s.f.)	New pavement (acres)	Area Disturbed (acres)
Range Center Infrastructure	120,000	0	60
Utilities and Tank Trails	0	0	920
Specialized Areas	1,300,000	70	3,500
Total	**1,420,000**	**70**	**4,480**

2.3.1.4 Specialized Areas

Six new specialized areas are proposed for WSMR, though the specific locations of these areas have not yet been identified. In total, these range projects would involve construction of almost 1.3 million s.f. of new facilities using about 18,200 acres of land, and disturbing about 3,500 acres during construction

(Table 2.3-4). No specific site locations are identified at this time. The activities, construction, and disturbance associated with the proposed development of specialized areas are described in the following sections.

2.3.1.4.1 Electro-Optical .50 Caliber Test Range

The Program Executive Office for Soldier Systems Electro-Optical Testing proposes a .50 caliber Small Arms Range for testing weapon-mounted systems. This range would be used for testing sensors and lasers for use on the battlefield in all weather conditions. The range would be approximately 1.2 to 1.9 miles in length, with two lanes of targets set up across a width of 1,720 feet (approximately 118 acres). It would include a cleared and graded 330-by-1,640-foot area (approximately 12 acres), bullet firing impact berms built at distances of 1,640, 3,820, and 6,560 feet, and a target range area approximately 1,640 feet in radius (a 785,000 s.f. area). Additional infrastructure required for the range includes approximately 6,400 s.f. of office space, an instrumentation room, laboratories, weapons storage and maintenance, and restrooms. Infrastructure such as water, power, internet, and telephone would also be required.

2.3.1.4.2 Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System

The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) consists of unpowered elevated radar sensors held aloft in helium-filled balloons (known as "aerostats") moored to the ground by long cables. The sensors provide over-the-horizon surveillance for defense against cruise missiles. JLENS tests the ability of system radars to detect, locate, and identify intruding aircraft and relay information to surface-based defensive systems. Elevated sensors would allow detection, tracking, and engagement of incoming cruise missiles by the defense systems before the targets can be detected by on-the-ground systems (Ref# 012). Physical infrastructure for the system would consist of an aerostat with a mobile mooring station and data processing stations. The system would require an airspace avoidance bubble.

One JLENS site is proposed for WSMR, requiring a fenced site encompassing a 1,000-by-1,200-foot area. There may be two additional sites supporting JLENS in the region, potentially on Fort Bliss. Within the fenced area, there would be a paved area approximately four acres in size for parking and facilities, as well as a concrete pad with a 450-foot radius (approximately 14 acres). The proposed JLENS site would require the construction of approximately 20 acres of impervious surface.

Test activity would involve daily equipment ground checks and radar radiation similar to the Patriot and Theatre High Altitude Area Defense radars (using X-band frequencies). Tests would use targets towed by aircraft and UASs, and would involve 30 drone operations per year. This program, supported by approximately 30 to 60 personnel, would begin in 2010. The size of the airspace avoidance bubble may vary depending on the length of the tether for specific tests[6].

2.3.1.4.3 Environmental Laboratory Complex

The proposed Environmental Laboratory Complex would include new and existing facilities with roads, parking space, and utilities located in a development area of approximately 1,600 acres in two parcels on either side of Range Road 2 (Nike Road). The facilities would support both non-hazardous and hazardous testing of missiles and components subjected to extreme conditions. The test facilities would have a 1,500-

[6] There is some flexibility to reel in the aerostat to avoid interference with other test programs, but this requires deflating and re-inflating the balloon, so this practice would occur as infrequently as possible.

foot radius safety footprint (including a volume of airspace defined by 1,500 vertical feet), all of which would be contained within the Complex boundary. The Complex includes the following 14 buildings:

- Temperature Test Facility (Existing)
- Microbiological Chamber (Existing)
- Rain, Humidity and Salt Test Facility
- Solar Radiation and Dust Test Facility
- Acoustic and Burst Test Facility
- Radiographic Test Facility
- Large Force Hydraulic Test Facility
- Large Force Electrodynamic Test Facility
- Medium Force Electrodynamic Test Facility
- Medium Force Hydraulic Test Facility
- Administration and Control Test Facility
- Shock and Centrifuge Test Facility
- Rail and Road Support Building
- Rail and Road Courses

2.3.1.4.4 Joint Urban Research, Development, Test and Evaluation Environment

The proposed Joint Urban RDT&E Environment specialized area would be sited within a two square-mile area (approximately 1,300 acres), utilize up to eight square miles of additional area, and could require a safety SDZ as large as 5,120 acres for test events. There would also be a comparable vertical Airspace Danger Zone in effect during test events. The size and duration of the restriction would depend on the power and intensity of the system being tested and the duration of the test event.

This project would create a mock urban environment composed of 32 single and multi-story buildings (approximately 320,000 s.f., covering a 55,000-s.f. footprint). The buildings would be composed of a variety of materials (such as steel, adobe, masonry, metal, and glass cladding) in order to replicate a range of possible conditions found globally in urban environments. The complex would also have utilities (such as power and water); subsurface tunnels; parking areas; passageways; and a cell phone tower and other emitters such as radar, microwave phone, TV, and broadband generators—all intended to replicate the complexity of the RF interference encountered in diverse battlefield situations. Site infrastructure would include sewer lines, tunnels, street lights, overhead power lines, radio and television transmitters, cell towers, fences, vehicles, landscaping, household appliances, and vehicles, in addition to test support communication and instrumentation infrastructure.

2.3.1.4.5 Individual Combat Skills Training Area

An Individual Soldier Combat Skills Area is proposed on a site relatively close to the Main Post. The facility would provide proficiency training in basic Soldier survivability skills. Soldiers are required regularly to accomplish prescribed tasks in a variety of courses and/or tests. These include obstacle and confidence courses, a bayonet course, Army Physical Fitness Test, day and night land navigation course, gas chamber exercise, and long distance (12 mile) marches.

Individual skills courses require a relatively flat area not exceeding 60 total acres. Obstacles (primarily posts) would be dug into or placed on the ground; however, there is relatively little ground disturbance involved, with the exception of a water obstacle, which requires the excavation of a small pit. Gas chamber exercises require a small building. Infantry skill "stations" are typically marked by sandbags on the ground, covered by camouflage nets.

2.3.1.4.6 Local Training Area

A Local Training Area would be developed to provide an area to train Soldiers in weapons use, force protection, small unit tactics, and teamwork. The Local Training Area would support regular training necessary to maintain these war fighting skills. While the Local Training Area is planned for the southern portion of the range, near the Main Post, a specific location has not yet been chosen.

Land requirements for the Local Training Area include an area approximately four miles by five miles (12,800 acres) – although it may not be one contiguous area. Within this area, approximately 12 acres of land would be used for buildings, structures and dedicated training areas; up to five percent of the area may be disturbed during development. Additional land disturbance would occur along existing roads and trails for training events intermittently. Sensitive environmental and cultural areas would be marked for avoidance. Travel throughout the area would include on-road and off-road maneuvering by wheeled and tracked vehicles with a weight up to 70 tons. Platoon and squad level training would occur within the Local Training Area. Larger unit training would occur on Fort Bliss. Training sites and activities within the Local Training Area would include:

- **Bridge-gapping**. An area would be used by the Wolverine M1A1 Tank (70-ton track vehicle), which has the ability to carry bridges for crossing gaps. The training includes crew drill and bridge emplacement and retrieval training at Squad and Platoon level. Manmade or natural gaps up to 75 feet are needed to fulfill bridge-gapping training requirements, which could be met by utilizing arroyos within the range.
- **Improvised Explosive Device (IED) Effects Simulator Training Lane**. This facility would consist of a 10 to 20 miles long training lane spanning differing types of terrain, including overpasses and bridges, in order to offer a realistic training environment for the Soldier. It provides training for IED detection and use of defeat and avoidance tactics for convoy protection. The training lane is equipped to create simulated battlefield conditions. The training lane may overlap with the Local Training Area, or use another location with a suitable existing range road or trail.
- **IED and Checkpoint/Entry Control Point Training Area**. This would include two cleared areas, one approximately 250-by-250 feet used for IED detection/defeat training, and a second area approximately 350-by-350 feet used for checkpoint training. The IED training area would include a vehicle with all fluids drained placed in the center of the cleared area where Soldiers would learn to locate IEDs and booby traps on parked vehicles. The checkpoint/entry control training area would include the use of concrete barriers and other easily assembled construction barricades. No live explosives would be used, but training involves the use of both pyrotechnic and non-pyrotechnic IEDs and vehicles with simulated IEDs.
- **Convoy Training and Soldier Road/Foot Marches**. This course would provide on-road convoy training for marches consisting of up to ten wheeled and tracked vehicles (weighing up to 70 tons). To the extent possible, existing roads can be used; however, some locations may need additional tank trails adjacent to the roads. Blank ammunition and ground burst simulators are used along the route.

- **Combative and Pugil Stick Training Area.** This area would consist of a covered sand pit used for combative and pugil fighting training. The pit would be approximately 100-by-100 feet with sandbags around the perimeter. The training area also would include a parking area and an area for grounding equipment.
- **Bayonet Assault Course**. This course would provide nine lanes with 72 dummy silhouettes. Individual Soldiers would practice assault techniques using rifle and bayonets while negotiating obstacles.
- **Land Navigation Course.** This course would be used with blank small ammunition, paintballs, artillery, grenade simulators, and smoke grenades.
- **Squad Level Team Building Exercise Area.** This would be an outdoor area for team building exercises. No additional construction would be needed.
- **Urban Training Area**. An existing urban area (such as unusable or unoccupied buildings on Main Post) would serve as a training facility for urban operations. Soldiers practice entering and clearing a building, movement techniques, and basic defense and attack in the urban environment.

2.3.2 EQUIPMENT AND VEHICLES

Alternative 1 does not include any increases in currently assigned equipment above levels described for the No Action Alternative (Table 2.2-8); however, the level of use of non-tactical (general services vehicles) and generators may increase as a function of increase support for test programs on WSMR. Generators provided by tests proponent would require coordination with WSMR Environmental Division to ensure permitting is in place or obtained for specific tests. There may be a gradual increase in commuter traffic (with up to 500 additional daily trips arriving through two access control points) as civilian employees increase (see Section 2.3.3). Temporary surges in gate and Main Post traffic could occur during surges for particular test programs. Range management and test support functions may increase two fold on the operational range; however, traffic counts on range roads are not recorded, as levels are exceeding low on average.

As described for No Action, the use of UASs and subscale and full-sized drones is expected to increase for test programs (possibly by 25 percent). Most UAS would stage from Holloman AFB, but some increase in staging would be likely at Condron Field, Stallion Range Center, Zumwalt Test Track, and any useable range road or facility on WSMR as well.

2.3.3 PERSONNEL

Alternative 1 includes the personnel changes described for the No Action Alternative in Section 2.2.3, plus additional personnel, almost all civilian, to support expanded test operations at WSMR (see Table 2.3-5). Government or contract civilians may or may not reside permanently in the local region, depending on the length of specific test programs. Over and above No Action, most increases are expected to take place after about FY 2011, as modernization test programs evolve and grow. For the purposes of analysis, a five percent increase over current civilian levels is used as an estimate, resulting in an estimated additional 480 positions over No Action by FY 2013.

Table 2.3-5. Personnel and Military Dependents under Alternative 1

	FY 2006[1]	FY 2007	FY 2008[2]	FY 2009	FY 2010[3]	FY 2011	FY 2012	FY 2013
Total Assigned Military	420	440	1,020	1,020	1,150	1,150	1,150	1,150
Military Students (Soldiers)	200	400	400	500	600	700	800	800

Table 2.3-5. Personnel and Military Dependents under Alternative 1 (continued)

	FY 2006[1]	FY 2007	FY 2008[2]	FY 2009	FY 2010[3]	FY 2011	FY 2012	FY 2013
Government Civilians[4]	3,010	3,010	3,080	3,090	3,130	3,140	3,220	3,300
Contract Civilians[4]	2,500	2,500	2,520	2,590	2,640	2,660	2,810	2,950
Total Post Personnel	**6,130**	**6,350**	**7,020**	**7,230**	**7,520**	**7,650**	**7,980**	**8,200**
Military Dependents	560	580	1,370	1,370	1,540	1,540	1,540	1,540
Difference from No Action Alternative								
Total Post Personnel	0	0	0	0	30	30	260	480
Military Dependents	0	0	0	0	0	0	0	0

1. WSMR Installation Population Summary, October 2007.
2. EN BN receives 585 soldiers in FY08.
3. EN BN receives 124 soldiers in FY10
4. For analysis, civilian numbers include some increase to support future test mission operations and programs, and civilians to increase support functions associated with EN BN.

2.4 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

Alternative 2 includes all the actions in the No Action Alternative and Alternative 1. In addition, this alternative addresses the effects of stationing a HBCT (or comparable unit) at WSMR (see Section 2.4.1). It also provides a capability for heavy off-road maneuver training (similar to a HBCT or comparable unit) at WSMR in a newly designated Southeast Multi-Use Area (see Section 2.4.2).

2.4.1 RANGE CAPABILITIES AND USE

2.4.1.1 Range Land Use

Alternative 2 would include the same land use changes as described in Section 2.3.1.1 for Alternative 1. In addition, Alternative 2 would create a new Specialized Area, the Southeast Multi-Use Area comprised of approximately 120,000 acres, for multiple uses to support both test and training maneuvers (see Section 2.4.1.4). This new area is located in the South Range, south of US 70 as shown on Figure 2.4-1 In addition to ground maneuvers for test (as described in Section 2.3.1.2), the area would support a higher level of off-road activity for training than proposed for the Augmented Test Zone Land Use Classification C.

Additional details on level of use are provided in the following sections. Any use of this special area would be subject to approval and completion of requisite surveys (e.g., archaeological) and possible mitigation or UXO removal.

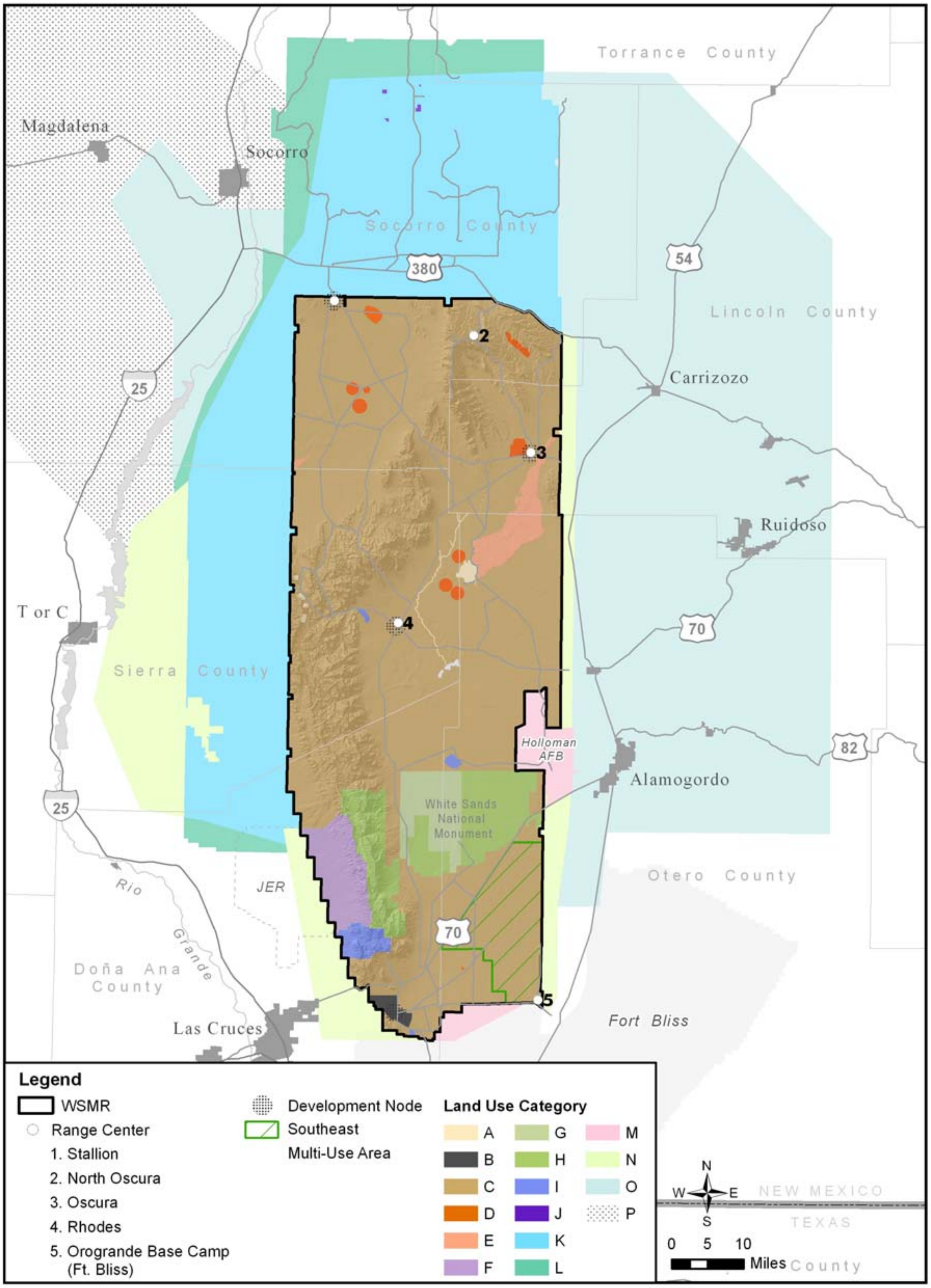


Figure 2.4-1. Proposed Location of the Southeast Multi-Use Area

2.4.1.2 Range Activities and Level of Use

2.4.1.2.1 Range Activities

Range activities and levels of use under Alternative 2 would be the same as described in Section 2.3.1.2 for Alternative 1.

2.4.1.2.2 Training Activities

Under Alternative 2, the proposed Southeast Multi-Use Area would support regular, heavy use for maneuver, similar to levels of a HBCT (or comparable unit). Future unit training in weapons and small arms, including tank gunnery and artillery firing, would occur at firing ranges on Fort Bliss. WSMR would continue to support test missions as a priority; therefore, to maintain flexibility with scheduling multiple uses, some portion of maneuver training may occur on adjacent Fort Bliss or other military installation training areas.

Training by a HBCT (or comparable unit) at WSMR would substantially increase field operations, dismounted training, and off-road vehicle maneuvers in the proposed Southeast Multi-Use Area. The level of use and intensity of maneuver training would differ from the off-road activities for test programs. Whereas maneuver-to-test activities for BCT Modernization and similar programs could be conducted throughout most of Land Use Classification C on an occasional, intermittent basis, training maneuvers would occur on a regular basis in the Southeast Multi-Use Area.

The intent of establishing the Southeast Multi-Use Area is to provide test and training users with an operational area that has undergone environmental review and approval. Each use for non-hot purposes would not require further coordination; however, activities in this area would be subject to scheduling and mission deconfliction as per WSMR's standard procedures, and the area may be subject to frequent evacuation for test events. Portions of the area may be off-limits due to resource value, safety hazards, or environmental management activity. These would be clearly marked in the field (and with other real-time GPS information), effectively defining the operable training area.

A HBCT (or comparable unit) would train in a dynamic fashion, moving relatively constantly across the land in tanks and other tracked and wheeled vehicles during any given training event. TC 25-1 "Training Land" and TC 25-8 "Training Ranges" define the training requirements for different types and sizes of units, including crew level (typically four to 10 Soldiers), platoon level (16 to 44 Soldiers), company level (62 to 190 Soldiers), and battalion level (300 to 1,000 Soldiers).

The broad categories of HBCT (or comparable unit) training events consist of: 1) Offense (move to establish contact with the enemy or attack); 2) Defense (defend from an enemy attack or move to break contact); and 3) Reconnaissance and Security (for moving and stationary assets). In some cases, all units in a brigade may participate in the same event (e.g., attack), while in other scenarios different units may have different missions simultaneously (e.g., one company attacks, one company provides security for a critical asset). Examples of vehicles used in such training include tracked vehicles, such as M2/M3 Bradley Fighting vehicles; M1113 Armored Personnel Carriers; and wheeled vehicles such as High-Mobility Multipurpose Wheeled Vehicles (HMMVVs), Light Medium Tactical Vehicles (LMTVs), and Modular Test Vehicles (MTVs).

2.4.1.2.3 Level of Use

The annual maneuver requirements outlined in TC 25-1 were used to quantify anticipated off-road maneuver training for a HBCT (or comparable unit). The duration of each training event would vary from 1 to 14 days and would be conducted annually, semiannually, or quarterly. TC 25-1 provides training requirements in metric values; therefore, this section presents maneuver training information in metric, followed by its English equivalent. In aggregate, the requirements for Alternative 2 would result in approximately 88,000 square kilometer days (km^{2}d) (34,000 mi^{2}d) of off-road vehicle maneuver training per year for a HBCT (or comparable unit). Km^{2}d are a measure of the amount of area used over time, in this case, over the course of a year. Table 2.4-1 shows HBCT basic training requirements.

Table 2.4-1. Heavy Brigade Combat Team Maneuver Requirements

Unit	No. of Units	Size of Maneuver Box (km^2)[1]	Duration (days)	Times per Year	Total Unit Days/Year	Total (km^{2}d)[2]	Total (mi^{2}d)
Platoon Level Exercises	33	20-100	4-10	4	1,320	33,000	12,740
Company Level Exercises	11	30-124	5-12	2	264	27,280	10,530
Battalion Level Exercises	3	248	14	2	84	20,830	8,040
BCT Level Exercise	1	496	14	1	14	6,940	2,680
Estimated Requirement						88,050	33,990

1. Varies by unit function and component of the exercise.
2. Km^{2}d are a measure of the amount of area used over time, in this case, over the course of a year. For example, a training event that lasts 14 days, occurs semiannually, and uses an area measuring 10 km by 25 km would be 7,000 km^{2}d (14 x 2 x 10 x 25).

The total estimated area directly disturbed in a year due to off-road activity (including both wheeled and tracked vehicles) would be 148,000 acres (accounting for width of tires and tracks and vehicle miles traveled). Within the proposed 120,000-acre Southeast Multi-Use Area, if this disturbance were equally distributed, some areas would be disturbed more than once. It is likely that activity would tend to concentrate in some areas, so that some areas may not be disturbed, and others disturbed more frequently. In addition, safety, environmental, and/or cultural concerns would constrain use in some portions of the Southeast Multi-Use Area, further concentrating activity in useable areas. For the purposes of analysis, it is assumed that all of the area except those sites that are designated off-limits would likely experience some level of disturbance every year. A little more than half of the disturbance would be caused by tracked vehicles and the remainder by wheeled vehicles.

In addition to heavy maneuver training, the Southeast Multi-Use Area could support less-intensive training such as IED route clearance training, similar to activities described for the Local Training Area under Alternative 1. IED route clearance training would occur primarily on existing roads and established routes. It would involve locating, identifying, and disposing of simulated enemy weapons, including IEDs and mines. Wheeled and tracked vehicles would remain on prescribed routes, generally using existing roads or trails, with minimal off-road maneuvering or disturbance. The area may also be used for test maneuver activities similar to those described in Section 2.3.1.2.

2.4.1.3 Infrastructure and Facilities Construction

Access between Main Post and the Southeast Multi-Use Area would require additional tank trails or restoration of old tank trails. Specific locations for new tank trails have not been identified; however, approximately 100 miles of a tank trail network are proposed south of US 70 within the Southeast Multi-Use Area. Figure 2.4-2 shows a hypothetical layout of 100 miles of tank trails (following existing roads). Prior to construction/restoration of tank trails, proposed locations would undergo a siting, review, and approval process. Hardened tank crossings would be constructed over the natural gas pipeline that traverses the proposed Southeast Multi-Use Area.

2.4.1.4 Specialized Areas

The size of the Southeast Multi-Use Area is based on Army Training Circular (TC) 25-1 "Training Land", the Army's definitive source for defining maneuver training land requirements. It specifies an optimal training space requirement for a brigade combat team of approximately 10 miles by 30 miles. This

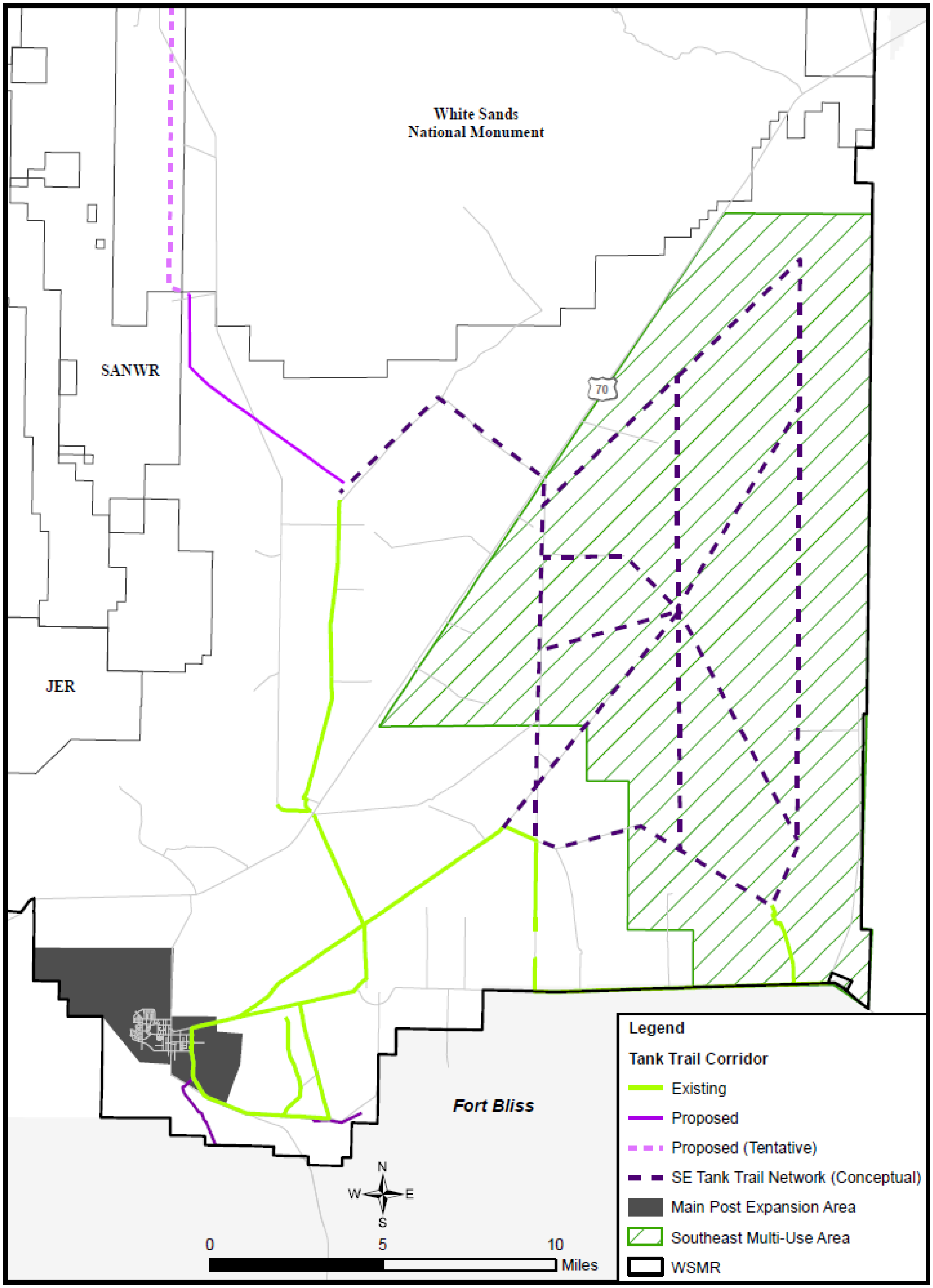


Figure 2.4-2. Conceptual Tank Trail Network in the Southeast Multi-Use Area

configuration allows an entire HBCT (or comparable unit) to train each maneuver task individually within this large box, without stopping between each exercise to reposition forces, thereby maximizing training efficiency. A smaller maneuver area of 10 miles by 19 miles can also be used, but it requires repositioning of forces between each exercise, decreasing training efficiency. The Southeast Multi-Use Area is sufficiently large to accommodate the larger maneuver boxes needed for brigade-level training.

Prior to using the Southeast Multi-Use Area for regular maneuver training, archaeological clearance would be completed according to procedures and criteria in the governing Programmatic Agreement. The area also would be appropriately cleared of UXO hazards. Areas designated as off-limits would be delineated clearly in the field.

The Southeast Multi-Use Area was identified as the most viable location on WSMR for heavy off-road maneuver training. From an operational perspective, it is relatively close to Main Post, reducing tank-driving distances. It avoids the area with high concentration of facilities and test beds in the south range. This location has the least interference with up-range missile testing and other routine test missions. It also has distinct geographic boundaries on three sides (WSMR installation boundary and US 70), which aids in limiting off-road activities to designated areas.

This location also poses the least environmental impact in terms of threatened or endangered species and surface water features. There is, however, a relatively high potential for encountering UXO or cultural resources in this area. Consequently, use of the Southeast Multi-Use Area would be contingent on conducting both UXO and cultural resource surveys. WSMR Environment Division would only approve areas following any requisite mitigation. Areas not approved for access would require clear marking as "off limits."

Within the Southeast Multi-Use Area, pre-selected sites would be designated for logistics and command and control operations in the maneuver areas. From those locations, the units would train on their mission essential tasks. The field sites would range from half an acre to a couple of acres in size. Some sites, but not all, may require a gravel surface, such as areas with high vehicle concentrations for refueling. Sites may have temporary structures (such as tents) where message centers or field functions could occur. For analysis, it is assumed there may be five field sites and suitable sites would undergo a screening and approval process with the WSMR Environmental Division to avoid operational and environmental constraints.

2.4.2 IMPLEMENTING UNIT STATIONING

The Army Growth and Restructuring decision to station a HBCT at WSMR (scheduled to arrive in October 2012 [FY 2013]), was recently reversed. However, the Army's need remains for flexibility to respond to changing situations globally and to provide training for its future fighting force. Therefore, analysis of stationing and training a HBCT (or comparable unit) at WSMR is retained in the Final EIS under Alternative 2. This section describes the basic elements of a beddown of a HBCT at WSMR.

2.4.2.1 Main Post Area Construction

Approximately 3.2 million s.f. of construction are projected under Alternative 2 in and around the Main Post. The U.S. Army Corps of Engineers (USACE) has established a program for standard facilities needed to support garrison operations and Families of the Army's modular brigade combat teams. Critical facilities required by a HBCT would include office space for brigade, battalion, and company Headquarters units; barracks space for single enlisted Soldiers; family housing; dining facilities; maintenance shops; parking for vehicles; and storage space. Table 2.4-2 shows the amount of space allocated by Army facility planners for a HBCT. Generally, these facilities need an area of about 250 to 300 acres for developing a cohesive critical facility layout.

Table 2.4-2. Critical Heavy Brigade Combat Team Facility Requirements

Garrison Facilities	Facility Size (s.f.)[1]
Brigade Offices	39,500
Battalion Offices	77,800
Company Offices	414,900
Organization Classroom	12,400
Ammunition Storage	5,000
Unit Storage Buildings	48,300
Family Housing	2,786,000
Barracks Space	558,900
Combat Vehicle Parking	2,329,400
Vehicle Maintenance	258,900
Total	**6,553,600**
Vehicle Fuel Storage (gallons)	375,900

1. Values rounded to the nearest hundred. Units are s.f. unless otherwise indicated.

The amount of new construction programmed for a specific installation may vary depending on existing facilities that can be used or renovated to meet a portion of the requirements. At WSMR it is estimated that a HBCT would require approximately 1.3 million s.f. of new facilities (excluding family housing), and about 53 acres of pavement for vehicle parking and equipment. Figure 2.4-3 shows the proposed location for a Future Development Area sited to the east of the EN BN enclave under this alternative.

A HBCT is usually allocated up to 2.8 million s.f. of family housing, but requirements depend on existing housing supply (Ref# 002). Therefore, WSMR may construct an additional 300 units (approximately 600,000 s.f.) for HBCT Families. This would require a future site of approximately 280 acres. Options within the existing Main Post or expanded Main Post would undergo a site selection and approval process in the future.

In addition to mission critical facilities, increased population on-post would generate requirements for other administrative, O&M, medical and dental facilities; community support; schools; and Morale, Welfare, and Recreation facilities. These Military Construction projects may include physical fitness areas, community support facilities, museum expansion, a Soldier supply center, a child development center, fire stations, communications center, and logistics facilities. As shown in Table 2.4-3, their functions could require approximately 980,000 s.f. of new development in the Main Post area. Utility upgrades needed under Alternative 2 include expansion of electrical substations and a new wastewater treatment plant to meet additional population demands.

Construction projects anticipated for the Main Post built-up area (totaling about 3.2 million s.f.) under Alternative 2 include facilities to support the expanded post population and training units. Each project listed below would include outdoor site work for parking and sidewalks and anti-terrorism/force protection (as per Army standards). Table 2.4-3 summarizes total estimated new facility construction,

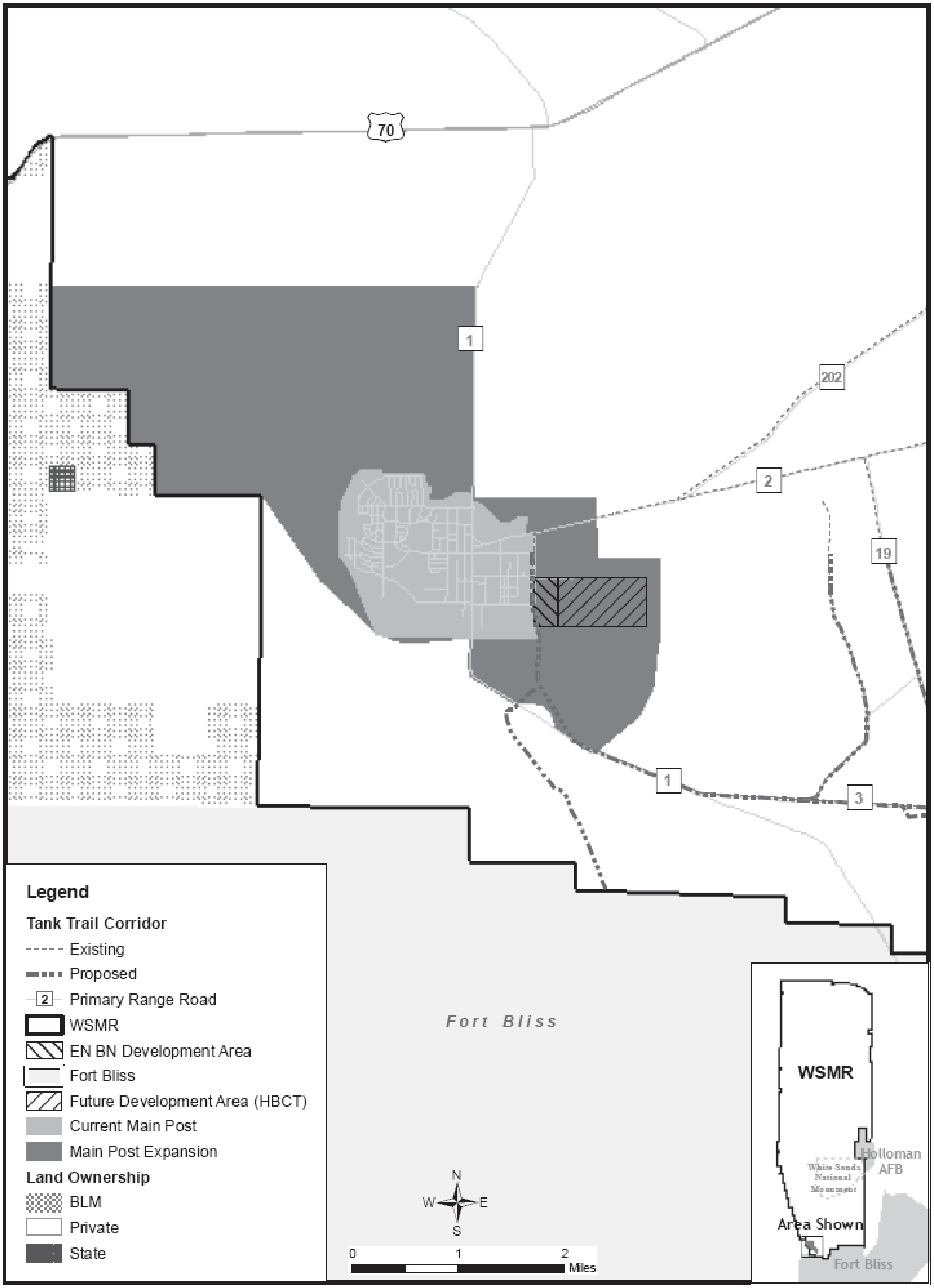


Figure 2.4-3. Proposed Location of the Future Development Area

development areas, and ground disturbance associated with the HBCT (or comparable unit) under Alternative 2.

- Garrison General Administration Space
- HBCT critical facilities (see Table 2.4-1)
- Mini Mall (Brigade size)
- Shopping Center Renovation
- Army Community Services Expansion
- Battle Command Training Center
- Bowling Center
- Public Safety Complex
- Centralized Wash Facility
- Chapel Complex
- Child Development Center Facility
- Commissary Addition/Alteration
- Consolidated Maintenance Complex
- Courtroom and Office
- Expand Golf Course (seven holes)
- Fire Station-One Company
- Future Family Housing (300 unit development)
- Network Service Facility
- New Elementary School
- New High School
- New Middle School
- Officer/Non-Commissioned Officer Club
- One Stop In/Out Processing Facility
- Physical Fitness Center Addition
- Physical Fitness Facility
- Soldier Family Care Medical/Dental Complex
- Telephone Service Facility
- Training Support Center

Table 2.4-3. Estimated Construction and Ground Disturbance under Alternative 2

Project	New construction (s.f.)	New pavement (acres)	Area Disturbed (acres)
Main Post Area (built-up areas)			
HBCT (core facilities)	1,320,000	50	300
Other Development (common facilities)	978,000	10	130
Family Housing[1]	600,000	10	280
New Schools[2]	320,000	70	320
Total	**3,218,000**[3]	**140**	**1,030**[4]

1. Estimated at about 2,000 s.f. per unit; development area includes outdoor areas and buffers.
2. Estimated based on 1,000 s.f. facility per acre. Construction estimate for schools is a basis for analysis in the EIS analysis, since there is not a known or programmed facility requirement at this time.
3. Total HBCT construction would be less than the amount allocated/required since existing facilities would be used to the extent possible (e.g., housing and administrative space, maintenance shops).
4. Area of temporary disturbance during construction may be about 20 percent larger than the area developed due to staging of materials and vehicle operations for any given project.

A HBCT would also require a new Training Support Center and a Battle Command Training Center located on or near the Main Post. These would support functions at the Local Training Area (see Section 2.3.1.4). The Training Support Center (34,000 s.f.) would include a warehouse, storage, administration buildings, and support facilities. The Battle Command Training Center (46,000 s.f.) would provide constructive battle simulations using networked computers and communications equipment, including a Tactical Operations Center and communication/antennae structure. The facility would also have an access control point, battle command training building, and parking for tactical and non-tactical vehicles.

2.4.2.2 Equipment and Vehicles

A HBCT (or comparable unit) would operate with a suite of ground equipment involving fueling operations and maintenance activities. A HBCT (or comparable unit) and its subunits would also conduct training of various types and levels. Proposed equipment and training requirements for a HBCT under Alternative 2 are described in the following subsections.

A HBCT would come with approximately 900 tactical wheeled vehicles (such as HMMWVs and convoy trucks), approximately 360 tracked vehicles (e.g., M1 tanks, Bradley fighting vehicles), 165 generator sets, and other equipment (such as non-motorized trailers and a variety of small arms). Based on the total increase in on-post personnel and Families for test programs, the EN BN, and increases in garrison support (see Table 2.4-5), a doubling of non-tactical and General Services Administration vehicles is also projected, growing in proportion to the unit assigned equipment levels. Table 2.4-4 shows the total equipment levels estimated for Alternative 2 (military, test, garrison, and civilian vehicles), including existing and projected vehicles not associated with a HBCT. This projection does not include non-government contractor vehicles and equipment.

Tracked vehicles would travel to and from Fort Bliss using a complex of existing tank trails that would be upgraded. The main trail for Doña Ana ranges and maneuver areas would connect to a WSMR tank trail leading to the EN BN and HBCT complexes. In addition, Heavy Equipment and Truck Transports may be used to transport tanks to the Orogrande Range Camp or to ranges at the southern end of Doña Ana. The approximate number of annual trips would be consistent with firing and qualification requirements. Assuming Soldiers would travel back to WSMR each evening during training, they would need to travel semi-annually for range qualification and up to 126 days a year for maneuver training.

Table 2.4-4. Estimated Equipment Levels at WSMR under Alternative 2

Type of Equipment	FY 2007	FY 2008[1]	FY 2009	FY 2010	FY 2011[2]	FY 2012	FY 2013[3]
Wheeled Vehicles	1,340	1,449	1,449	1,449	1,487	1,487	2,382
Tracked Vehicles	12	97	97	97	141	141	503
Generator Sets	567	600	600	606	606	606	771
Non-tactical and General Services Administration	1,665	1,862	1,862	1,862	1,938	1,938	3,172

1. Addition of the EN BN to WSMR.
2. Assumed as the addition of additional Clearance Company to EN BN.
3. For the purposes of analysis, it was assumed that the entire HBCT would move to WSMR in FY 2013.

2.4.2.3 Personnel

The stationing of a HBCT was assumed to increase the population at WSMR by approximately 3,800 military personnel and additional 5,120 Family members in FY 2013. Under this scenario, to support the new brigade, additional civilian personnel (approximately 200) would start arriving in FY 2012. After 2012, the Garrison could add an additional 2,200 civilian positions to support the increased population and expanded mission support requirements (Ref# 013). As shown in Table 2.4-5, this alternative would result in total on-post personnel of approximately 14,300 in FY 2013. This includes the EN BN and Soldiers attending qualification training, as well as an increase in civilian personnel to support test programs (see Section 2.3.1.4) between FY 2008 and 2013.

Table 2.4-5. Personnel and Military Dependents under Alternative 2

	FY 2006[1]	FY 2007	FY 2008[2]	FY 2009	FY 2010[3]	FY 2011	FY 2012[4]	FY 2013[5]
Total Assigned Military	420	440	1,020	1,020	1,140	1,150	1,150	4,950
Military Students (Soldiers)	200	400	400	500	600	700	800	800
Government Civilians[6]	3,010	3,010	3,080	3,090	3,130	3,140	3,420	4,500
Contract Civilians[6]	2,500	2,500	2,520	2,590	2,640	2,660	2,810	4,050
Total Post Personnel	**6,130**	**6,350**	**7,020**	**7,230**	**7,520**	**7,650**	**8,180**	**14,300**
Military Dependents	560	580	1,370	1,370	1,540	1,540	1,540	6,660
Difference from No Action Alternative								
Total Post Personnel	0	0	0	0	30	30	460	6,580
Military Dependents	0	0	0	0	0	0	0	5,120

1. WSMR Installation Population Summary, October 2007.
2. EN BN receives 585 soldiers in FY08.
3. EN BN receives 124 soldiers in FY10
4. For the purposes of analysis, the entire HBCT was assumed to move to WSMR in FY 2013.
5. Additional Army civilians to support Garrison in FY 2013, as per telecom with Infrastructure Report Team and USACE representative Mr. Frank Covington, December 2008.
6. For analysis, civilian numbers include some increase to support future test mission operations and programs, and civilians to increase support functions associated with EN BN and HBCT.

This represents a total increase of approximately 7,900 personnel above FY 2007 levels and 6,100 additional military Family members, for a combined population of about 21,800 (personnel and Family members). The number of school-aged children is projected to increase from approximately 330 in FY 2007 to approximately 3,800 in FY 2013. The number of military households (accompanied military personnel) would increase from approximately 250 to approximately 2,870 in that period. These numbers are based on current knowledge of stationing actions and assumptions about how other mission and support functions could grow.

In addition to the projected changes in Army personnel, construction projects would result in a number of jobs for construction workers. For the purposes of planning infrastructure requirements, the Army projects transient workers to increase from 100 in FY 2008 to as many as 1,500 annually between FY 2009 to FY 2013, leveling off at about 300 sometime after FY 2013 following the completion of the major construction for a HBCT (or comparable unit).

2.5 Measures Incorporated in the Alternatives to Reduce Adverse Impacts

WSMR has established standard requirements for approval and execution of all programs and activities. These requirements are common to all alternatives, including the No Action Alternative. Table 2.5-1 lists the standard procedures and requirements of all range users. In addition, WSMR requires coordination, review, and approval for different activities undertaken on the range (as needed or appropriate) as listed below:

- Preparation of Test Plans and compliance with standard procedures (Table 2.5-1)
- Ground and flight safety review and approval
- Flight Termination System review (for missile firings)
- Scheduling of surface resources and airspace
- Notice to Airmen and FAA coordination
- Highway closure/road block notifications
- Compliance with landowner MOAs
- Evacuation notifications
- Siting approval (for new facilities and test beds)
- Master Planning Board review
- Archeological survey and/or approval
- UXO survey and clearance
- Environmental permits
- Frequency approval and assignment
- Non-ionizing radiation review
- Compliance with New Mexico DOT and county regulations when traveling on public roads

Table 2.5-1. WSMR Standard Procedures and Requirements for Range Users

Land Use and Aesthetics	
Infrastructure	Infrastructure projects shall be sited through the WSMR master planning process.
	WSMR will continue to coordinate with the White Sands National Monument on new projects that are adjacent to or within the viewshed of the Monument that may affect visual resources.
Ground Operations	Prior to dismounted operations in the JER, coordination with USDA through the Public Works Environmental Division would occur.
	All activities shall be restricted to existing approved areas, unless authorized by the WSMR Environmental Division.
Hazardous Operations	SDZs shall not extend beyond the boundaries of WSMR or its call-up areas.
	Hunting activities are de-conflicted from missions through scheduling.
	All hazardous activities shall be restricted to existing approved areas, unless authorized by the WSMR Environmental Division.
Air Quality	
General	Customers shall coordinate with WSMR Environmental Division (Air Quality Manager) when using an emission source.
Cultural Resources	
Infrastructure/General	Personnel shall notify the WSMR Environmental Division immediately if any historic or archaeological resources are discovered during construction activities.
Ground Operations	WSMR shall designate sensitive areas by various methods approved by the WSMR Environmental Division.
	Comply with installation Section 106 compliance process prior to using any area for off-road vehicle maneuver.
Earth Sciences	
Infrastructure	Following construction, disturbed areas not covered with impervious surfaces like roofs and paved areas, will take into consideration methods to minimize erosion.

Table 2.5-1. WSMR Standard Procedures and Requirements for Range Users (continued)

Biological Resources	
General	WSMR shall protect migratory birds, nest, eggs, and nestlings in accordance with the WSMR Commander's Guidance on the Migratory Bird Treaty Act (MBTA) (Ref# 014), the DoD/USFWS MOU to Promote the Conservation of Migratory Birds, and the Final Rule: Migratory Bird Permits; Take of Migratory Birds by the Armed Forces. The WSMR Environmental Division shall be contacted regarding any issues related to migratory birds.
	WSMR shall protect bald and golden eagles in accordance with the Bald and Golden Eagle Protection Act of 1940, as amended. WSMR is required (by permit) to report all eagle carcasses discovered to USFWS within 48 hours, and then be appropriately transferred to the USFWS. The WSMR Environmental Division shall be contacted regarding any issues related to eagles, their nests, eggs, or nestlings.
	Restrict ground operations from intercepting within the boundaries of Limited Use and Essential pupfish habitat. Coordination required otherwise.
	Todsen's pennyroyal areas will not be used for construction or ground disturbing test or training activities.
	WSMR is required to conserve Threatened or Endangered species listed under the Endangered Species Act. By permit, WSMR is required to report observations of the Northern Aplomado falcon to the USFWS within 24 hours. WSMR Environmental Division shall be contacted regarding observations for follow-up by permitted biologists.
	Projects occurring within Chihuahuan desert grassland habitat will be coordinated with WSMR Environmental Division to ensure that appropriate surveys for the Northern Aplomado falcon are conducted by permitted biologists. If a Northern Aplomado falcon nest is observed, projects will be sited to avoid impacts to the falcons, nests, eggs, or nestlings.
	WSMR environmental shall be contacted when any bat roost or snake den site is discovered. Bat roosts are sensitive resources and will not be disturbed. Bats or snakes shall not be handled except by qualified WSMR biologists who are able to exclude bats from buildings or relocate snakes away from project sites.
Water Resources	
Infrastructure	Stormwater management strategies would be implemented as prescribed in the latest storm water management plan.
Safety	
Infrastructure	All residents, employees, and visitors requiring access to WSMR areas outside the Main Post must receive UXO awareness training. A statement shall be provided for each individual to sign, indicating that she/he has received the briefing, and the action proponent shall maintain the statement for follow-up monitoring.
Ground Operations	All government and contractor-owned vehicle and motorized heavy equipment shall be equipped with a portable fire extinguisher (minimum 2.5-pound dry chemical).
	Communication equipment is required when travelling beyond the Main Post.
General	The action proponent and the proponent's contractors(s) shall comply with Occupational Safety and Health Act (OSHA) of 1970, 29 U.S.C. §§ 651-678 and 29 CFR Parts 1910 and 1926. All personnel (construction and operational) shall be briefed on the potential hazards and necessary precautions to be taken and procedures to be followed.
Hazardous Operations	An approved SOP shall be submitted to and approved by the Safety Office prior to any operation of any hazardous operation.
Hazardous Materials and Hazardous Waste	
General	All tactical vehicles in the field are required to use drip pans.
	The action proponent shall be responsible for spill prevention and cleanup.
	All project debris shall be removed from the project areas following the action. Cleanup and restoration of the area shall be coordinated with WSMR Environmental Division personnel, as determined necessary.

Table 2.5-1. WSMR Standard Procedures and Requirements for Range Users (continued)

Facilities and Infrastructure	
Infrastructure	Prior to digging, construction contractors shall obtain a digging permit. All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.
Ground Operations	Digging associated with ground operations will also require a digging permit. WSMR will update its Standard Operating Procedure for the dig permit process to specifically address digging associated with military test and training events.
Transportation	
Infrastructure	Construction contractors shall conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on roads except with written permission of the Contracting Officer.
Hazardous Operations	US 70, 54, and 380 roadblocks shall conform to notification and time constraints outlined in the 1972 State Highway Commission Resolution.
Frequencies	
General	Coordinate all frequency uses with the WSMR frequency manager.
Wildland Fire	
Ground Operations	All wildfires shall be reported immediately to the WSMR Fire Department..

2.6 Alternatives Considered But Not Carried Forward For Full Analysis

This section briefly summarizes two alternatives for accomplishing the purpose and need for the Proposed Action that were considered and eliminated from the scope and decision-making of this document. ***Please note that the alternatives described here are those that were included in the Draft EIS prior to the Army's June 2009 decision not to station a HBCT at WSMR.***

2.6.1 CONSTRUCTION AND USE OF FIRING RANGES ON WSMR FOR HEAVY BRIGADE COMBAT TEAM AND ENGINEERING BATTALION TRAINING

The Army did not consider this as a reasonable alternative, because Fort Bliss has adequate capability to support weapons training requirements of units stationed at WSMR, including a HBCT. Based on the capabilities at Fort Bliss and their proximity to WSMR, the Army has no plans to construct firing ranges for training on WSMR.

2.6.2 HEAVY BRIGADE COMBAT TEAM MANEUVER TRAINING IN UPRANGE PORTION OF WSMR

An alternative that would designate an area for off-road vehicle maneuver for a HBCT (or comparable unit) training in the northern part of WSMR was not considered reasonable because of the lack of developed infrastructure to support Soldier training in that part of the installation. In addition, uprange areas support varied test missions and experience the highest level of evacuations due to safety hazards from live-fire and directed energy test missions. These types of activities are likely to increase in the future. Interrupted and limited availability of uprange locations would affect the quality and possibly the quantity of Soldier training that could be conducted. Conversely, Soldier training could constrain test activities that are also vital to supporting WSMR's MRTFB purpose; therefore, current and future operational constraints made this alternative unreasonable.

2.7 Preferred Alternative and Environmentally Preferred Alternative

The Department of Army and WSMR have selected Alternative 1 as the Preferred Alternative, which would include implementation of the Land Use and Airspace Strategy Plan, changing land use at WSMR, and expand testing and training capabilities to support new and evolving test requirements throughout the installation, including providing limited field training capability within specialized areas and off-road maneuver areas for testing programs.

NEPA requires that an environmentally preferred alternative be identified. The No Action Alternative provides a baseline of on-going and previously approved test and training activities at WSMR that have undergone previous NEPA evaluation. The No Action Alternative would have no significant adverse impacts, and would be the environmentally preferable alternative. However, the No Action Alternative would not meet WSMR's mission needs to support new and evolving test requirements through implementation of the Land Use and Airspace Strategy Plan, nor the field training capability needed at proposed specialized areas.

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3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the environmental setting and existing physical, biological, social, and economic conditions that occur at WSMR and within the region of influence (ROI). The ROI defines the geographic extent of potential impacts from the alternatives on the important elements of that resource. The information contained in this chapter also provides a baseline for evaluating the potential project-related environmental consequences of the alternatives discussed in Chapter 2.

> The region of influence (ROI) is the physical area that bounds the environmental, sociologic, economic, or cultural features of interest for analysis purposes.

This chapter is organized into sections for each resource area. As applicable, each section contains an introduction to the resource; a definition of the ROI, which varies due to the specific nature of the resources (e.g. air quality impacts could occur in a much wider area than noise, which would be more localized); and a discussion of the existing condition of the resource within the ROI.

This chapter describes the environmental setting and existing conditions for the following resource areas in this order:

- Land Use And Aesthetics
- Airspace
- Air Quality
- Cultural Resources
- Earth Sciences
- Biological Resources
- Water Resources
- Safety
- Noise
- Hazardous Materials and Hazardous Wastes
- Facilities and Infrastructure
- Transportation
- Socioeconomic Resources
- Environmental Justice
- Energy
- Frequencies
- Wildland Fire

The affected environment has been determined using the criteria in the Army NEPA Guidance Manual 2007 (Ref# 007).

3.2 Land Use and Aesthetics

3.2.1 INTRODUCTION AND DESCRIPTION

The attributes of land use addressed in this analysis include general land use patterns, land ownership, land management plans, and special use areas. Land ownership is defined according to major categories of land owner, including private, Federal, Native American, and State. Federal lands are further described by their managing agency (e.g., USFWS, U.S. Forest Service, BLM, or DoD). Several agencies identify special use areas, which are managed differently than other lands, due to their sensitivity. The ROI for land use includes all land areas where land use patterns may be altered as a direct result of implementation of the Proposed Action. The ROI includes land under WSMR's administrative purview, lands in WSMR call-up areas, land beneath WSMR Restricted Area airspace, and lands immediately surrounding these areas (e.g. City of Las Cruces and City of Alamogordo). Brief descriptions of the lands making up the ROI are provided in Section 1.2.1 of this EIS.

Visual or aesthetic resources are generally defined as the natural and built features of a landscape that contribute to the public's overall appreciation of that landscape. The potential for a project to impact visual resources is dependent upon the extent to which a project's presence would alter the perceived visual character and value of the environment.

3.2.2 ARMY LAND USE MANAGEMENT

Land management on WSMR is guided by several regulations including (AR) 210-20, *Real Property Master Planning for Army Installations*, AR 350-19, *The Army Sustainable Range Program*, and AR 200-2, *Environmental Efforts of Army Actions*. AR 210-20 defines the Army real property master planning process, which integrates goals and objectives for installation development with natural, cultural, and other land use constraints. AR 350-19 provides policy and guidance on the Range and Training Land Program and the ITAM Program. The WSMR ITAM program facilitates integration of mission requirements and environmental constraints. AR 200-2 defines the Army methodology for assessing environmental impacts of Army actions. On WSMR Main Post, a Real Property Planning Board reviews and approves facility siting plans, as per the requirements of AR 210-20. This review process integrates facility operational requirements with environmental constraints and other land use planning considerations. Once a project passes the Real Property Planning Board, the Garrison Commander submits it to the IMCOM-West Region Director for formal siting review and approval.

Mission planning and facility siting on the range is carried out using a different process from that used on the Main Post. The details of the process vary case-by-case. In most cases, the process starts with WSMR Business Development working together with the new customer (agency requesting mission/facility) to define project requirements. A range sponsor is assigned either from the Test Center or from the Directorate of Public Works. The range sponsor works with the WSMR Environmental Division and other relevant offices to formulate a workable solution to meet the customer's needs. During this coordination process, impacts of the project on environmental resource areas are considered, NEPA documentation is prepared, ITAM Range and Training Land Analyses are conducted, and potential operational conflicts are identified. Final decisions on range facility/mission siting are made by range senior leadership (Ref# 015).

3.2.3 CURRENT LAND USES

As a designated MRTFB, most WSMR lands contribute to the mission either directly or through operational support. Patterns of land development on the installation reflect a steadily increasing number of permanent facilities which support increasingly complex and varied testing. In general, the range has been developed with densely populated facilities in the southern portion of the range [e.g., Main Post, NASA White Sands Test Facility (WSTF), Launch Complexes, HELSTF, etc.]. The northern portion of the range contains fewer regularly inhabited facilities than the southern portion (e.g., Stallion, Oscura, and North Oscura Range Centers) and the central portion of the range contains very few regularly inhabited facilities (e.g., Rhodes Range Centers). This configuration minimizes inconvenience associated with evacuation of personnel from areas in the central and northern portions of the range, as required during certain hazardous operations. The number of hazardous operations occurring annually under baseline conditions is presented in Table 2.2-4. Certain areas are permanently designated as being unsafe (e.g., explosives Q-D arcs). Access to these areas is tightly controlled and inhabited structures are never allowed.

Existing rights of way for roads and utilities corridors can constrain certain activities, particularly when they form a barrier. For example, US 70 and US 380 must be closed during many hazardous activities that occur on WSMR to provide a safety buffer. Road closures are carried out in accordance with an MOU with the New Mexico DOT, which limits frequency and duration.

The following is a description of each of the land use classifications within the WSMR boundary (see Figure 2.2-1).

3.2.3.1 Primary Test Zone

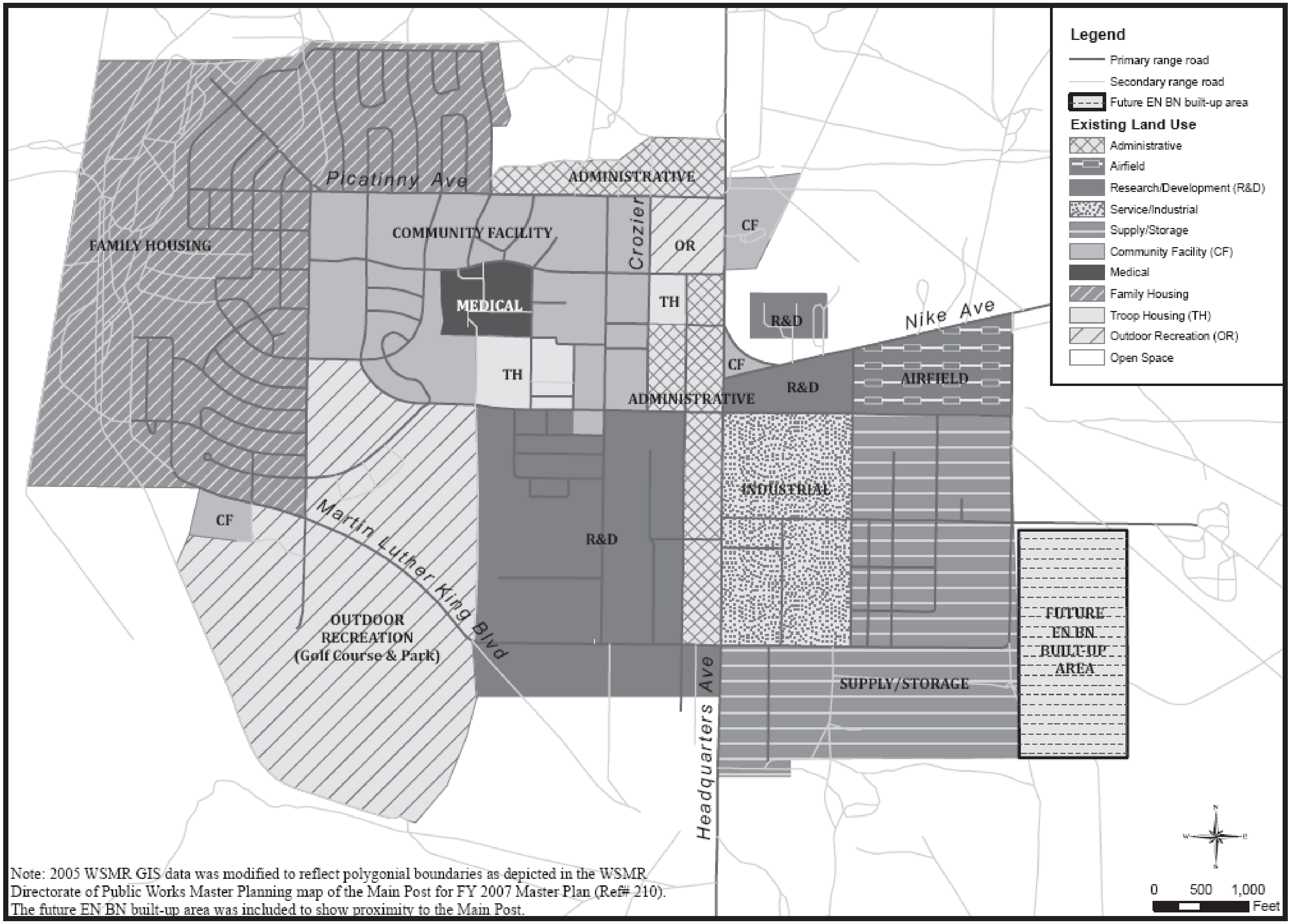
Most of WSMR functions as a Primary Test Zone (Land Use A). This land use classification supports a wide variety of test and management activities, including airborne and surface-based weapons firing, impact zones, and danger zones, directed energy systems, aircraft operations, dismounted operations, communications and instrumentation, field operations, and off-road travel with lightweight vehicles. Several land uses which involve personnel are considered to be compatible with the Primary Test Zone. The ROI currently includes 1,635,000 acres of Primary Test Zone. Activities in the Primary test zone may be constrained by a variety of environmental or operational factors. For example, certain safety buffers, such as around munitions storage facilities, are in effect continuously and preclude siting or occupation of other facilities. The large safety buffers associated with many testing activities at WSMR are temporary, lasting only for the duration of the test, allowing multiple uses at other times.

3.2.3.2 Range Centers and Built-up Areas

Range Centers and Built-up Areas include the Main Post area and Stallion, North Oscura, Oscura, and Rhodes Range Centers. The ROI currently contains 2,000 acres of land in this category. These areas have higher concentrations of facilities and development, focusing on general mission support functions, and working and living of personnel.

The Main Post comprises about 1,500 acres and is located in the far southwest part of WSMR. The Main Post contains approximately 820 structures with a combined size of 3.6 million s.f. (Ref# 016). Siting of new facilities on the Main Post is subject to approval by a Master Planning Review Board, which considers compatibility of adjacent land uses.

Much of the northern and western portion of the Main Post has been developed as family housing and portions of this area are being re-developed with new housing units (see Figure 3.2-1). The housing area abuts open space to the north and west and Community Facilities and Outdoor Recreation to the south and east. Family housing areas are sufficiently removed from industrial and administrative areas of the base to provide a safe environment which is free from excessive traffic and noise.



Source: Ref# 017

Figure 3.2-1. Existing Land Use in the Main Post Area

Community Facilities include any facility whose primary purpose is to support the community. Community Facilities include the Post Exchange, the gas station, bank, community center, pool, outdoor recreation centers, school, museum, library, police stations, and fire stations. Community Facilities are concentrated near the center of the Main Post; however, two cultural facilities (the White Sands Missile Range Museum and a monument) are located along Headquarters Avenue and the Frontier Club is located in the extreme southeastern section of the base.

The Outdoor Recreation Area includes the nine-hole White Sands Golf Course and a biking/running trail which are located along the southwest edge of the Main Post. In addition, several sports fields are located near the northeastern edge of the Main Post, near the Las Cruces Gate.

The McAfee U.S. Army Health Clinic is conveniently located near the center of the built-up portion of the Main Post. Helicopter flights to the clinic's helipad are infrequent, occurring only as necessary to handle emergency cases. Helicopter noise and vibration would not be expected to be frequent enough to cause compatibility issues with nearby housing areas.

Troop Housing (i.e. housing for Unaccompanied Soldiers) areas are located near the center of the Main Post, in close proximity to several community facilities, medical facilities, outdoor recreation areas, administrative office buildings, and Research and Development facilities. Nearby land uses do not contribute to excessive traffic or noise at the Troop Housing locations. Family housing is located on the northwest edge of the Main Post away from the key mission facilities, surrounded by open space up against the Organ Mountains to the west.

Administrative areas include facilities related to base infrastructure, maintenance, and management of base operations. Administrative areas are located in the northeastern sector of the Main Post and along Headquarters Avenue.

Research and development, industrial facilities, and storage facilities are located in the southern and eastern portion of the Main Post area. Facilities in this area provide logistical and operational support to base and range operations as well as a location for storage of range equipment.

Recently, troop training activity has increased on Main Post. Most Soldier training involves pedestrian activity and limited field operations in open space throughout Main Post and nearby areas.

A helicopter landing pad is located between Nike and Aberdeen Avenues to the east of the J.W. Cox Range Control Center. The presence of the multi-story Range Control center prevents helicopter approaches and departures to the east, but the helipad is unconstrained by obstructions in all other directions (Ref# 018).

Land uses on Stallion, Oscura, North Oscura, and Rhodes Range Centers are primarily Industrial, Administrative, or Supply and Storage, with limited areas being used for Troop Housing and Community Facilities. Table 3.2-1 provides an overview picture of the size and number of structures in each of these areas. Stallion Range Center provides key support facilities including operational support headquarters and a runway, which accommodates occasional aircraft operations related to testing and training missions.

3.2.3.3 Augmented Test Zone

The Augmented Test Zone is similar to the Primary Test Zone, and also allows off-road travel using all types of vehicles (heavy/light, tracked/wheeled) (see Table 2.2-1 for a description of land use classifications). A 206,640-acre area located south of US 70 is available for off-road test maneuver subject to archaeological approval and UXO safety conditions (Ref# 005). This recent change in land use responds to test mission needs for more off-road operations.

Table 3.2-1. Overview of Structures at Range Centers and Range Camps

Area	Combined Total Structure Size (s.f.)	Number of Structures
Stallion Range Center	114,630	35
Oscura Range Center	28,134	15
North Oscura Range Center[1]	26,742	11
Rhodes Canyon Range Center	21,201	10
Total	**190,707**	**71**

1. North Oscura Range Center totals include North Oscura Peak.

3.2.3.4 Impact Area

These areas (15,400 acres total) are known to contain dud high-explosives rounds and are not compatible with any ground activity other than EOD and data recovery. Adjacent areas are subjected to noise, smoke, dust, and an increased potential for wildfires.

3.2.3.5 Lava Flows

This 42,710-acre area, known as 'the Malpais', is covered in rugged basaltic-rock terrain. Currently, the area is used for safety buffer, overflight area and training operations. While it is not well-suited to construction of roads or any other structures, it may support certain types of ground activity.

3.2.3.6 Jornada Experimental Range

JER (60,570 acres) is operated by USDA and is used by the New Mexico State University (NMSU) for agricultural and ecological research. It lies partially within and partially outside of WSMR boundaries. The JER Co-Use agreement with WSMR, allows for limited military use including SDZ for missile events, and limited access by WSMR personnel and test operators (Ref# 019). WSMR has responsibility for natural resources in this area, but is advised by JER staff.

3.2.3.7 White Sands National Monument Co-Use Area

White Sands National Monument is comprised of 142,639 acres and a 57,080 acre Co-Use Area (see Figure 2.2-1). In the Co-Use Area, activities by both WSMR and White Sands National Monument are allowed in accordance with an interagency agreement (IAA) (Ref# 020). The interagency agreement allows WSMR to place mobile instrumentation equipment within the Co-Use area and to access the area for explosive ordnance disposal and recovery operations using established roads. Public access to the Co-Use area is allowed by permit only. The White Sands National Monument offers bicycling, picnicking, sledding, stargazing, backpacking, photography, and guided tours to the general public. During hazardous WSMR testing, affected areas on White Sands National Monument are evacuated of all persons, including White Sands National Monument staff (Ref# 020). These closures are published by White Sands National Monument to minimize inconvenience to visitors.

3.2.3.8 Conservation/Protected Area

Conservation/Protected areas include the SANWR, operated under Co-Use agreement with WSMR, and the remainder of White Sands National Monument (outside the Co-Use area). SANWR provides important habitat for the State threatened species, the desert bighorn sheep (*Ovis Canadensis mexicana*) as well as several other species. This Land Use Classification is compatible with overflight and act as a safety buffer for WSMR testing, but cannot be used for ground maneuvers without consultation with appropriate State and Federal agencies.

3.2.3.9 Dedicated Use Area

These areas (comprising 257,000 acres) include NASA's WSTF, the Army's Nuclear Effects Complex, and several facilities operated by the Air Force. These areas perform specific functions for one user and are managed and operated by that user.

NASA conducts tests and research at WSTF in support of its space mission. The facility comprises 60,800 acres (which includes large safety buffers) along the western flank of the San Andres Mountains and operates under Co-Use agreement with WSMR. Under the agreement, NASA is permitted to make modifications within the industrial area without WSMR approval. Construction of facilities in the safety buffer zone, however, requires permission from the WSMR Master Planning Board and Commanding Officer.

The Army's Nuclear Effects Complex is located in the central portion of the installation. This facility simulates conditions of a nuclear blast to test effects on various types of equipment.

The Air Force's Aeroacoustic Research Complex, which is located south of Stallion Range Center, carries out detailed measurements of aircraft acoustic signatures. Miscellaneous aircraft types to be tested at the Aeroacoustic Research Complex often operate out of Holloman or Kirtland AFBs. The Air Force's NRTF allows dispersed testing of systems using high-speed secure connectivity of several range facilities. The Radar Cross Section Advanced Management System facility is a U.S. Air Force asset and dedicated to tests related to defining radar signatures for various aircraft and equipment.

3.2.3.10 Other WSMR Land

WSMR uses several properties that are off the main range. Several instrumentation sites are leased by WSMR in the Northern Call-Up Area. Facilities at Green River, Utah; Fort Wingate, New Mexico; and Shoofly, Idaho are not located beneath WSMR's airspace. Fort Wingate has conducted missile tests in recent years.

Control of Mendiburu Ranch, which is located north of US 380, was recently transferred to WSMR. As part of the transfer, approximately 1,400 acres of privately-owned land were deeded to WSMR. WSMR now owns about 12,400 acres of the approximately 75,000-acre ranch outright, while the BLM and State continue to own and manage the remainder of the lands within the ranch boundary. WSMR has no plans to change how the land is used. The ranch currently supports grazing operations (through permits with the BLM and the State). The ranch lies within the Northern Call-Up Area.

3.2.4 CALL-UP AREAS AND RESTRICTED AREA AIRSPACE

The 4,459,850-acre area underlying off-range portions of WSMR Restricted Area airspace and call-up areas includes portions of Doña Ana, Otero, Lincoln, Sierra, Socorro, and Torrance counties. Population centers in the ROI are separated by wide expanses of sparsely populated land, the majority of which is used for agriculture. Agriculture in the ROI is primarily in the form of livestock grazing with crop agriculture being generally limited to relatively small irrigated areas. Major transportation routes in the ROI include Interstate 25 (running north-south from El Paso through Socorro), and US 70, 54, and 380. Municipalities within the study area include Las Cruces, Carrizozo, Ruidoso, Ruidoso Downs, Tularosa, and Alamogordo.

Counties within the ROI include Doña Ana, Lincoln, Otero, Sierra, Socorro, and Torrance. The average annual growth rate in the affected counties between 2000 and 2007 ranged from negative one percent in Sierra County to two percent in Doña Ana County. Much of the population growth in the counties has occurred in or near towns such as Las Cruces, Ruidoso and Ruidoso Downs, which experienced average annual growth rates between 2000 and 2007 of three, two, and six percent, respectively (Ref# 022).

A large percentage of the land within the study area is owned by government agencies (see Table 3.2-2). Figure 1-1 shows generalized land ownership in the affected area. Land uses in each ownership category are described below.

Table 3.2-2. Land Ownership

Owner	Acres	Percentage of Total Area
Private	1,469,200	22
BLM (Federal)	1,256,340	19
USDA (Federal)	48,620	1
DoD (Federal)	2,071,600	31
Forest Service (Federal)	520,560	8
USFWS (Federal)	141,990	2
Bureau of Indian Affairs (Federal)	356,660	5
NPS (Federal)	144,980	2
State	639,150	10
Total	**6,649,100**	**100**

Source: Ref# 030

3.2.4.1 Privately-Owned Lands

The majority of privately-owned lands in the ROI outside of developed areas are used for livestock rangeland. Many livestock operations in the area make use of several tracts of land including privately-owned land and land leased from BLM or other government agencies. The Pedro Armendariz Ranch, which lies under WSMR Restricted Area airspace five miles west of WSMR, stands out due to its size (360,000 acres). Observatories are another notable example of land use within the ROI. The Apache Point Observatory, located eight miles southeast of Alamogordo, benefits from the clear, dark night skies.

Hunting is a very popular activity in the ROI in privately owned as well as publicly owned lands. Under the authority of 36 CFR Part 53 (e) and 36 CFR Part 261.54 (e), Call-Up areas may be closed to scheduled and unscheduled hunting to protect public safety. During these closures all persons, including hunters are evacuated from the areas and roadblocks are established along roads to prevent access (Ref# 023).

The City of Las Cruces has grown in population by 22 percent between 2000 and 2007. In the same time period, Doña Ana County has grown by 12 percent with much of that growth occurring in the area immediately surrounding Las Cruces (Ref# 024). To plan for utilities, transportation, and other needs associated with growth, the City and County prepared comprehensive plans in 1999 and 1994, respectively (Ref# 025, 026). A separate comprehensive plan covers the Las Cruces Extraterritorial Zoning jurisdiction, which was created within a five-mile radius of the Las Cruces city limits (Ref# 027). Zoning maps and ordinances are updated regularly to address new or changing situations (Ref# 028, 029). Work is currently underway on a document, known as 'Vision 2040', which will establish long-range goals for development in the county and its incorporated areas. While both the city and extraterritorial zoning maps identify substantial land areas for residential and supporting light commercial development, privately-owned land near Las Cruces is limited. Only 13 percent of Doña Ana County is privately owned (Ref# 030). Parcels of New Mexico State Land Office Land and BLM land, however, could potentially be sold and made available for development (Ref# 029, 031). In a 1993 Resource Management Plan, the BLM identified 65,000 acres of land in Doña Ana County for potential disposal through sale. A new Resource Management Plan, which is currently under production, may revise the number and extent of BLM lands available for sale in the county (Ref# 031).

The Lincoln County Comprehensive Plan (Ref# 032) has identified Ruidoso and Ruidoso Downs as being the nodes for major growth in the foreseeable future. It is expected that retirees and tourists will continue to drive additional growth in residential and light commercial land uses in the two towns. The Otero County Comprehensive Plan (Ref# 033) recognizes the importance of Holloman AFB to the region's economy and discusses land use controls to prevent encroachment by incompatible civilian development on the base. Portions of Sierra, Socorro, and Torrance counties which underlie WSMR Restricted Area Airspace or that are within WSMR call-up areas do not contain major population centers. Land use in these areas can be expected to remain primarily agricultural.

3.2.4.2 Bureau of Indian Affairs

The Mescalero Apache Indian Reservation lies partially beneath WSMR Restricted Area airspace. The reservation covers approximately 460,000 acres in total and had a population of 3,156 according to the 2000 Census (Ref# 022). Land use patterns on the reservation are similar to privately owned land nearby, with development concentrated primarily along transportation corridors, such as US 70. Much of the reservation remains forested, and commercial development is restricted.

3.2.4.3 Bureau of Land Management

BLM lands in the affected area are under the jurisdiction of the Las Cruces, Albuquerque, and Pecos District Offices. Each district office prepares one or more Resource Management Plans, which establish policies based upon the principles of multiple use and sustained yield. Resources considered include recreation, agriculture, timber, minerals, watershed, fish and wildlife, wilderness and natural scenic and historical values (Ref# 034). Land uses on BLM lands include agriculture, resource extraction, and recreation.

In accordance with the Federal Lands Management and Policy Act of 1976, BLM may dispose of or acquire parcels of land when land use planning shows that such action is warranted. Lands critical to protection of natural or cultural resources are not considered for disposal (Ref# 034). During WSMR call-up area evacuations, primary access roads leading into the affected evacuation area(s) are blocked, and BLM personnel, recreational users, and other members of the public are not allowed to enter (Ref# 035).

In general, BLM lands are open to grazing subject to the terms of lease agreements unless they are physically unsuitable (steep grades or barren ground) or in a designated special use area that specifically disallows grazing. The number of cattle permitted to graze each allotment is established using the metric 'animal unit months' where an 'animal unit' is the amount of forage necessary to feed a 1,000 pound cow, with or without a calf. Grazing-related improvements, such as watering troughs and salt licks, are strategically placed to provide the greatest positive impact (Ref# 034, 035). Other revenue-generating activities on BLM land include crop agriculture, mineral extraction, oil and gas extraction, and alternative energy development.

In all but very rare circumstances, BLM lands are open and accessible to the public for recreation. Recreation may be limited to areas improved to support the activity or dispersed. Major recreational activities include off-road vehicle recreation, camping, picnicking, hunting, hiking, sightseeing, rock climbing, bicycling, rock hounding, fishing, and bird watching. Hunting on BLM lands is conducted in accordance with NMDGF regulations.

The BLM has designated several special use areas in the ROI. The Organ/Franklin Mountains Area of Critical Environmental Concern (ACEC) includes all BLM-managed public lands within the Organ Mountains adjacent to WSMR. The area is managed to protect recreational, scenic, wilderness, biological, and cultural values. The Aguirre Springs Campground and Dripping Springs Natural Area are public recreation sites within the ACEC. There are also three Wilderness Study Areas: Organ Mountains, Organ Needles, and Peña Blanca. Other ACECs in the region include: the Doña Ana Mountains and Sacramento ACECs. The Valley of Fires Recreation Area is located three miles west of Carrizozo. The area, which is managed by the Roswell District BLM office, is named for the lava fields that exist there. The same lava fields extend further southwest into the area of WSMR known as 'the Malpais'. The Recreation Area supports camping, hiking, hunting, picnicking, and wildlife viewing. Within the boundaries of the Valley of Fires Recreation Area, are the Little Black Peak Wilderness Study Area and the Carrizozo Lava Flow Wilderness Study Area. These areas provide opportunities for scientific research as well as recreation and a wide range of other uses. The Three Rivers Petroglyph Site, located 17 miles north of Tularosa, offers hiking, camping, picnicking, and interpretive guidance on the prehistoric petroglyphs found there. The Jornada del Muerto Wilderness Study Area is located immediately adjacent to WSMR's western boundary and within the WSMR Aerobee 350 Call-Up Area.

3.2.4.4 State of New Mexico

The New Mexico State Land Office is the primary management agency for State lands, and is tasked with generating funds through leases to support education within the state. Of the 629,980 total acres owned by the State in the WSMR restricted area airspace and call-up areas, 607,500 acres are leased for agricultural purposes, 35,090 acres are leased for oil and gas extraction, 75,510 acres are leased for commercial purposes, and 2,910 acres are leased for mineral extraction (Ref# 036).

State lands are used for a number of purposes in addition to generating income. The New Mexico State University Rangeland Research Center, located 10 miles north of Las Cruces, is dedicated to teaching, research, and extension endeavors related to livestock grazing methods. Spaceport America is a commercial spaceport being developed on 17,280 acres of land located 45 miles north of Las Cruces. To date, five sub-orbital rocket launches have taken place at the spaceport. Oliver Lee Memorial State Park is a 640-acre park located 12 miles south of Alamogordo. The park offers boating, hiking, and historic exhibits.

3.2.4.5 Department of Defense

The DoD is a major land owner in southwestern New Mexico. Fort Bliss (1,112,000 acres) is located immediately south of WSMR. Land use on Fort Bliss is described in the *Fort Bliss, Texas and New Mexico, Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement* (Ref# 037). Holloman AFB (59,700 acres) lies on the eastern edge of WSMR and White Sands National Monument.

Holloman AFB is located on the eastern border of WSMR. The host unit at Holloman AFB, the 49th Fighter Wing, flies F-22 aircraft. The installation is also home to the 46th Test Group and the German Air Force Flying Training Center. The installation supports UAV, helicopter, QF-4, QF-16 and other research aircraft operations for DoD, foreign military, and commercial purposes. Ground training on Holloman AFB includes training for the New Mexico National Guard, Army, multi-force deployment training and training in the use of Basic Expeditionary Airfield Resources assets. The High Speed Test Track facility is used for manned and unmanned aircraft operations supporting test events. Holloman

AFB manages natural resources on its land cooperatively with WSMR and White Sands National Monument.

3.2.4.6 United States Forest Service

The Lincoln National Forest is located 15 miles to the east of WSMR. Significant portions of the Smokey Bear and Sacramento Ranger Districts (subdivisions of the Lincoln National Forest) lie beneath WSMR Restricted Area airspace. The National Forest offers camping, spelunking, fishing, hiking, and skiing. The White Mountain and Capitan Wilderness Areas are located adjacent to the Lincoln National Forest and support hiking and other recreation as well as wildlife conservation goals. The Mescalero Apache ski resort, Ski Apache, is located within the White Mountain Wilderness Area (Ref# 038).

3.2.4.7 United States Fish and Wildlife Service

Two NWR lie outside of WSMR Main Range, but partially within the WSMR call-up areas and restricted airspace. The Bosque del Apache NWR is located 15 miles south of Socorro and the Sevilleta NWR is located 20 miles north of Socorro. Both refuges provide habitat and protection for migratory birds and threatened and endangered species as well as recreational and educational opportunities for visitors. Hunting, fishing, and frogging are allowed on both refuges within designated areas and in accordance with USFWS regulations (Ref# 039).

3.2.4.8 Department of Agriculture

A portion of the JER lies outside of WSMR boundaries. Land on the experimental range is used for experimentation related to agricultural and ecological research.

3.2.5 VISUAL RESOURCES AND AESTHETICS

WSMR has extensive visual resources both within its boundaries and merging into surrounding areas. The area is primarily characterized by scenic desert landscapes and rugged topography and contains some of the most natural views in the region. High mountains with sheer rock faces provide stark contrasts with broad, flat basins creating scenic panoramas of considerable visual appeal. Most of the WSMR landscape, however, is not viewable from locations accessible to the general public due to access restrictions (Ref# 001).

Diverse landscapes and habitats are present including desert, ungrazed grasslands, woodlands, lava flows, surface waters, riparian areas, wetlands, and canyons, which support a wide variety of plants and animals. The nearby White Sands National Monument is a stunning expanse of white gypsum sand dunes whose sands are derived from a largely barren playa lakebed (Lake Lucero). Prominent features include the Organ Mountains, the San Andres Mountains, the Oscura Mountains, White Sands National Monument, and the Jornada del Muerto and Malpais lava beds. These features create a diverse and unique visual environment (Ref# 040).

Night light is emitted from WSMR facilities such as the Main Post and NASA WSTF, which has been noted as intrusive to night time astronomical observations. Lighting is a necessary safety and security requirement, which is mitigable (Ref# 001).

In order to facilitate the analysis of aesthetic resources within WSMR, areas of note which may include WSMR as part of their viewshed have been divided into two major public view categories: Areas of Aesthetic Concern and Public Roads and Highways (Ref# 001). These areas are described below and are shown in Figure 3.2-2.

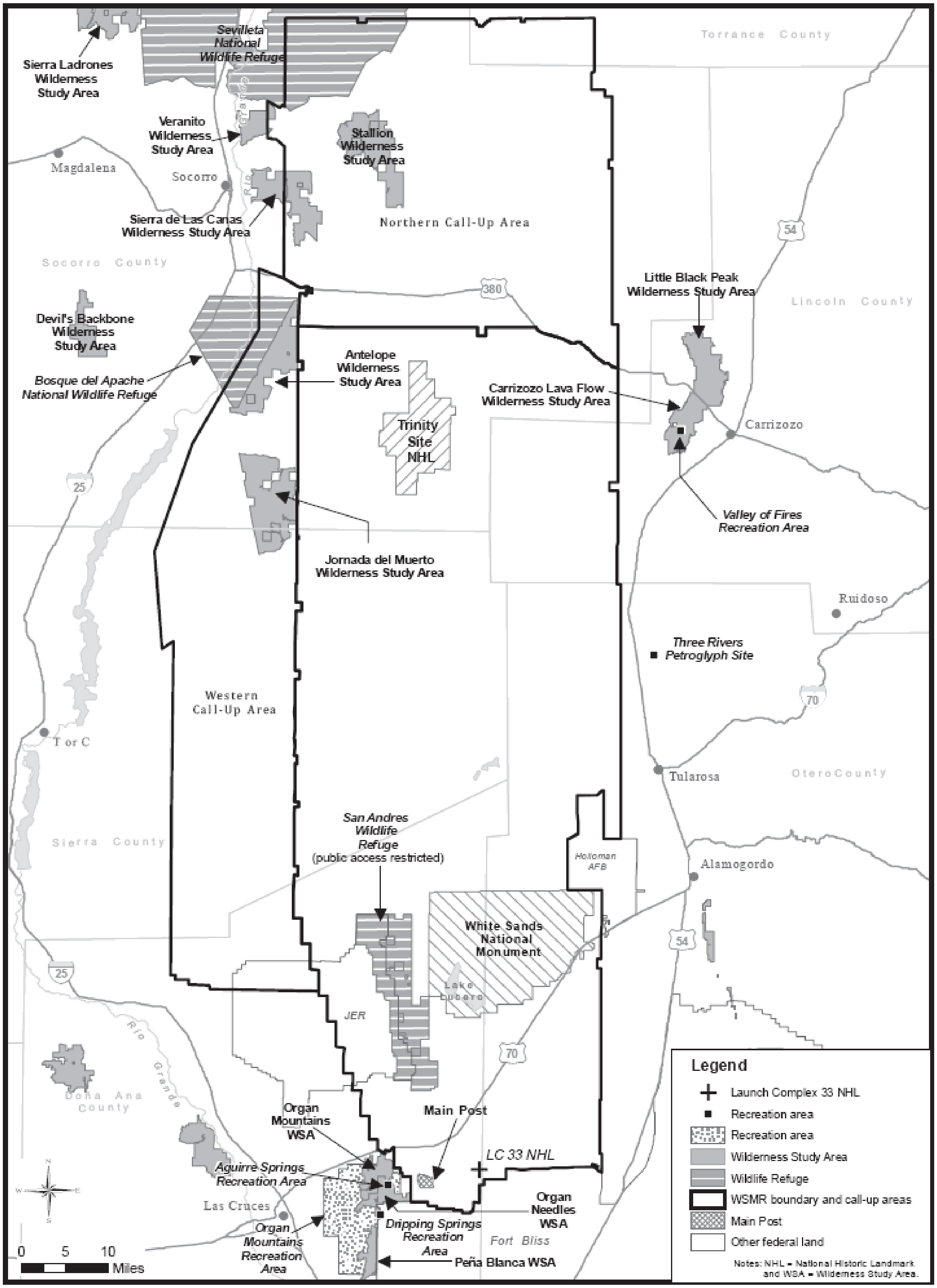


Figure 3.2-2. Areas of Aesthetic Value near WSMR

3.2.5.1 Areas of Aesthetic Concern

Areas of Aesthetic Concern are locations where portions of WSMR may be viewed by members of the general public who primarily have an interest in the aesthetic value of their surroundings. The nature of interest has been determined by the nature of the viewing areas themselves; thus, these areas include outdoor recreation and historical sites within or near WSMR (Ref# 001).

3.2.5.1.1 White Sands National Monument

White Sands National Monument is encircled by WSMR on three sides. The monument contains one of the largest gypsum sand deserts in the world, making it a unique place both in terms of aesthetic value and wildlife habitat. White Sands National Monument contains a visitor center, scenic vistas, and hiking trails and visitation is greatest on weekends and throughout the summer. Currently, WSMR facilities cannot be viewed from the main visitor-use areas; however, the viewscape at the monument is an important component of its recreational value (Ref# 001).

3.2.5.1.2 Trinity Site

The Trinity Site, a National Historic Landmark, located in the north part of WSMR, is the location of the first atomic bomb detonation, which occurred during a field test in 1945, and includes a monument and a protected area containing the blast crater. The site is located in the north-central portion of WSMR and is listed as a National Historic Landmark; therefore, it is administered under an MOU between the U.S. Army and the New Mexico State Historic Preservation Office (SHPO). The viewscape of the area containing the Trinity Site is desolate, which helps create a solemn visual environment (Ref# 001).

3.2.5.1.3 Launch Complex 33

Launch Complex 33 (LC-33), located along Nike Road (Range Road 2) on WSMR, is the Nation's first major rocket launch facility, with work on the V-2 rocket beginning in 1945. Work conducted there ultimately led to many advances in aeronautics, such as manned space flight. This site is located approximately 6.5 miles east of the Main Post. Because of its historic significance, LC-33 was designated a National Historical Landmark by the NPS in 1983 (Ref# 041). The launch complex is still in use; therefore, public access is limited to guided tours under special circumstances.

3.2.5.1.4 Bosque del Apache National Wildlife Refuge

The Bosque del Apache National Wildlife Refuge (managed by the USFWS) has an area of approximately 57,000 acres along the Rio Grande River near the northwest corner of WSMR, partially inside the Western Call-Up Area. The Refuge contains approximately 13,000 acres of lowlands and is considered important habitat for migratory birds and endangered species (Ref# 042). Recreation opportunities consist of hiking trails with benches and observation points (Ref# 043). Visitation to the Refuge is greatest during the winter season (Ref# 001). The Antelope Wilderness Study Area (encompassing nearly 21,000 acres) (Ref# 044) is located along the eastern border of the Refuge and a portion of it lies adjacent to WSMR's northwestern boundary.

3.2.5.1.5 Little Black Peak Wilderness Study Area

The Little Black Peak Wilderness Study Area consists of approximately 15,000 acres of land near the northeastern corner of the WSMR boundary on the north side of US 380. Recreational attractions include caves and volcanic lava flows (Ref# 001, 044).

3.2.5.1.6 Jornada del Muerto Wilderness Study Area

The Jornada del Muerto Wilderness Study Area (encompassing over 31,000 acres) is located near the northwestern boundary of WSMR and falls within the Western Call-Up Area. Attractions include lava formations and wildlife; however, difficult access results in low visitation (Ref# 001, 044).

3.2.5.1.7 Three Rivers Petroglyph Site

The Three Rivers Petroglyph Site contains approximately 50 acres of land with numerous ancient rock art etchings dating back to between 900 and 1400 AD. The site lies to the east of the WSMR boundary on the east side of US 54, 17 miles north of Tularosa. Recreational opportunities consist of ancient ruins and artwork, hiking trails, and a campground (Ref# 045).

3.2.5.1.8 Dripping Springs Natural Area, Aguirre Springs Campground, and Organ Mountains and Organ Needles Wilderness Study Areas

The Dripping Springs Natural Area and the Aguirre Springs Campground are located to the west of the southern boundary of WSMR. The landscapes of these destinations are heavily influenced by the Organ Mountains to the west, which are named after their long, needle-like peaks which resemble the pipes of an organ. Activities at both locations include hiking, picnicking, and wildlife viewing. In addition, Aguirre Springs has campgrounds and allows horseback riding (Ref# 046, 047).

The Organ Mountains and Organ Needles Wilderness Study Areas are also located in the Organ Mountains, which combined encompass nearly 15,000 acres (Ref# 044). The aforementioned Dripping Springs Natural Area and Aguirre Springs Campground are located within the Organ Needles Wilderness Study Area.

3.2.5.1.9 Valley of Fires Recreation Area

The Valley of Fires Recreation Area is located to the east of the northeastern boundary of WSMR, south of US 380. The recreation area is just south of the Little Black Peak Wilderness Study Area within the boundaries of the Carrizozo Lava Flow Wilderness Study Area. Activities include a visitor center, a nature trail, and campsites with picnic shelters (Ref# 048).

3.2.5.2 Public Roads and Highways

Members of the public are able to view portions of WSMR from nearby public roads and highways. The major public roads and highways in the vicinity of WSMR are briefly described below:

- **Interstate Highway 25**. This highway runs north and south roughly parallel to the western boundary of WSMR. At the northern and southern ends of WSMR, the highway lies close enough so that public viewing of WSMR is possible. This Interstate Highway 25 portion runs from the City of Las Cruces in the south, north through Truth or Consequences and Socorro (Ref# 001).
- **US 54**. This highway runs north and south nearly parallel to the eastern boundary of WSMR. At the southern and central portions of WSMR, the highway lies close enough so that portions of WSMR become viewable to the public. This portion of US 54 runs through the Town of Orogrande in the south, north through Tularosa and Carrizozo (Ref# 001).
- **US 70**. This highway passes through WSMR, coming from the City of Las Cruces and entering WSMR from the southwest. The highway continues northeastward through WSMR and passes by the White Sands National Monument on the way to Alamogordo east of WSMR (Ref# 001).
- **US 380**. This highway runs east and west just north of the border between WSMR and the Northern Call-Up Area. This portion of the highway runs through Carrizozo east of WSMR to San Antonio on Interstate Highway 25 south of Socorro (Ref# 001).

3.3 Airspace

3.3.1 INTRODUCTION AND DESCRIPTION

3.3.1.1 Airspace Management

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" which overlies the geopolitical borders of the US and its territories (Ref# 049). "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under USC Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC § 40102). Congress has charged the FAA with responsibility for developing plans and policy for the use of the navigable airspace and assigning by regulation or order the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b); FAA Order 7400.2 (2004). The FAA regulates military operations in the National Airspace System through the implementation of FAA Order JO 7400.2G *Procedures for Handling Airspace Matters* and FAA Handbook 7610.4J, *Special Military Operations*. The latter was jointly developed by the DoD and FAA to establish policy, criteria, and specific procedures for air traffic control planning, coordination, and services during defense activities and special military operations.

AR 95-2, Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids, covers U.S. Army policy, responsibilities, procedures and rules for airspace, airfields/heliports, flight activities, ATS and navigational aids. Additionally, DoD Directive 5030.19 establishes procedures and policy regarding DoD and FAA coordination of matters impacting the Federal airspace system.

3.3.2 ARMY MANAGEMENT OF WSMR AIRSPACE

3.3.2.1 Airspace Control

The airspace associated with WSMR is a complex of restricted airspace designed to ensure the separation of non-participating aircraft from potentially hazardous operations at WSMR. Table 3.3-1 lists the restricted airspace units that make up the WSMR airspace complex and provides a number of characteristics of each. Altitudes are specified in feet above MSL or in Flight Level (FL). Flight Level indicates the number of hundreds of feet above MSL.

The majority of these airspace units are 'joint use' which means that control over access to these airspace units is returned to the FAA (the controlling agency) when the airspace is not activated for DoD use. In certain cases, the joint use airspace has designated times of use during which DoD takes control. These times are designated in "Zulu Time", a standard time reference that allows pilots to avoid complications related to time zone changes. In other airspace units, a "Notice to Airmen" is issued to advise pilots of an upcoming activation of the airspace by DoD. Restricted airspace units R-5107B and R-5107D are continuously active; for these airspace units, DoD facilities (WSMR and Holloman AFB) are the controlling agencies as well as the using agencies. When WSMR airspace units are active, air traffic control is provided by Holloman AFB, which is located on the eastern border of WSMR (see Figure 2.2-1).

Airspace at WSMR is designed and controlled to accommodate other interests to the maximum extent practicable. Restricted airspace units R-5107G and R-5107F are specially designated corridors which allow non-participating aircraft to transit the WSMR airspace complex while other portions of the complex are active. In addition, certain areas within WSMR, including SANWR and White Sands National Monument, are designated as overflight avoidance areas. Both of these areas have a recommended minimum altitude of 2,000 feet above ground level (AGL).

Table 3.3-1. WSMR Restricted Areas

Restricted Area Description	Airspace Designation	Surface Footprint		Lower Altitude (feet)	Higher Altitude (feet)
		Square Nautical Miles	Square Miles		
WSMR Range Restricted Airspace					
Primary WSMR Restricted	R-5107B	3,140	4,158	Surface	Unlimited
Sub-set of primary	R-5107D	552	731	Surface	22,000
Sub-set of primary	R-5107F	1,196	1,584	24,000	45,000
Sub-set of primary	R-5107G	956	1,266	24,000	45,000
Sub-total Primary Restricted Airspace		3,140	4,158	Surface	Unlimited
Northern WSMR Call-Up	R-5107C	892	1,181	9,000	Unlimited
Sub-set (complete to surface)	R-5107J	77	102	Surface	9,000
Sub-set (complete to surface)	R-5107H	817	1,082	Surface	9,000
Western WSMR Call-Up	R-5111A	404	535	13,000	Unlimited
	R-5111B	404	535	Surface	13,000
	R-5111C	318	421	13,000	Unlimited
	R-5111D	318	421	Surface	13,000
	R-5107E	127	168	Surface	60,000
Sub-total Western Call-Up		849	1,123	Surface	Unlimited
Northeast WSMR Call-Up[1]	R-5109A	1,684	2,230	Surface	Unlimited
Southeast WSMR Call-Up[1]	R-5109B	1,004	1,330	Surface	Unlimited
Sub-total WSMR Call-Up		2,688	3,560	Surface	Unlimited
Total Area		**7,569**	**10,024**	**6,415,089 acres**	
Off-range WSMR Airspace					
Fort Wingate, NM	R-5117	22	29	Surface	60,000
Socorro, NM	R-5119	425	563	35,000	60,000
Fort Wingate, NM	R-5121	38	50	20,000	60,000
Magdalena, NM	R-5123	152	201	Surface	60,000
Green River, UT	R-6413	204	270	Surface	60,000
Total Off-Range WSMR Airspace		**841**	**1,114**	**713,231 acres**	
Total WSMR Restricted Area[2]		**8,410**	**11,138**	**7,128,320 acres**	

1. Limited to use for debris fall out, two per month. Holloman primary user as restricted >20,000.
2. Excluding Fort Bliss Restricted Areas.

In addition to the 14 restricted area airspace units that make up the WSMR airspace complex, WSMR also controls five geographically-separated pieces of restricted airspace (R-5117, R-5119, R-5121, R-5123, and R-6413 – Green River UT) and a potential missile debris corridor (not special use airspace). These assets support missile testing in which missiles are launched from off-range facilities.

3.3.2.2 Airspace Scheduling

The above airspace is scheduled and mainly utilized for research, development testing and experimentation, military training and civilian contract program development and testing. Additionally, aircraft from Holloman AFB and Fort Bliss Army Airfield operate within the restricted airspace at various times. Civilian and commercial air traffic may enter the restricted airspace only with permission of WSMR Range Control. The major activities conducted within the WSMR restricted airspace include air-to-air and surface-to-air weapons systems tests. Other activities include: the operation of aerial drone targets; towed aerial targets; UASs; space probes; safety chase; aerial photography; and fixed and rotary-wing security patrols. Training activities in the WSMR airspace include NASA crew training, aircraft weapons delivery, air-to-air combat maneuvers, and other military exercises. Also, a large amount of the airspace is used as safety buffer zones for missile and rocket firings.

At WSMR, the Cox Range Control Center (CRCC) is the designated scheduling agency, which is responsible for scheduling airspace use and for the management and control of the airspace area in WSMR. The efficient scheduling of airspace use is an important factor in airspace management and air traffic control. At WSMR, any aircraft which has not been authorized and scheduled by the CRCC is prohibited from entering the active controlled/restricted airspace areas. Once authorized and approved, these airspace areas, in most cases, can be scheduled for use from the surface to unlimited altitude 24 hours per day.

WSMR *Range Operations Mission Scheduling and Range Test Planning Policy* (Ref# 050) establishes a priority scheduling system for the use of WSMR airspace. Each authorized activity supported by WSMR is categorized as a range program. There are four priority levels used in scheduling WSMR airspace:

- National Priority, the highest priority, which requires written U.S. Army direction.
- Priority 1 is assigned to research and development testing and experimentation, guided-missile firings, and high-energy laser operations.
- Priority 2 is assigned to non-research and development testing and experimentation, guided-missile firings, and high-energy laser operations.
- Priority 3 includes all other programs.

3.3.2.3 Runways

There are several runways within or adjacent to WSMR. These runways are used to support testing and training operations at WSMR. Stallion Range Center has a runway to accommodate rotary and fixed-wing aircraft landings. This runway is located near the Range's northern boundary and is aligned in a north-south direction. There are other rotary and fixed-wing landing areas on WSMR including White Sands Space Harbor, which NASA maintains as a backup site for space shuttle landings. The White Sands Space Harbor is used for shuttle training missions and potentially for testing other types of space vehicles. There is the potential that this strip will revert back to WSMR once the Shuttle Program ends.

Holloman AFB is a major installation for military aircraft training and is located adjacent to the southeast corner of WSMR. This facility operates three active runways and is home to the German Air Force and the 49th Fighter Wing which is now transitioning from the recently retired F-117A aircraft to the new F-22A. Aircrew training programs are conducted at Holloman AFB which uses a portion of the designated WSMR controlled airspace. In addition, Holloman AFB is anticipating the beddown of the MQ-1 Predator and MQ-9 Reaper UAS Second Formal Training Unit; the first UAS was shipped to the base in June 2009. Bombing ranges used include the Oscura and Red Rio ranges (located on WSMR) and the Centennial Range (located to the east of and adjacent to WSMR on Fort Bliss property).

3.3.2.3.1 Bombing Ranges

The Oscura and Red Rio Bombing Ranges are both used for aircraft air-to-ground gunnery and bombing training. The Oscura Bombing Range is located less than one mile north of Oscura Range Center (see Figure 2.2-1). The Red Rio Range is a U.S. Air Force impact area and gunnery range located in the extreme northeast corner of WSMR, which is used by Holloman AFB (Ref# 001).

3.3.2.3.2 Level of Use

Table 3.3-2 lists aircraft sorties in WSMR airspace units in FYs 2003-2007. The term "sortie" is defined here as any time an aircraft enters and then later leaves an airspace unit. Table 3.3-2 also lists the number of hours during which the airspace was released to the controlling agency.

Table 3.3-2. Aircraft Sorties In WSMR Airspace

Airspace	FY 2003		FY 2004		FY 2005		FY 2006		FY 2007	
	Aircraft Sorties	Hours Returned to FAA	Aircraft Sorties	Hours Returned to FAA	Aircraft Sorties	Hours Returned to FAA	Aircraft Sorties	Hours Returned to FAA	Aircraft Sorties	Hours Returned to FAA
R-5107B	7,373	N/A	6,018	N/A	5,256	N/A	4,259	N/A	2,941	N/A
R-5107C	5,089	4,775	4,125	4,803	3,698	4,676	3,460	4,847	2,523	5,078
R-5107D	7,255	5,016	5,856	4,935	4,907	4,192	3,965	4,864	2,641	4,192
R-5107E	817	8,189	245	8,027	773	8,027	434	7,676	325	7,860
R-5107F	6,971	4,772	5,672	4,726	4,831	4,683	3,959	4,880	2,637	5,140
R-5107G	6,964	4,772	5,672	4,726	4,831	4,683	3,959	4,880	2,637	5,140
R-5107H	5,101	4,854	4145	4,964	3,825	4,797	3,454	4,943	2,591	5,221
R-5107J	5,417	4,815	4,113	4,855	3,713	4,798	3,430	4,878	2,576	5,399
R-5109A	163	8,458	151	8,524	498	8,493	56	8,613	11	8,681
R-5109B	142	8,477	151	8,524	498	8,493	56	8,613	11	8,681
R-5111A	1,855	5,676	1,809	5,634	2,279	5,387	2,250	5,337	2,321	5,454
R-5111B	291	8,229	159	7,931	629	7,462	87	7,606	135	7,909
R-5111C	109	8,561	108	8,504	509	8,365	18	8,666	59	8,612
R-5111D	73	8,599	92	8,561	50	8,386	18	8,689	22	8,704
R-5117	0	8,760	0	8,784	0	8,758	0	8,760	0	8,760
R-5119	0	8,760	0	8,784	0	8,760	0	8,760	0	8,760
R-5121	0	8,760	0	8,784	0	8,760	0	8,760	0	8,760
R-5123	0	8,760	0	8,784	0	8,760	0	8,760	0	8,760

Source: Ref# 051.

Oscura and Red Rio Bombing Ranges were used for 1,108 hours and 1,219 hours respectively in 2007 (Ref# 052, 053).

3.4 Air Quality

This section describes the Federal and State regulations that apply to air quality, the air quality of the region and at WSMR, and regional climate.

3.4.1 FEDERAL AND STATE AIR QUALITY REGULATIONS

The principal framework of national, State, and local efforts to protect air quality in the United States is the Clean Air Act (CAA) (42 USC § 7401 et seq.). Under the CAA, the U.S. Environmental Protection Agency (EPA) has set health-based standards known as National Ambient Air Quality Standards (NAAQS) for six criteria pollutants considered to be key indicators of air quality: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and two categories of particulate matter—namely particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) (40 CFR Part 50).

3.4.1.1 National Ambient Air Quality Standards and State Ambient Air Quality Standards

The primary National Ambient Air Quality Standards (NAAQS) define levels of air quality, with an adequate margin of safety that sets limits to protect the public health (i.e., "health-based"). The secondary NAAQS define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (i.e., "welfare-based").

The EPA is responsible for ensuring that all air quality standards are met or attained in cooperation with State, Tribal, and local governments through national strategies to control air pollutant emissions. Under the CAA, State and local agencies may establish State Ambient Air Quality Standards (AAQS) of their own, provided these are at least as stringent as the Federal requirements. As delegated by the EPA, the State of New Mexico is responsible for protecting New Mexico's air quality. In turn, the New Mexico Environmental Department (NMED) Air Quality Bureau is responsible for interpreting and implementing those statutes that pertain to air pollution control. The State of New Mexico has thereby established its own AAQS equivalent to the NAAQS for PM_{10}, O_3, and Pb. The State of New Mexico's AAQS are more restrictive than Federal NAAQS for these three air pollutants: CO, NO_2, and SO_2. In addition, New Mexico regulates emissions of total suspended particulates (TSP), hydrogen sulfide (H_2S), and total reduced sulfur, three pollutants for which there are no Federal standards. Pertinent State regulations are found in Title 20, Chapter 2, Part 3 of the New Mexico Administrative Code (NMAC) 20.2.3.1 to 20.2.3.11 issued by the Environmental Improvement Board on September 6, 2006. Federal NAAQS and State of New Mexico AAQS are shown in Table 3.4-1.

3.4.1.2 Prevention of Significant Deterioration

Areas that meet the NAAQS are defined as in "attainment." The air quality in attainment areas is managed under the Prevention of Significant Deterioration (PSD) Program of the CAA. The goal of this program is to maintain a level of air quality that continues to meet NAAQS. Areas that do not meet one or more of the NAAQS are designated as "nonattainment" areas for criteria pollutant(s). For regulatory purposes, areas that have not been monitored for air quality are listed as "unclassified" and are considered to be in attainment. A maintenance area is an area that had been redesignated by EPA from nonattainment to attainment of the NAAQS for a criteria air pollutant pursuant to a request submitted by the state to the EPA. The state then submits a revision to the State Implementation Plan (SIP) for a 10-year maintenance plan that details how the maintenance area will maintain attainment.

Table 3.4-1. National Ambient Air Quality Standards and New Mexico State Ambient Air Quality Standards

Pollutant	National Ambient Air Quality Standards (NAAQS)		New Mexico State Ambient Air Quality Standards (AAQS)
	Standard	Standard Type[1]	
Carbon Monoxide (CO)			
8-hour Average[2]	9 ppm	Primary	8.7 ppm
1-hour Average[2]	35 ppm	Primary	13.1 ppm
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	0.053 ppm	Primary & Secondary	0.05 ppm
24-hour Average	None	None	0.10 ppm
Ozone (O_3)			
8-hour Average[3]	0.075 ppm	Primary & Secondary	None[4]
Lead (Pb)			
Quarterly Average	1.5 µg/m^3	Primary & Secondary	None[4]
Fine Particulate ($PM_{2.5}$)			
Annual Arithmetic Mean[5]	15 µg/m^3	Primary & Secondary	None[4]
24-hour Average[6]	35 µg/m^3	Primary & Secondary	None[4]
Particulate (PM_{10})			
24-hour Average[7]	150 µg/m^3	Primary & Secondary	None[4]
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	0.03 ppm	Primary	0.02 ppm[8]
24-hour Average[1]	0.14 ppm	Primary	0.10 ppm[8]
3-hour Average[1]	0.50 ppm	Secondary	None[4]
Hydrogen Sulfide (H_2S)			
1-hour Average[9]	None	None	0.10 ppm
Total Reduced Sulfur			
Half-hour Average[10]	None	None	0.003 ppm
Total Suspended Particulates (TSP)			
Annual Arithmetic Mean	None	None	60 µg/m^3
30-day Average	None	None	90 µg/m^3
7-day Average	None	None	110 µg/m^3
24-hour Average	None	None	150 µg/m^3

1. Primary Standards are "health-based," and Secondary Standards are "welfare-based."
2. Not to be exceeded more than once per year.
3. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
4. The NAAQS applies.
5. To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m_3.
6. To attain this standard, the 3-hour average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m_3.
7. Not to be exceeded more than once per year on average over three years.
8. For the entire State of New Mexico except for the area within 3.5 miles of the Chino Mines Company smelter furnace stack near Hurley where higher levels (same as NAAQS) apply.
9. 1-hour average not to be exceeded more than once a year. For the entire State of New Mexico, except for those parts of the Pecos-Permian Basin Intrastate Air Quality Control Region where higher levels apply.
10. Total reduced sulfur does not include H_2S. Applies to the entire State of New Mexico except for those parts of the Pecos-Permian Basin Intrastate Air Quality Control Region where higher levels are in effect.

Source: 40 CFR Part 50, NMAC 20.2.3.1 to 20.2.3.11

Section 162 of the CAA established the goal of PSD of air quality in all international parks, national parks that exceed 6,000 acres, and national wilderness areas and memorial parks that exceed 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states, Tribal nations, and the Federal government have the authority to re-designate areas as (nonmandatory) Class I areas. Class I areas (mandatory and nonmandatory) are those where any appreciable deterioration of air quality is considered significant. For areas that are already in compliance with the NAAQS, the PSD requirements provide maximum allowable increases in concentrations of pollutants, which are expressed as increments. The PSD increments provide rigorous safeguards to prevent deterioration of the air quality in Class I areas as specified in 40 CFR Part 51.166(e) (see Table 3.4-2).

Table 3.4-2. Allowable Prevention of Significant Deterioration Program Increments

Pollutant, Averaging Period		Class I Area ($\mu g/m^3$)	Class II Area $\mu g/m^3$)
SO_2	3-Hour	25	512
	24-Hour	5	91
	Annual	2	20
NO_2	Annual	2.5	25
PM_{10}	24-Hour	8	30
	Annual	4	17

When modeling to demonstrate compliance with the PSD increments, dispersion modeling must include all PSD increment-consuming sources in addition to the proposed source. All post-baseline sources emitting SO_2, NO_2, or PM_{10} are considered to consume increment whether or not their emission rates exceed EPA's *de minimis* ton per year (tpy) levels.

Air Quality Related Values are described in the CAA to pertain to protecting a resource considered by a Federal Land Manager that may be adversely impacted by air quality changes in an area designated as a Class I area or Class II area. The resource may include visibility or a specific scenic, cultural, physical, geologic, biological, ecological, or recreational resource identified by the FLM for a particular area. The CAA Section 169A established the additional goal of prevention of further visibility impairment in PSD Class I areas. Visibility impairment is defined as atmospheric discoloration and a reduction in the visual range. The Regional Haze Rule (40 CFR Part 51.300-309) calls for State and Federal agencies to work together to improve visibility in 156 national parks and wilderness areas, including nine Class I areas in New Mexico. Those Class I areas that lie within 100 kilometers of a major source may be assessed in a PSD permit application for potential adverse impacts on Air Quality Related Values. Class I areas that are within 100 kilometers of WSMR are the Bosque del Apache Wilderness Area in Socorro County and immediately west of the northwest corner of the installation, and the White Mountain Wilderness Area in Lincoln County and approximately 15 miles (25 kilometers) east of the northern portion of the east boundary of the installation. The State of New Mexico's Regional Haze State Implementation Plan (Ref# 054) complies with the Regional Haze Rule.

3.4.1.3 Hazardous Air Pollutants

The EPA has set National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for emissions of hazardous air pollutants (HAPs) (also known as air toxics) not covered by NAAQS which may cause an increase in fatalities or in serious, irreversible, or incapacitating illness (40 CFR Part 61). EPA currently lists 188 compounds to be controlled as HAPs, the majority of which are VOCs. The CAA, Section 112, requires the control of HAPs from specific area and major source categories. An area source category emits less than 10 tpy of any one HAP and less than 25 tpy of all HAPs. A major source emits more than 10 tpy of any one HAP and over 25 tpy of all HAPs. Additionally, New Mexico has set guidelines (NMAC 20.2.72.402), and emission concentrations and levels (NMAC 20.2.72.502) to determine whether a new or modified source emitting a HAP (toxic air pollutant) may require air quality permitting.

3.4.1.4 Clean Air Act General Conformity Rule

The CAA requires each state to produce and regularly update a SIP that includes a description of control strategies or measures to deal with increased criteria pollutant levels, for areas which are failing to achieve or are maintaining the NAAQS. Section 176(c)(1) of the CAA requires that Federal actions conform to the applicable SIP. The final rule for "Determining Conformity of Federal Actions to State or Federal Implementation Plans" (General Conformity Rule) was promulgated by the EPA on November 30, 1993 (58 FR 63214) and took effect on January 31, 1994 (40 CFR Parts 6, 51, and 93). This General Conformity Rule established the conformity criteria and procedures necessary to ensure that Federal actions conform to the SIP and meet the provisions of the CAA. Under the rule, an agency must engage in a conformity review process and, depending on the outcome of that review, conduct a conformity determination. Thus the Army may not engage in, support, provide assistance for, or approve activities which would not "conform" (prove inconsistent) with SIP requirements.

> **Air Quality Control Region** - A geographic area established within a state (counties, urbanized areas, consolidated metropolitan statistical areas, etc.), which, due to existing air quality and/or projected growth rates, has the potential for exceeding any national emission standard for air pollutants.
>
> **NO_x** ("nitrogen oxides," or "oxides of nitrogen") include nitric oxide (NO), nitrogen dioxide, and nitrous oxide (N_2O). Typically, "NO_x" represents NO + NO_2. NO_x is measured as a NO_2 equivalent.
>
> **VOCs** are not classified as a criteria pollutant, however O_3, which is formed from two major classes of directly emitted precursors: VOCs and NO_x. The relation between O_3, VOCs, and NO_x is driven by complex nonlinear photochemistry.

As described below in 3.4.2, the Proposed Action would occur within an attainment area for all criteria air pollutants. Hence, the provisions for a conformity determination do not apply here.

3.4.2 ARMY AIR QUALITY MANAGEMENT

Army Regulation 200-1, part 1-24, Environmental Protection and Enhancement (Ref# 87), states (in part) that Garrison Commanders will: "Comply with applicable Federal, State, and local environmental laws, regulations, internal directives and goals, Eos, and overseas Foreign Governing Standards." To that end, the Environmental Asset section of AR 200-1 lists the following air quality policies and program goals:

- Comply with applicable Federal, State and local air quality regulations, permit requirements, and overseas Final Governing Standards;
- Identify and implement cost-effective pollution prevention measures that will reduce toxic or criteria air emissions;
- Eliminate dependency on ozone depleting substances; and
- Achieve and maintain air quality standards to protect human health and the environment, while minimizing mission impacts.

3.4.3 WSMR AND REGIONAL AIR QUALITY

WSMR is located in south-central New Mexico. The Main Post is located at the eastern base of the Organ Mountains in Doña Ana County, near the southwest corner of the installation. The installation extends into four other counties: Otero, Sierra, Socorro, and Lincoln. WSMR extends approximately 35 miles east west and 100 miles north south and covers an area of 2.2 million acres. In addition, call-up areas (evacuation areas) are located to the north and west of the installation. All the land within the WSMR boundary and the call-up areas are in an attainment area for all criteria pollutants. The nearest nonattainment area to WSMR lies 17 miles south of the southernmost boundary of WSMR at Anthony in

Doña Ana County, classified as moderate nonattainment for PM_{10}. This is the only nonattainment area within the State of New Mexico. The greater part of WSMR within parts of Doña Ana, Otero, Sierra, and Lincoln counties, is encompassed by the New Mexico portion of the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region 153. The northernmost portion of the installation that lies in Socorro County is within the Southwestern Mountains-Augustine Plains Intrastate Air Quality Control Region 156.

Table 3.4-3 shows tons of air pollutant emissions in 2001 from area and point sources for the air pollutants CO, NO_x, PM_{10}, $PM_{2.5}$, SO_2, and VOCs, in Doña Ana, Lincoln, Otero, and Sierra counties. Also shown are totals for the entire State of New Mexico.

Table 3.4-3. Tons of CO, NO_x, PM_{10}, $PM_{2.5}$, SO_2, and VOC Emissions in 2001 for Doña Ana, Lincoln, Otero, and Sierra Counties, and for the State of New Mexico

County	Area Source Emissions (Tons), 2001						Point Source Emissions (Tons), 2001					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Doña Ana	83,671	11,398	67,737	11,440	1,211	10,199	790	2,155	112	94.4	151	554
Lincoln	19,476	2,202	16,984	3,527	207	1,791	65.1	469	0.75	0.75	0.18	100
Otero	28,647	2,906	31,921	5,873	273	3,472	381	123	132	125	119	167
Sierra	20,137	1,751	8,300	1,843	121	2,007	0	0	196	110	0	0
State Total	1,014,215	144,334	860,049	156,001	15,513	123,363	39,519	163,141	17,520	12,827	138,793	13,631

Source: Ref# 055

Table 3.4-4 shows the sum of tons of all 188 HAP emissions in 1999 for Doña Ana, Lincoln, Otero, and Sierra counties, for area, point, road and non-road sources, and likewise for all sources. Also shown are totals for the entire State of New Mexico.

Table 3.4-4. Hazardous Air Pollutant Emissions in 1999 for Doña Ana, Lincoln, Otero, and Sierra Counties, and for the State of New Mexico

County	Major Sources (tons)	Area & Other (tons)	On-road (tons)	Non-road (tons)	All Sources (tons)
Doña Ana	121	589	1,427	184	2,321
Otero	0	371	284	68	723
Sierra	0	173	178	233	584
Lincoln	0	280	118	64	462
State Total	11,042	10,355	12,814	3,234	37,445

3.4.3.1 WSMR Title V Operating Air Permit

The WSMR Title V Operating Air Permit no. P085R1 was renewed on 18 August 2006. In this permit, WSMR is considered a major source as defined in 20.2.70 NMAC. WSMR's allowable emissions of NO_x TSP, and CO each exceed 100 tons per year (tpy). In this permit, WSMR is described as a minor source with respect to the PSD preconstruction permitting program. WSMR's allowable point source emissions are below the PSD major source threshold of 250 tpy for each pollutant; however, WSMR allowable facility-wide emissions exceed 250 tpy of NO_x.

WSMR is a minor HAP source because HAPs emissions are less than 10 tpy for any one HAP and less than 25 tpy for all HAPs combined. The Permit specifies these facility-wide allowable emissions limits and ensures that the installation is not a major source of HAPs.

The NMED Air Quality Bureau exempts insignificant source categories and emission units from the Title V operating permit process. Insignificant activities are those activities, listed by the NMED Air Quality Bureau and approved by the EPA as insignificant on the basis of size, emissions or production rate. The WSMR Title V Permit specifies allowable air pollutant emission limits from the sources described in Table 3.4-5.

The Permit requires WSMR to maintain activity records, calculate emissions, and report emissions from all permitted sources within the above listed categories semi-annually to NMED Air Quality Bureau. The WSMR Environmental Division is responsible for air quality compliance and permitting at WSMR.

Table 3.4-6 lists allowable emission limits (tpy) from all significant sources at WSMR, total allowable emissions, and actual reported emissions for 2007. Historically, actual emissions have remained far below permitted allowable emissions, and the most recent 2007 emissions data shown here are representative of historic data.

3.4.3.2 Natural Events Action Plan for High Wind Events Doña Ana County

Analysis by the NMED Air Quality Bureau has shown that high velocity winds, common during the late winter and spring, are responsible for most of the exceedances of the PM_{10} standard in Doña Ana County because of their action on dry exposed soils. Federal law and policies recognize that declaring an area non-attainment and requiring stringent controls on sources are not appropriate responses where natural events contribute significantly to exceedances of the PM_{10} standard. EPA's Natural Events Policy sets forth the requirements for a more appropriate approach for natural events such as high wind events, in a Natural Events Action Plan. A Natural Events Action Plan was developed by NMED Air Quality Bureau in conjunction with the City of Las Cruces Planning Department, the Doña Ana County Community Development Department, stakeholders including WSMR, and other agencies, that was submitted to the EPA in December 2000 (Ref# 056). The Natural Events Action Plan was updated in December 2005 (Ref# 057).

The purpose of the plan is to: educate the public about the problem; identify and implement Best Available Control Measures for man-made sources of windblown dust that are feasible both technologically and economically; and mitigate health impacts on exposed populations during future events. WSMR, as one of the primary stakeholders, is working with the NMED Air Quality Bureau on the development of Best Available Control Measures implementation for the Natural Events Action Plan. Other stakeholders include Doña Ana County, the City of Las Cruces, the New Mexico Highway Department and New Mexico State University. WSMR agreed to expand the scope of its dust control needs to include the Natural Events Action Plan and protection of public health. WSMR is currently developing a Particulate Matter Control Plan that covers emissions from construction sites, landfills, impact areas, and dirt roads; and recommended control measures. Furthermore, WSMR would continue to follow county ordinances regarding erosion control and construction where practical and when it is not in conflict with the mission of the installation.

Table 3.4-5. Sources Permitted under WSMR Title V Operating Air Permit

Source	Description
Abrasive blasting	Abrasive blasting operations use a hard medium such as glass, metal, or plastic beads or sand to clean or strip paint, rust, or corrosion from materials and equipment. Unenclosed abrasive blasting operations are subject to limits and an allowable emission limit has been established at WSMR for the entire source category. Particulate matter (PM, PM_{10}, and $PM_{2.5}$) is emitted into the air from the blasting medium and materials which are removed.

Table 3.4-5. Source Permitted under WSMR Title V Operating Air Permit (continued)

Source	Description
Aggregate processing	WSMR does not routinely process aggregate and has one portable aggregate processing plant. WSMR mostly contracts aggregate processing work as part of construction projects. The rock for WSMR and the contracted operations is procured from quarries located on WSMR. Particulate matter is emitted during rock crushing and aggregate handling.
Asphalt production	WSMR contracts asphalt production, as needed, in support of road construction or repair projects. Asphalt production involves mixing aggregate and liquid asphalt cement in measured quantities to produce hot mix asphalt, and emissions of NO_x, CO, SO_2, particulate matter, VOCs, and HAPs occur. Road construction or repair projects typically last up to two months, and it is not uncommon that two operations may occur at the same time.
Concrete production	There are three WSMR-owned/operated concrete batch plants: two at the Permanent High-Explosive Testing Site (PHETS) primarily used during construction of pads and small buildings for weapons testing, and one at Capitol Peak used for instrumentation bunkers, covering underground cable trenches, repairing damaged shotcrete, and constructing weapons pads. There is also one contractor owned/operated portable plant. At concrete batching plants, sand, aggregate, cement, and water are gravity fed from a weigh hopper into mixer trucks, which transport the resulting concrete to where it is needed. Typically, individual projects at WSMR last one day and there may be up to eight projects a month. Particulate matter is emitted from these concrete batch plants.
Data disintegrator	Small amounts of particulate matter are emitted from pulverization of official documents in a disintegrator located in Building 1858.
Dust generation	Small amounts of particulate matter are generated from an unenclosed dust generator used in particle test studies.
Equipment leaks (unleaded fuel)	Non-point source “fugitive” VOCs result when fuel vapors leak from petroleum distribution equipment such as valves, pump seals, pressure relief valves, flanges, connections, and open-ended lines.
External combustion	Approximately 170 external combustion systems are used throughout WSMR that are fueled by distillate oil, natural gas, or propane to provide heat for facilities (water heaters, boilers, and forced air furnaces), with resulting emissions of NO_x, CO, SO_2, particulate matter, VOCs and trace amounts of HAPs.
Fuel dispensing (unleaded)	VOC and trace amounts of HAP emissions occur while gasoline, JP-8, and diesel fuel are dispensed into equipment and vehicles for use throughout WSMR. Dispensing of JP-8 and diesel fuel is defined as an insignificant activity by the NMED Air Quality Bureau.
Fuel loading racks (unleaded)	Fuel loading rack operations consist of transferring fuel between tanker trucks and fixed storage tanks. VOC and trace amounts of HAP emissions occur from fuel vapor displacement during this fuel transference. Loading of JP-8 and diesel fuels is defined as an insignificant activity by the NMED Air Quality Bureau. There are three gasoline loading rack operations at WSMR: the petroleum, oil, & lubricant (POL) yard on Main Post, Rhodes Canyon, and Stallion Range Center.

Table 3.4-5. Source Permitted under WSMR Title V Operating Air Permit (continued)

Source	Description
Internal combustion	WSMR maintains numerous standby and portable generators to provide electrical power to various operations throughout the Range. The generators vary in power output and burn either diesel fuel or natural gas. In addition, several internal combustion engines are used to power back-up pumps at the domestic water production wells at WSMR. All portable engines at WSMR meet the EPA definition of non-road engines. WSMR currently has over 760 stationary and portable internal combustion engines of which 723 are smaller than NMED Air Quality Bureau significance thresholds or meet the definition of standby equipment, and therefore, are considered insignificant. NO_x, CO, SO_2, particulate matter, VOCs, and trace amounts of HAPs emissions occur.
Laser emissions	The HELSTF and the Army Research Laboratory at WSMR conduct periodic tests using hydrogen fluoride/deuterium fluoride (HF/DF) lasers. Lasing creates gaseous HF and DF chemically identical to HF and because HF is regulated as a HAP, these lasers are considered HAP emission sources.
Miscellaneous sources	Various organizations at WSMR use solvents, paints, and other chemicals for a variety of purposes that act as sources of VOCs and/or HAPs. Included also are PM, PM_{10}, and $PM_{2.5}$ emissions from the Hazardous Materials Minimization Center (HMMC), distributed material emissions; Large Blast Thermal Simulator aluminum oxide emissions; 300K, Environmental Test Area (ETA) and Hazardous Test Area (HTA) rocket motor emissions.
Nuclear reactor	The Directorate for Survivability, Vulnerability Assessment operates a research reactor to test the effects of neutrons and mixed radiation fields on materials and items. Fission products and activation products are produced during operations and certain radionuclide emissions are regulated as a HAP under 40 CFR Part 61, Subpart I for radionuclide emissions from Federal facilities.
Surface coating (paint booths)	WSMR conducts surface coating operations for both mission support and facilities maintenance activities, both within and outside of paint booths. These operations are a potential source of particulate matter, VOCs, and trace amounts of HAPs.
Storage tanks (unleaded fuel)	WSMR stores gasoline, JP-8, and diesel fuel in storage tanks, and all are potential VOC emission sources. Most of the tanks at WSMR are aboveground, fixed-roof tanks, although there are two underground tanks at the Post Exchange Service Station. The NMED Air Quality Bureau defines storage of JP-8 and diesel fuel, and gasoline storage at the Post Exchange Service Station as an insignificant activity. WSMR has five aboveground gasoline storage tanks, considered significant, three of which are at the Main Post, one at Station Range Center, and one at Rhodes Canyon.
Woodworking	Woodworking is performed at various locations at WSMR for fabricating materials to be used in tests and for conducting maintenance. Six non-trivial woodworking operations at WSMR are equipped with central dust collection systems; five have potential emissions below one tpy and are considered insignificant by NMED Air Quality Bureau. One significant woodworking operation is at the Main Post. Sawdust from woodworking is a source of particulate matter.

Table 3.4-6. Allowable Air Pollutant Emission Limits from Significant Sources, Total Allowable Emissions, and Actual Reported Emissions in 2007

Source Category	WSMR Allowable Emission Limits (tpy)[1]							
	CO	NO_X	SO_2	TSP			VOC	HAP/Total HAP
				PM	PM_{10}	$PM_{2.5}$		
Abrasive Blasting	--	--	--	6.2	0.88	0.09	--	--
Aggregate Processing	--	--	--	11.8	4.3	4.3	--	--
Asphalt Production	50.0	15.0	11.0	5.25	3.38	3.38	1.03	9.9/24.9
Concrete Production	--	--	--	5.3	1.8	1.8	--	--
Data Disintegrator	--	--	--	0.31	0.31	0.31	--	--
Dust Generation	--	--	--	1.5	0.75	0.75	--	--
Equipment Leaks	--	--	--	--	--	--	5.8	9.9/24.9
External Combustion	9.7	10.9	2.3	1.4	1.2	1.1	1.1	9.9/24.9
Fuel Dispensing	--	--	--	--	--	--	6.7	9.9/24.9
Fuel Loading Racks	--	--	--	--	--	--	2.8	9.9/24.9
Internal Combustion	93.5	516.5	23.4	20.6	20.6	20.6	25.2	9.9/24.9
Laser Emissions	--	--	--	--	--	--	--	9.9/24.9
Miscellaneous Sources	--	--	--	32.7	16.4	16.4	19.1	9.9/24.9
Nuclear Reactor	--	--	--	--	--	--	--	9.9/24.9
Surface Coating (paint booths)	--	--	--	0.3	0.3	0.3	8.4	9.9/24.9
Unleaded Storage Tanks	--	--	--	--	--	--	29.4	9.9/24.9
Woodworking	--	--	--	1.1	0.56	0.56	--	--
Total Allowable	**153.2**	**542.4**	**36.7**	**186.5**	**50.5**	**49.6**	**99.5**	**Total HAPs-24.9 Individual HAP-9.9**
Actual total emissions in 2007[3]	**12.5**	**53.3**	**1.6**	**5.9**	**5.0**	**5.0**	**44.5**	**12.3 Total HAPs**

1. Ref# 058.
2. "--" denotes no emissions assessed from source in Title V Operation Permit no. P085R1, Statement of Basis and Data Base Summary, White Sands Missile Range, August 16, 2006.
3. Ref# 059.

3.4.4 EXISTING CLIMATE, WEATHER AND METEOROLOGY

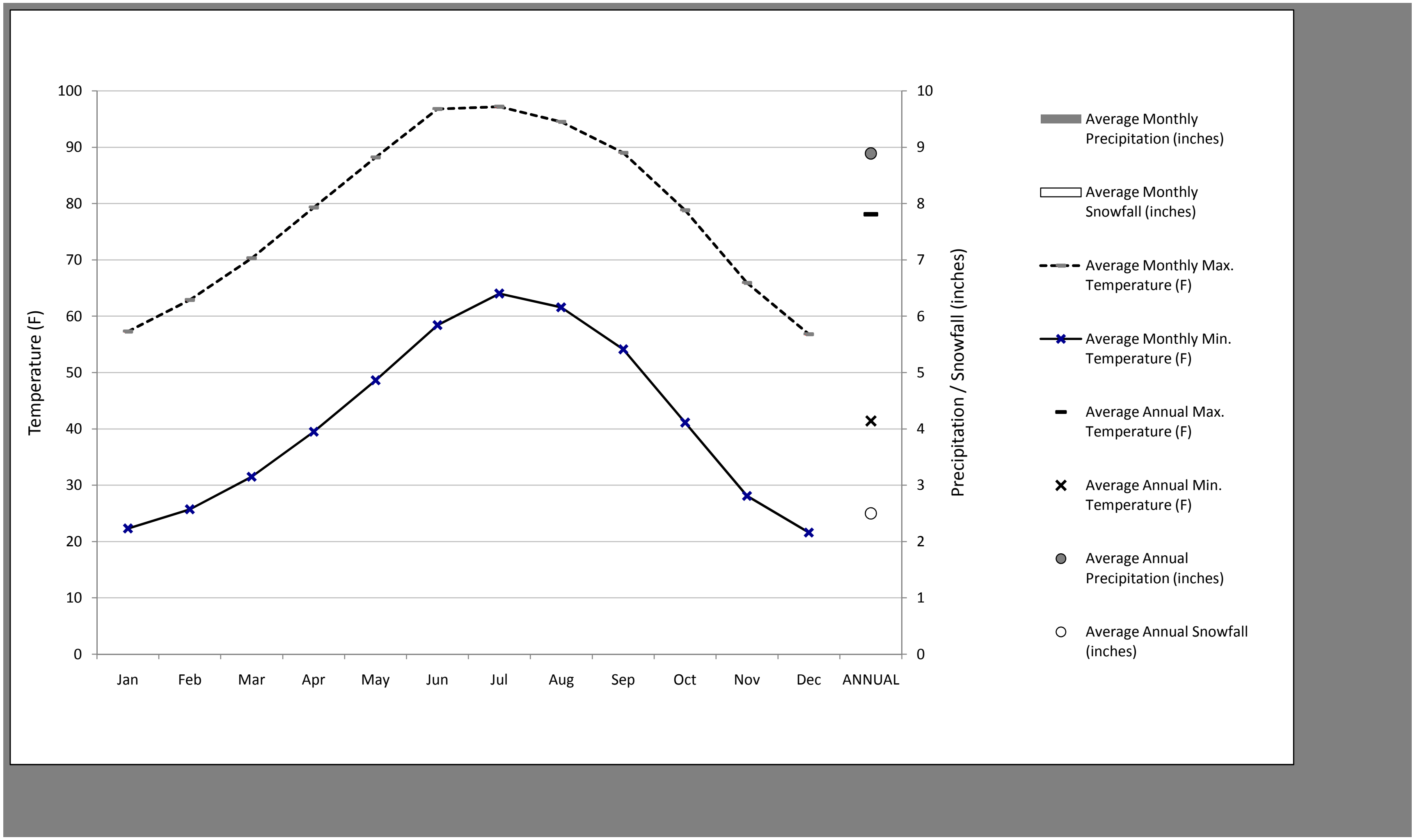
Air quality is closely intertwined with day-to-day meteorological weather conditions and the influences of longer-term climate. Concentrations of atmospheric air pollutant gases/species can be influenced by meteorological variables, e.g., wind speed which affects dispersion of particulates from soils; wind direction and speed which affects transportation; mixing depths and stability which affect dispersion; and temperature, humidity, sunlight, and cloud water which can play a role in the chemical formation of certain air pollutants.

New Mexico has a mild, arid or semiarid, continental climate characterized by light precipitation totals, abundant sunshine, low relative humidity, and a relatively large annual and diurnal temperature range. The principal sources of moisture for the limited amounts of rains and snows that fall on the State are the Pacific Ocean, 500 miles to the west, and the Gulf of Mexico, 500 miles to the southeast. Mean annual temperatures range from 64° F in the extreme southeast to 40° F or lower in high mountains and valleys of the north; however, elevation is a greater factor in determining the temperature of a locality than its latitude. During the summer months, individual daytime temperatures often exceed 100° F below 5,000 feet altitude; and average monthly maximum summer temperatures range from above 90° F at lower elevations to above 70° F at higher elevations. In January, the coldest month, average daytime temperatures range from the mid-50° F in the southern and central valleys to mid-30° F in the higher elevations of the north. Average annual precipitation ranges from less than 10 inches over much of the southern desert and the Rio Grande and San Juan Valleys to more than 20 inches at higher elevations in the State. The ROI for WSMR encompasses the Tularosa Basin in southern New Mexico, which lies between the Sacramento Mountains to the east and the San Andres and Oscura Mountains to the west and the Jornada del Muerto Basin in the northwestern portion of the range. The climate of the Tularosa and Jornada del Muerto Basins is typical of the arid regions of the State at lower altitudes.

Figure 3.4-1 shows monthly average temperatures and precipitation recorded at the White Sands National Monument Weather Station 299686 (Latitude +32.783, Longitude -106.183, Elevation 3,996 feet), for the period 1939 through 2005, and provides a representative example of general conditions in the ROI.

Average relative humidity is lower in the valleys, but higher in the mountains because of the lower mountain temperatures, and range from 65 percent approximately at sunrise to near 30 percent in mid-afternoon; however, afternoon humidity in warmer months is often less than 20 percent and occasionally as low as four percent.

Wind speeds are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months and sometimes occur just in advance of thunderstorms. Frontal winds may exceed 30 knots for several hours and reach peak speeds of more than 50 knots. Spring is the windy season. Blowing dust and soil erosion can occur during dry spells. Winds generally predominate from the southeast in summer and from the west in winter.



Source: Ref# 060.

Figure 3.4-1. Average Minimum and Maximum Monthly Temperatures, Precipitation and Snowfall, at White Sands National Monument, New Mexico

3.5 Cultural Resources

This section reviews and summarizes known and expected cultural resources at WSMR to provide the necessary background to analyze impacts from the Proposed Action. The cultural resources analysis will address potential impacts to historic properties, including archaeological and architectural resources, and traditional cultural properties (TCPs) from construction actions, training, and human presence through improved access, changes in use and increased population. WSMR will be developing a PA or an Army Alternate Procedures Agreement for the management of cultural resources on the installation. The PA will follow the example developed for Fort Bliss resources (Ref# 256), involving cooperation and coordination among State and Federal agencies, Tribes, and the WSMR Garrison Commander and Cultural Resources Program.

The affected environment approach incorporates existing data and new baseline information from recent archaeological surveys of WSMR, additional architectural survey of Cold War facilities, description of sensitivity assessments and updates, and other studies which have been conducted since the ICRMP was completed in 2006 (Ref# 009). Issues and concerns for cultural resources have been identified by the WSMR Environmental Division as follows (Ref# 061):

- Additional archaeological survey coverage may be needed on areas for proposed expanded activities and National Register of Historic Places (NRHP) evaluations completed for any archaeological resources recovered; NRHP eligibility evaluations may be required for Cold War-era and other architectural resources located outside of the Main Post.
- Certain areas which have been previously surveyed will require re-survey, due to changes in inventory standards.

3.5.1 INTRODUCTION AND DESCRIPTION

Cultural resources include historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources. Cultural resources that are eligible for inclusion in the NRHP under the established criteria in 36 CFR Part 60.4 (*Parks, Forests, and Public Property—National Register of Historic Places Criteria For Evaluation*) are known as “historic properties”. Cultural resources may also be important to American Indian or other traditional groups as outlined in the American Indian Religious Freedom Act (AIRFA), Native American Graves Protection and Repatriation Act (NAGPRA), and E.O. 13007. A historic property must usually be more than 50 years old, although exceptions can occur. For example, more recent historic resources on a military installation, such as WSMR, may be considered significant if they are of exceptional importance in understanding the Cold War, or if the resource has exceptional scientific or technical importance. Determining the significance of resources less than 50 years old is discussed in depth in *National Register Bulletin 22-Guidelines for Evaluating and Nominating Properties that Have Achieved Significance Within the Past Fifty Years* (Ref# 062).

Certain Native American sites of traditional cultural and religious importance may not meet NRHP criteria as historic properties, but are still considered to be cultural resources. The American Indian and Alaska Native Policy (Ref# 257) emphasizes the importance of respecting and consulting with Tribal governments on a government-to-government basis to assess the effects of proposed DoD actions “that may have the potential to significantly affect protected Tribal resources, Tribal rights, and Tribal lands” before decisions are made by the services (Ref# 257). Properties identified by Tribes as properties of traditional cultural and religious importance, but that do not qualify for inclusion in the NRHP, are still managed according to the DoD American Indian and Alaska Native Policy.

To be considered eligible for inclusion in the NRHP, Native American and Euroamerican archaeological resources, architectural resources, landscapes, and properties of traditional cultural and religious importance must be determined to be significant by meeting one or more of the criteria outlined in 36 CFR Part 60.4. A property of traditional cultural and religious importance which is also eligible for the NRHP (i.e., a historic property) may be called a TCP. Significant resources are those which:

- Are associated with events which have made a significant contribution to the broad patterns of our history;
- Are associated with lives of persons significant in our past;
- Embody the distinctive characteristics of a type, period, or method of construction, or which represent the work of a master, or which possess high artistic values, or which represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in prehistory or history.

To be listed in or determined eligible for listing in the NRHP, a historic property must meet at least one of the above criteria and must also possess integrity. Integrity is defined as the authenticity of a resource's historic identity as evidenced by the survival of physical characteristics which existed during the resource's historic or prehistoric occupation or use. The NRHP recognizes seven aspects or qualities which define integrity: location, design, setting, materials, workmanship, feeling, and association.

3.5.2 ARMY CULTURAL RESOURCE MANAGEMENT

WSMR manages cultural resources in accordance with various Federal and State laws and regulations, and Army policies and regulations which have been established for the management of cultural resources. Of particular relevance is Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 USC 470), as amended, which requires Federal agencies to take into account the effects of their undertakings on historic properties.

WSMR manages cultural resources on approximately 2.2 million acres of land. This includes 5,158 identified archaeological sites, buildings and structures, and many more resources which have yet to be recorded. In addition to the Federal laws briefly mentioned in Section 3.5.1, WSMR adheres to a number of other regulations and agreements. The Army has issued regulations for the management of cultural resources, AR 200-1. In compliance with these regulations and NHPA, WSMR developed an ICRMP (Ref# 009), covering the period from 2004 through 2009. In this plan, "internal and external coordination procedures are specified to ensure compliance with cultural resources laws during the execution of WSMR mission activities through a detailed series of eight SOPs which provide guidance for the conduct of a range of activities conducted at WSMR" (Ref# 009).

- SOP 1: Internal Coordination / When to Consult with WSMR Environmental Division
- SOP 2: NEPA Compliance
- SOP 3: Section 106 of the NHPA Compliance
- SOP 4: Archeological Resources Protection Act (ARPA) Compliance
- SOP 5: NAGPRA Compliance
- SOP 6: Accidental Discovery Procedure
- SOP 7: Reporting Damage to Historic Properties
- SOP 8: Paleontological Resources

The ICRMP also incorporates three agreements which are specific to WSMR.

- 1985 PMOA for consultation on WSMR
- 1985 Data Sharing Agreement with New Mexico
- 1988 MOU for Trinity Site

A 1985 PMOA signed by the Commanding General of WSMR, the Advisory Council on Historic Preservation (ACHP) and the New Mexico SHPO contains provisions for an advisory group, education plan, research plan, and consultation. The intention of the PMOA was to expedite consultation and avoid delays in WSMR's mission. Although the PMOA pre-dates a number of amendments to the NHPA concerning Native American consultation, increased public involvement and ACHP involvement, it is still in effect. The current ICRMP, an internal management document, brings these elements up to date.

WSMR has a data sharing agreement with the State of New Mexico (1985) which allows archeological information from WSMR to be comparable with that from nearby areas, thereby providing a better understanding of the history and prehistory of New Mexico.

A MOU, completed in 1988 with the New Mexico Historic Preservation Division/SHPO, provides for management of the Trinity Site as a part of the WSMR Historic Preservation Plan, with stipulations that WSMR will maintain an inventory of all post-Trinity test structures, facilities and other land modifications, as well as an inventory of all Trinity historic features. Located in the northern part of WSMR, the Trinity Site National Historic Landmark is managed by WSMR. In addition to specific consultation requirements, the MOU establishes a Historic Zone and a Limited Compatible Land Use Zone within the Trinity Site. All future actions within the Trinity Site that require an EA or an EIS will be communicated to the SHPO, and the SHPO will be afforded an opportunity to comment on options to avoid, reduce, or otherwise mitigate effects of those actions. In addition, the agreement stipulates that all future structures at the site will be temporary, and will be removed after completion of the action which necessitated their construction. The agreement also establishes a Historic Zone and a Limited Compatible Land Use Zone within the Trinity Site. This agreement corresponds with NHPA Section 106 requirements in effect at the time of the agreement. Additional consultation requirements were included in the revised guidelines implementing the Section 106 process (36 CFR Part 800). To comply with these regulations, the ACHP now is included as a consulting party for all actions which have the potential to impact this National Historic Landmark.

In addition to these installation-specific agreements, there is a class of buildings that fall under a DoD-wide PA (PA among DoD, ACHP and National Conference of State Historic Preservation Officers Regarding the Demolition of World War II Temporary Buildings, effective June 7, 1986). Under this PA, World War II Temporary Buildings may be demolished without further Section 106 consultation. Other actions regarding the World War II Temporary Buildings (e.g., renovation) require Section 106 consultation. Three WSMR buildings originally considered temporary were built within the timeframe covered by this agreement (1939-1946) (Ref# 009). The agreement includes mitigation of effects from all actions up to and including renovation, repair, and demolition of the buildings and associated landscapes. The DoD and/or the Army has negotiated other nationwide Program Comments and developed Historic Contexts with the ACHP and National Conference of State Historic Preservation Officers that cover additional property types present on WSMR. When applicable, WSMR will use these program comments as part of Section 106 compliance. Covered property types include Capehart and Wherry-era (1949-1962) Housing; Cold War Era (1946 - 1974) Unaccompanied Personnel Housing, World War II and Cold War Era (1939 - 1974) Ammunition Storage Facilities, and World War II and Cold War Era (1939 - 1974) Army Ammunition Production Facilities and Plants, and Army airfields.

WSMR is currently pursuing a PA with the New Mexico SHPO. The PA will include procedures for updating SOPs and other information. More information about this anticipated PA can be found in Section 4.5.1.

3.5.3 PREHISTORIC AND HISTORIC RESOURCES

This section summarizes the history of WSMR, described more fully in the ICRMP (Ref# 009). Native American archaeological sites which predate Euroamerican contact are generally referred to as *prehistoric*, in reference to the absence of a written record. It is estimated there are as many as 50,000 prehistoric sites on the installation dating from 12,000 years ago to the 1800s (Ref# 009). These sites include evidence for Paleoindian and Archaic hunters and gatherers, Jornada Mogollon agricultural villages, and the Protohistoric/Historic Apache.

The sites vary in size from small short-term campsites located in the sand dunes to large villages with adobe room blocks (Ref# 063, 064). Prehistoric pictographs are found in the San Andres and Oscura Mountain ranges. Additionally, suspected prehistoric fields and irrigation channels are found here but have yet to be verified (Ref# 009).

The most common artifacts found are ceramics and chipped stone associated with the Formative Period of approximately AD 400-1450. The ceramics are generally found broken and fragmented and are of El Paso series ceramics, which includes El Paso Brown, El Paso Bichrome, and El Paso Polychrome. It is thought that these ceramic fragments are the remains of common Formative Period artifacts such as bowls, ollas and jars (Ref# 064, 009). The chipped stone debris are the remnants from the manufacture of stone tools. They commonly consist of pieces of sharp-edged, microcrystalline rock, or chert, which comes in a large variety of shapes, sizes, and colors. Stone artifacts are also found made of basalt, quartzite, rhyolite, obsidian, sandstone and limestone. Chipped stone was used in all Prehistoric Periods, beginning 12,000 years ago. Other common indications of prehistoric sites at WSMR are clusters of burnt rock, grinding stones, mortar holes (conical holes ground into stone by generations of pounding) and archaeological features such as hearths or burnt structures indicated by layers of ash.

In addition to the prehistoric sites, there are approximately 1,000 historical period sites at WSMR, ranging from the Spanish Salt Trail and salt gathering sites to the Trinity Site National Landmark, where the first atomic bomb was tested. Although most of the Spanish settlement followed the Rio Grande, various military expeditions traveled through the Tularosa Valley. In addition, caravans of carretas, or ox carts, traveled the salt trail to gather salt, to extract gold and silver, and to preserve foods. Remains of the trail and gathering sites can still be found on WSMR (Ref# 009).

3.5.3.1 Prehistory

The prehistory of WSMR spans several thousand years and is comprised of a mixture of diverse cultural sequences and periods. Most archaeologists would agree that the area has yet to be fully explored, although the last 30 years have seen an increased number of contracted archaeological projects which have greatly expanded knowledge of this region (Ref# 009). The archaeological evidence for Paleoindian, Archaic, and Formative Period occupations are located throughout south-central New Mexico, representing the use of this region for over 12,000 years. The region was utilized by various indigenous groups of hunters and gatherers, and in the later periods, horticulturalists and early agriculturists (Ref# 063, 064). The chronology and cultural histories of these groups on WSMR has been developed primarily through numerous archaeological surveys, excavations, and academic studies (Ref# 009).

Although relatively few sites from any of the time periods or culture have been excavated within the boundaries of WSMR, the surrounding area, known as the Tularosa Basin, has seen extensive research (Ref# 009).

The cultural history in the Tularosa Basin has been synthesized by many archaeologists (e.g., Ref# 063, 064, 065, 066). There is general agreement that the occupation of the Tularosa Basin may be divided into several distinct time periods: Paleoindian Period (10,000-6,000 BC); Archaic Period (6,000 BC-AD 400); Formative Period (AD 400-1450); Protohistoric (ca. AD 1400-1600), and the Historic Period (AD 1540-Present) (see Table 3.5-1).

Table 3.5-1. Prehistoric Periods and Phases of the WSMR Region

Period	Phase	Temporal Range
Paleoindian	*Clovis*	10,000 BC – 9,000 BC
	Folsom	9,000 BC – 8,000 BC
	Plano	8500 BC – 6,000 BC
Archaic	*Early*	6,000 BC – 3500 BC
	Middle	3500 BC – 1500 BC
	Late	1500 BC – AD 400
Formative	*Mesilla*	AD 400 – AD 1200
	Doña Ana	AD 1200 – AD 1,300
	El Paso	AD 1300 – AD 1450
Protohistoric	*“Abandonment”*	ca. AD 1400 – AD 1600
Historic	*Euroamerican Exploration and Settlement*	AD 1540 – Present

Source: Adapted from Ref# 009, 063, 064

Paleoindian sites in New Mexico are most commonly found in the eastern section of the State along the western edge of the Great Plains and along the middle Rio Grande Valley. While even earlier Paleoindian remains may exist, the commonly accepted traditions began with Clovis 12,000 years before the present, followed by Folsom, Late Paleoindian, and Terminal Paleoindian.

The sites, dating between 9500 BC and 5500 BC, reflect a variety of activities associated with short-term and long-term occupations (e.g., temporary and long-term camps), killing and butchering sites, and quarrying and tool manufacturing activities. Much of the evidence for Paleoindian cultures on WSMR consists of isolated points and tools, rather than archaeological sites (Ref# 066).

The Archaic Period represents a shift from the hunting-focused Paleoindian economy to broad-spectrum hunting and gathering. Numerous Archaic sites have been documented throughout WSMR, dating from the Early, Middle and Late Archaic Periods. Over the years, investigators have classified the local Archaic into at least three cultural traditions. These include the Cochise tradition, as defined in southeastern and east-central Arizona. A substantial number of diagnostic projectile points and other artifact types are identical with those described for the Oshara tradition of northern New Mexico (Ref# 009, 063, 064).

It is suggested that the regional Archaic is part of a larger southern Chihuahua tradition specifically adapted to the Chihuahuan desert, and distinct from neighboring Cochise to the west and Oshara to the north (Ref# 009). Environmental conditions during the Archaic Period were generally drier than that of the Paleoindian Period associated with the Late Pleistocene (Ref# 063, 064). Very little is actually understood about the Archaic peoples living in the region, including social and material technologies. Archaic Period remains are found in a greater variety of topographic settings than those from the

Paleoindian Period and indicate a more diverse set of utilized resources. Archaic-Period diversity indicates a subsistence economy of hunting and gathering, with an emphasis on seed gathering and a land use pattern based on high mobility/low residence and the exploitation of major biotic communities throughout the Basin and Range province (Ref# 063, 064).

The Formative Period is defined by the presence of ceramics, the development of horticultural/agricultural subsistence strategies, and the emergence of semi permanent villages. Most of the Formative Period material culture on WSMR is referred to as the Jornada Mogollon but elements of the Mimbres and Anasazi or Ancestral Piro material cultures are also present (Ref# 009). These archaeologically defined groups overlap both temporally and spatially. The Southern Branch of the Jornada Mogollon occupied most of the southern half of WSMR south of the Malpais. The Northern Branch of the Jornada Mogollon includes the northeastern portion of WSMR east of the Carrizozo Lava Flow or Malpais. The Mimbres Mogollon extends from the Rio Grande across the Jornada del Muerto and the southern San Andres Mountains into the Tularosa Basin. The Ancestral Piro utilized the northwestern and extreme north-central portions of what is now WSMR. It is suspected as with many indigenous groups occupying the Southwest, many areas of WSMR were only used seasonally or short-term and were part of a larger subsistence/settlement pattern (Ref# 063).

In general, it is thought that the earliest Formative populations lived in pithouse villages and exploited a wide range of natural resources in addition to pursuing agriculture (pithouses are dwellings partially excavated into the earth, and roofed with a superstructure built of poles covered with vegetation or earth). This is evidenced by the archaeological remains associated with archaeological and geomorphological studies in the region (Ref# 009). By approximately 800 years ago, pithouses were joined by adobe pueblos and agriculture had made wide spread gathering of wild plants a less critical part of the subsistence strategy. During the late 1300s, large adobe communities in the southern portions of WSMR were located on mountain slopes and near lakebeds where large quantities of corn (*Maize*) beans and peppers were grown. Around AD 1400, for reasons not completely understood, the large agricultural settlements in the southern and eastern areas were abandoned, while the northwestern portion of WSMR continued to be utilized by the Ancestral Piro from the Rio Grande near Socorro and the Chupadera Mesa. It is speculated that the Jornada Mogollon in the south and east may have remained in the area but altered their economy back to hunting and gathering wild native plants and animals (Ref# 009).

Those protohistoric groups identified by the Spanish in southern New Mexico include the Manso, Suma, and Jumano, all of whom may have been descendants of the Jornada Mogollon (Ref# 009). The modern Native American populations at Tortugas, New Mexico, and Ysleta del Sur in El Paso have been identified (Ref# 067) as being a mixed ethnic population descending in part from the Manso. Around AD 1450, the Apache, Athapaskan speakers from the north, moved into the region. These newcomers occupied the outlying areas on the edge of the Plains, the region between the Rio Pecos and the Rio Grande, and the mountains to the west of the Rio Grande (Ref# 068). By the time of the Spanish Entrada in AD 1540, the ancestors of the Mescalero Apache occupied areas of the Pecos River drainage and the Sacramento Mountains while utilizing the Tularosa Basin and the San Andres, Organ, and Oscura Mountains. The Tchine or eastern Chiricahua Apache occupied the area west of the San Andres Mountains to the Arizona border. Both groups claim sacred mountains on WSMR (Ref# 009).

3.5.3.2 Historic Period

The history of the region has been influenced by the Spanish, Mexican, and the US activities in the region. These activities included explorations and establishing routes of travel, both peaceful and violent relationships with native groups, colonization by small agricultural groups, battles with the Mexican Army, and settlement by farmers, ranchers, miners, and others from the eastern and western regions of the US.

The first Europeans to see south-central New Mexico were the Spanish explorers Francisco Sañchez Chamuscado (1581-1582), Antonio de Espejo (1582-1583), and Francisco Leyva de Bonilla (1593). All helped to explore the route from Chihuahua to the Santa Fe area (Ref# 064). The chroniclers of these expeditions noted the physical landscape and descriptions of the native populations as they traveled through the arid and sparsely populated region. In 1598, Juan de Oñate led a group of colonists through the region to establish a permanent colony and territorial capital in the northern part of the State. The site of Santa Fe was selected and remained occupied until a revolt by several Puebloan groups in 1680 caused the abandonment of northern New Mexico and Arizona. Colonists and loyal Indian servants fled down El Camino Real de Tierra Adentro, the major road for travelers and traders which connected Santa Fe with the Spanish towns of Chihuahua, Durango, and Mexico City. Many resettled in El Paso del Norte (modern City of Juarez) and surrounding areas. Many settlements took the name of the original settlement (e.g., Ysleta del Sur, Socorro).

The Reconquest in 1692 under the command of Diego de Vargas reestablished the colonies in northern New Mexico. The Camino Real continued to be the primary route between Mexico City and the territorial capital of Santa Fe. In 1822 Mexico gained independence from Spain. Colonists in Santa Fe were now part of the Mexican nation. Responding to overcrowding conditions at El Paso del Norte, settlers moved up the Rio Grande Valley to the area around Doña Ana and dug acequias and planted fields (Ref# 009). In 1846, the US declared war on Mexico to acquire Texas, New Mexico, Arizona, and California. After capturing Santa Fe, the US Army moved south and met the Mexican Army near the colony of Brazito. The battle was brief on December 25, 1846 and the Mexican troops retreated to El Paso del Norte (Ref# 009). The war concluded with the signing of the Treaty of Guadalupe Hidalgo. Under this treaty, lands west of the Rio Grande and south of the Gila River remained part of Mexico (Ref# 009).

In 1849, colonists at Doña Ana moved south to avoid overcrowding conditions. At the requests of the alcalde of Doña Ana, Don Pablo Melendres, Second Lieutenant Delos Bennett Sackett laid out a townsite in this area now known as Las Cruces. The settlers drew lots for ownership of lots within the community (Ref# 009). The US Army established a number of forts along the Rio Grande from Fort Bliss to Santa Fe. The Army provided protection from the Apache, surveyed lands, and performed other tasks as needed. With the Gadsden Purchase in 1854, the United States acquired additional land south to what today is the border between Mexico, and Arizona and New Mexico (Ref# 009).

With the outbreak of the Civil War, the Confederate Army of Texas began a campaign to capture the lands of New Mexico, Arizona, and Colorado. Fort Bliss, Fort Fillmore, Fort Stanton, and the communities of Albuquerque and Santa Fe were in fact captured by the Confederate Army; although Fort Craig was also considered a Confederate victory by some, Union forces succeeded in retaining possession of the Fort. The Union forces defeated the Confederates at the Battle of Glorieta Pass (March 26-28, 1863) and forced their retreat back into Texas (Ref# 009). Settlement in the more remote regions was very dangerous as the region was the homeland for the Mescalero and Chiricahua Apache. The establishment of the Mescalero Apache Reservation in 1873 opened the surrounding region to increased Euro-American/Hispanic settlement, especially with the Desert Land Act of 1877 (Ref# 069). Conflicts with Apache groups continued, culminating with the battle at Hembrillo Basin on April 6, 1880 (Ref# 070).

Mines were developed in the mid-1850s on the west side of the Organ Mountains, such as the Stephenson Mine. Work was sporadic because of conflicts with the Apache. Prospecting for gold, silver, and copper became important in the 1880s and continued into the early 1900s. National demand for these minerals had prospectors all over the Organ, San Andres, and Oscura Mountains looking for exploitable deposits. The southern end of the San Andres Mountains, especially around Mineral Hill, had mines of different sizes. The largest townsite was Gold Camp, begun in the 1880s and lasting into the early 1900s. It had a population of over 1,000 individuals and was on a stage coach route. None of the deposits were valuable enough to make the mines successful, resulting in several abandoned shafts, adits, spoils piles, and architectural features.

In the early 1880s, ranchers began establishing ranches in the San Andres, Organ, and Oscura mountains and on the floor of the Tularosa Basin. Ranchers applied for homestead patents around springs and grazing patents for prime pasture lands, but often these were not successfully completed. By the late 1800s and early 1900s, ranches were scattered throughout the area. Water was usually the determining factor for the success or failure of a ranch. The early ranches had hand-dug wells where the water table was shallow while the later ranches relied on deep well drilling. The water was brought to the surface with windmills. Dirt tanks were also developed by constructing an earthen dam across intermittent drainages to capture and hold runoff water from winter and summer storms.

This remote region was one of the last frontiers in the US even in the early 1900s. The remoteness of the region, preferred by many of the ranching families, was the deciding criterion for US government in selecting the region for two wartime projects (Ref# 009).

In the Tularosa Basin, White Sands Proving Ground (WSPG) was assembled from existing firing ranges, the Alamogordo Bombing Range, and large tracts of both private and public lands. From a list of eight prospective locations, the Trinity Site in the northern section of the Jornada del Muerto Basin, adjacent to the Tularosa Basin, was chosen as the test site for the Manhattan Project. Preparation of the Trinity Site began in the fall of 1944. On July 16, 1945, the first atomic bomb was exploded at Trinity Site. Shortly thereafter, atomic bombs were dropped on Japan, bringing surrender by the Japanese government and an end to World War II.

WSPG was originally developed as a temporary test range, but it soon became apparent that a permanent and based-testing range was needed. In addition to temporary buildings for Army and Navy programs, more permanent buildings were being constructed in the early 1950s. Soon, WSPG became White Sands Missile Range, a testing range and a community with a school, library, newspaper, social clubs, and service organizations.

WSPG was renamed White Sands Missile Range in 1958. Work at the range included V-2 firings and developmental testing of such missiles as Nike, Viking, Corporal, Lance, and Multiple Launch Rocket System. The National Park Service designated the V-2 Complex a National Historic Landmark in 1985. It is still active today and is known as Launch Complex 33.

3.5.3.3 Existing Conditions

For a comprehensive treatment of the WSMR historic context and documented cultural resources, see the WSMR ICRMP (Ref# 009).

Approximately 12 percent of WSMR's 2.2 million acres has been surveyed for the presence of cultural resources (see Figure 3.5-1). These efforts have documented more than 5,158 archaeological sites demonstrating at least 12,000 years of human occupation in the area. Based on existing research, WSMR could encompass more than 50,000 archaeological sites (Ref# 009).

Documented sites include Native American sites, historic mining sites, homesteads, ranches, trails, and sites related to the military presence in the area. Although the southeast corner of the range (south of US 70) represents the most intensively surveyed portion of WSMR, there are areas in this region which have not been surveyed. Additionally, most of the archaeological sites documented through these survey

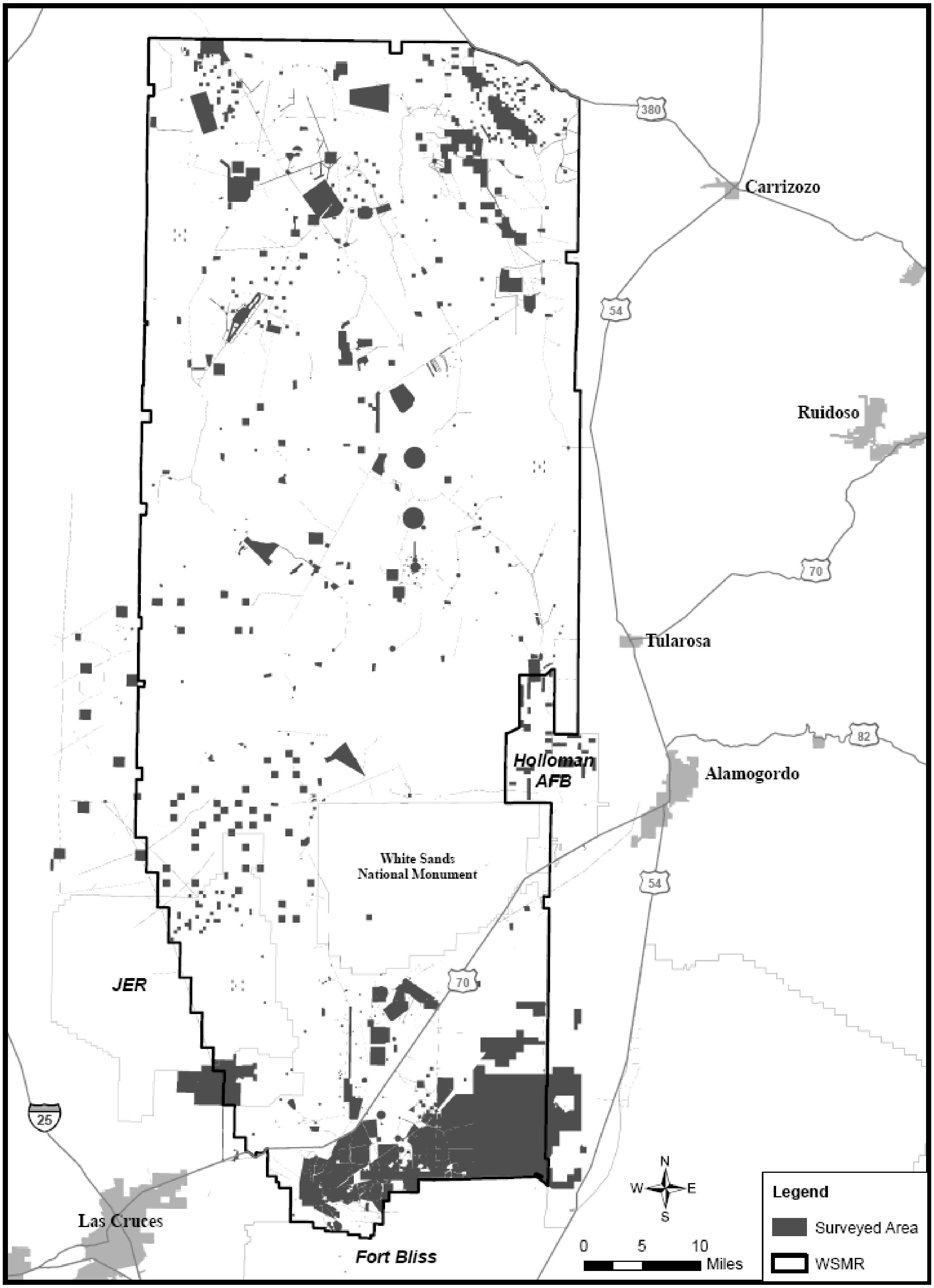


Figure 3.5-1. Archaeological Surveys on WSMR

efforts were not evaluated for NRHP eligibility when recorded (Ref# 009). As a result, there are areas requiring additional survey, and recorded archaeological resources which need to be evaluated. Table 3.5-2 lists resource counts by time period as known in 2004. Since then, many unevaluated sites have been revisited and determined eligible or not eligible for the NRHP, and additional sites have been documented and evaluated. Historic period sites include over 1,000 mining, ranching, spring and well sites that have been recorded throughout WSMR (Ref# 009).

Table 3.5-2. WSMR Cultural Resources

Cultural Description	Eligible	Not Eligible	Undetermined	Total
Paleoindian	1	4	51	56
Archaic	2	64	644	710
Formative	6	118	3211	3335
Protohistoric	0	2	9	11
Historic	11	44	991	1046
Totals[1]	**20**	**232**	**4906**	**5158**

1. Eligibility totals are approximate.

Currently, two WSMR properties are listed on the NRHP. One of the listed properties is also a National Historic Landmark: the Trinity Site, where the world's first atomic bomb was detonated on July 16, 1945 and was listed on the NRHP in 1966. Launch Complex 33, where German V-2 rocket technology was tested after the close of World War II (Ref# 009) was listed in 1985.

On the Main Post, the WSMR Historic District consists of over 50 Cold War facilities related to the development of testing and training programs conducted there (Ref# 009). Throughout WSMR, dozens of other architectural resources may be eligible for their Cold War-era significance or their technological and scientific importance, or both.

Adjacent areas of WSMR have been inventoried for archaeological resources. In compliance with U.S. Army regulations and Section 106, WSMR plans to complete cultural resources identification and evaluation surveys for the areas of proposed projects prior to their implementation.

3.5.3.4 Predictive Model

A predictive model for cultural resources at WSMR was developed in 2001 (Ref# 009, 061). This project incorporates data from over 300 archaeological surveys, and environmental data. A number of factors temper the usefulness of this model. First, survey coverage is uneven, with concentrated information only for south of US 70 and certain land forms completely undocumented. Second, because of the unevenness of the level at which resources have been documented, site types are not consistently recorded. Finally, eligibility has not been determined for a majority of sites, so predicting the distribution of sites that are significant, i.e., eligible for listing on the NRHP, is also imperfect. Despite these issues, this model is a start and over time will be refined into a useful tool that can be incorporated into the WSMR-wide PA for managing cultural resources.

3.5.4 NATIVE AMERICAN RESOURCES

A TCP is defined generally as a place or location which is eligible for inclusion in the National Register of Historic Places. A TCP's eligibility rests on its association with cultural practices or beliefs of a living community which (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

These principles are outlined in National Register Bulletin 38:1. Traditional cultural properties are most often eligible for the National Register under Criterion A (36 CFR Part 60.4[a]), because of associations with important events, or patterns of events, in a community's traditional history and culture.

Native American sacred sites, or "properties of traditional cultural and religious importance", fall within the definition of traditional cultural properties. The NHPA specifically provides for the eligibility of Native American sacred sites, and states that Federal agencies must consult with Native American groups which may value such sites (16 USC 470a(d)(6)(B)).

As of September 2008, only five potentially eligible TCPs have been identified at WSMR. These include Salinas Peak, North Oscura Peak, Victorio Peak, Hembrillo Canyon rock art site at Hembrillo Spring, and Sweetwater Spring on Salinas Peak. None of these have been evaluated for NRHP eligibility as they are not affected by WSMR's mission, nor anticipated to be affected in the future. Management approach to these sites focuses on preservation in place. Other site types and geographic locations that could be of traditional cultural and religious importance to Native Americans include rock art (pictographs and petroglyphs), rock shelters, springs, and prominent geographic features.

Detailed information on traditional beliefs, values, customs, sacred sites, and use areas is often not available, as Native Americans are reluctant to share such information with outsiders. The NHPA and E.O. 13007, however, require consideration of Native American concerns in the management of historic properties. WSMR has therefore consulted with, and will continue to consult with, Native American groups with traditional ties to the area.

WSMR consults with the Mescalero Apache Tribe and the Ysleta del Sur Pueblo (Tigua) regarding their concerns about properties of traditional cultural and religious importance which may be present on WSMR, and consultation will continue. Generally, several types of topographic features have spiritual significance, including caves, springs, and certain mountain peaks. To a lesser extent, resource areas containing specific botanical and geological materials used in ceremonies are also considered important by the Mescalero Apache.

As part of its responsibilities under NAGPRA, WSMR has completed an initial inventory of all cultural remains previously found on WSMR lands which contain human remains or artifacts associated with these remains. Two NAGPRA-inventoried items are with the Museum of New Mexico in Santa Fe. As required by NAGPRA, WSMR has completed its Section 5 (inventory for human remains and associated funerary objects) consultation, contacting Tribal groups with historic ties to the area (Mescalero Apache and Ysleta del Sur Pueblo [Tigua]) (Ref# 061).

3.5.5 PALEONTOLOGICAL RESOURCES

3.5.5.1 Definition and Description

Paleontological resources are scientifically significant fossilized remains, specimens, deposits, and other such data from prehistoric, non-human life. The Archaeological Data Preservation Act (ADPA) (also known as the Archeological and Historic Preservation Act or Moss-Bennett Bill) of 1974 specifically provides for the survey and recovery of scientifically significant data which may be irreparably lost as a result of any alteration of the terrain from any Federal construction projects, or Federally-licensed project, activity, or program. Known paleontological resources will be addressed in any NEPA documentation prepared for actions which may impact or cause irreparable loss or destruction of such resources.

3.5.5.2 Army Management of Paleontological Resources

Collection and removal of paleontological resources is prohibited on WSMR except in the case of professionally collected samples which are to be curated in museums or university collections; for the purpose of academic studies by museums, academic institutions, or government agencies; or for recovery as mitigation of a proposed adverse effect. Such collection activities shall be requested in writing and approved by the WSMR Environmental Division staff geologist after being reviewed for NEPA concerns. The request shall specify the area of study, type(s) of fossil to be collected, location(s) where the fossils will be stored or exhibited, how the fossils may be accessed for academic study by other interested parties, method of collection, dates of activity, and quantity of fossils required to address the research goal.

Proponents that propose activities which adversely impact paleontological resources shall be required to mitigate the activity, either to remove the adverse effect or to fund a recovery program. If recovery is required, the Directorate geologist shall prepare a recovery plan, and after receipt of funding, undertake to oversee the recovery of a sufficient sample of fossils to characterize the deposit.

Professional survey and recovery activities may be programmed in the Environmental Program Requirements report for studies to further scientific research. The geologist shall consult and coordinate with the White Sands Cultural Resources Manager when paleontological specimens, deposits, and remains are suspected to be, or are known to occur, in an archaeological context. Those paleontological resources found in an archaeological context are considered as an archaeological resource under ARPA.

The geologist shall identify sites or locations where paleontological resources of scientifically significant fossilized remains, specimens, deposits, and other such data from prehistoric, non-human life are known to occur as special or sensitive management areas within the WSMR EIS to assist with planning military activities and missions. The discovery of unknown sites and locations will be identified and included in the ICRMP and INRMP and appended to any updates of the plans.

3.5.5.3 Paleontological Research in New Mexico

Paleontological research in New Mexico began as early as the late 19th century (Ref# 071). In 1887, Cope proposed the first scientific name for a Triassic theropod referred to as *Coelophysis bauri* which is now been named as New Mexico's State Fossil. A large fossil bed was discovered in the mid 20th century near Ghost Ranch in northwest New Mexico which is considered by numbers, the largest accumulation of Triassic theropods ever recorded (Ref# 071).

During the last 50 years, paleontological research in New Mexico has provided valuable data on a myriad of topics including but not limited to insect populations, climate change, aquatic and terrestrial species identification, social behaviors of dinosaurs, avifauna, emerging Miocene mammals, and late Pleistocene mammals (Ref# 071, 072).

Geologic time spans billions of years, encompassing the history of fossil formation. Precambrian studies focus on the ancient water bodies, landscapes, and micro-invertebrate fossils which existed on the planet (e.g., Ref# 071, 072, 073). Discovery of fossils associated with this time period are rare but Precambrian formations and deposits are considered to be of scientific interest. Following Precambrian time, which lasted from 4.5 billion years to 540 million years ago, geologic time is divided into three Eras. Each is discussed below with relevant events pertaining to the WSMR project area. Table 3.5-3 shows the geologic periods that make up the Paleozoic, Mesozoic, and Cenozoic eras.

3.5.5.3.1 The Paleozoic Era

The Paleozoic Era is subdivided into six periods and two epochs. During this era, which spans roughly 400 million years, geologists have documented the emergence of marine life, including trilobites, the first fishes, sharks, terrestrial plants, and amphibians.

Table 3.5-3. Geologic Time Scale

Era	Start (million years ago)[1]	End (million years ago)[1]	Temporal Span (million years)[1]
Paleozoic Era (540 to 250 million years ago)			
Cambrian Period	540	490	50
Ordovician Period	490	445	45
Silurian Period	445	415	30
Devonian Period	415	355	60
Carboniferous Period	355	300	55
Permian Period	300	250	50
Mesozoic Era (250 to 65 million years ago)			
Triassic	250	200	50
Jurassic	200	145	55
Cretaceous	145	65	80
Cenozoic (65 million years ago to Present)			
Tertiary	65	2	63
Quaternary	2	Present	2

1. Dates are +\- 5-10 million years.
Source: Ref# 177

During the Mississippian Period (e.g., Lower Carboniferous Period), evidence suggests that sharks and amphibians were abundant; the Mississippian is also marked by the emergence of large floral groups including seed ferns. At the end of the Permian Period there appears to have been an extinction episode of most marine animals including the trilobites. During this period, the inland lakes began to dry up leading to the later formation of the White Sands Dunes located at WSMR.

3.5.5.3.2 The Mesozoic Era

The Mesozoic Era is divided into three time periods. These periods in history provide documented evidence for the first dinosaurs, abundant cycads, and conifers, the first birds, mammals, flowering plants, and abundant insects. By the end of the Cretaceous Period, mass extinction occurred and ended the dominance of the dinosaurs on the planet.

3.5.5.3.3 The Cenozoic Era

The Cenozoic Era includes modern time periods. It is divided into two periods and seven epochs. The Tertiary Period is divided into five epochs and spans nearly 60 million years. During these periods the planet witnessed the emergence of placental mammals (Paleocene), modern mammals (Eocene), running mammals (Oligocene), grazing mammals (Miocene), and large carnivores (Pliocene).

The Quaternary Period is divided into two epochs. The Pleistocene Epoch experienced northern glaciations, glacial decline, vast inland lakes and water bodies, and the emergence of early hominid forms in Africa, Asia and Europe.

The Plio-Pleistocene Mammalian Paleontology SNA on WSMR is located along the eastern foot of the San Andres Mountains. It includes Pleistocene megafauna trackways found at the western margin of the

Lake Lucero/Dunes Ecological Management Unit (EMU) and the southern edge of the Upper Tularosa Basin EMU, as well as rich deposits of skeletal remains. The fossilized trackways are imprints of horse, camel, and mammoths that walked along the near-shore deposits of Lake Otero from two million to 10,000 years ago. Megafauna trackways are rare in New Mexico (most notable is a BLM site near Santa Fe known as Camel Tracks, which dates from the late Pliocene or early Pleistocene period, approximately 2.5 million years ago) (Ref# 074).

The diversity of fossils at this SNA is an important aspect of the scientific nature of this resource. Paleontological resources such as those found within this SNA are classified as "scientifically significant fossilized remains" (Ref# 075). The AHPA specifically provides for the survey and recovery of scientifically significant data that may be irreparably lost as a result of any alteration of the terrain from any Federal construction projects or from a federally licensed project, activity, or program. Erosion poses a potential threat to the preservation of these fossils. Although there is no conservation plan to preserve or maintain this SNA (Ref# 074), an area containing the fossils could be demarcated on the ground to prevent any disturbance by human activities, and GIS data are available to plan operations so as to avoid them.

3.6 Earth Sciences

3.6.1 INTRODUCTION AND DESCRIPTION

The Earth Sciences section includes geology, landforms, seismicity, and soils. Soil is the one earth resource which has the potential to be affected by the alternatives. Therefore, the primary earth resource to be addressed in this EIS is soils, with specific emphasis on characteristics which would affect and be affected by construction and ground-disturbing test and training activities, especially off-road vehicle maneuvers.

The ROI for soils is the area which may be affected by proposed facility construction and changes in test and training activity or intensity. It includes the soils and geology on WSMR, with a focus on the Southeast Multi-Use Area.

3.6.2 REGIONAL GEOLOGY AND TOPOGRAPHY

Major land resource areas (MLRA) are geographically associated land resource units with similar characteristics, identified by the USDA to facilitate regional and national planning (Ref# 076). The dominant physical characteristics of the MLRAs describe relevant land use, elevation and topography, climate, water, soils, and potential natural vegetation. The ROI falls within two MLRAs. Southern Desertic Basins, Plains, and Mountains (comprising 82 percent of WSMR), is distinguished by intermontane desert basins and broad valleys bordered by gently sloping to strongly sloping hills, alluvial fans, and terraces, with steep mountain ranges trending north to south in the western part. Most soils are well drained and medium textured, formed mainly in locally transported sediments on the smoothly sloping sites. Shallow soils occur on steep and broken hill slopes. This area supports desert grass-shrub vegetation with variations of plant communities, depending on landscape position, soils, and topography. Central New Mexico Highlands (comprising 18 percent of WSMR) is characterized by block-faulted ranges separated by intermountain basins. Tablelands and mesas are capped by sedimentary rocks, and steep escarpments and breaks are common. Land use is primarily private grasslands in ranches. Water is scarce throughout the area because of low and erratic precipitation and few perennial streams. Most soils are well drained and moderately fine to moderately coarse textured with mixed mineralogy.

The topography and geology of WSMR consist of linear and isolated mountain ranges composed of volcanic rocks which have been folded and eroded. Mountain ranges include the San Andres Mountains to the west, the Sacramento Mountains on the east, and the Jarilla Mountains are located in the middle, near the Oro Grande Range Camp on Fort Bliss. The geologic history includes periods of volcanic activity, rock thrusting and folding, erosion, and deposition of marine sediments and alluvium, which affected the terrain and resulted in the current surficial geology. The oldest rocks exposed at WSMR come in the form of outcrops of Precambrian granitic and metamorphic units, such as those on the eastern flank of the San Andres Mountains In the valleys are alluvial fans extending from the base of the mountain ranges and thick marine sediments, including gypsum, and many with fossils which form much of the underlying geology in the plains (Ref# 074).

The Tularosa Basin is one of the easternmost parts of the Rio Grande Rift and contains many ephemeral playa lakes, alkali gypsum flats, and gypsum dunes carried from the playa lakes by the wind (Ref# 005). Thick deposits of gypsum, many with fossils, form much of the underlying bedrock in the plains and affect the topography by dissolving and subsiding, in certain locations forming playas which trap surface water and may form sinkholes.

Unique geologic features in the vicinity of WSMR include the Jornada del Muerto, located in the northwestern portion of WSMR, a southward plunging asymmetrical syncline. The center of this basin is believed to be a Pleistocene-age lake with high concentrations of gypsum and dolomite. Another unique geologic feature on WSMR is the Carrizozo lava flows, formed from two distinct basaltic flows which erupted within 1,000 years of each other. They are well preserved and extend nearly four miles within WSMR, with an average thickness of 33 to 49 feet (Ref# 074).

In addition, the White Sands are an expanse of white gypsum sands. The sand constantly drifts into dunes 10 to 60 feet high. In the southwest corner of the monument is Lake Lucero, a usually dry marsh (playa) encrusted with selenite crystals created by the evaporation of gypsum-laden runoff water. The gypsum is the product of erosion of gypsum-rich sedimentary rocks from the San Andres and Sacramento Mountains.

3.6.3 SEISMICITY AND GEOLOGIC HAZARDS

Although the Rio Grande Rift is a fault block, it is not defined by earthquake activity. The closest center of earthquake activity experienced eleven events between 1999 and 2004 is called the Socorro Seismic Anomaly, centered near and mostly north of Socorro, New Mexico. One earthquake, magnitude 3.2, was recorded on November 2004 in the vicinity of WSMR (south of Three Rivers in Otero County). WSMR is not located within an area of frequent or serious seismic events (Ref# 077).

While sinkhole formation is possible in the areas of WSMR underlain by gypsiferous and other calcareous rock, they are not common. The predominant karst topography in southern New Mexico is located in the Delaware Basin of the Guadalupe Mountains in Eddy County to the east of Fort Bliss (Ref# 078).

3.6.4 GEOLOGIC RESOURCES

WSMR contains a number of potential geologic resources, including gypsum, oil and gas, and other minerals. Mining operations are not currently conducted anywhere on WSMR, although the area does have a mining history dating back to the discovery of mineral deposits in the Organ Mountains in 1846. Mining in the area that was to become WSMR peaked in the late 1800s and early 1900s before dwindling to practically zero activity around 1935 (Ref# 001). The Organ Mountains and the San Andres mountains had either been prospected or mined for gold, silver, zinc, copper, and lead before the creation of White Sands Proving Ground, which later became WSMR. Quaternary gypsum dunes and gypsum rock in the San Andres Mountains represent millions of tons of potentially commercial grade gypsum and the dunes of White Sands National Monument are recognized as the world’s largest continuous deposit of gypsum sands (Ref# 001).

Both the Tularosa Basin and the Jornada del Muerto are considered to possess geologic conditions favorable for the presence of oil and gas resources, although a thorough examination of the existence of such resources at these locations and within the boundaries of WSMR has not yet been conducted (Ref# 001). Oil and gas exploration is restricted on the entire installation. A subbituminous coal field (the Engle Field) extends through the Western Call-Up area, near the Sierra-Doña Ana county line (Ref# 001). WSMR has several designated borrow pits for fill and rock throughout the range.

3.6.5 SOILS

The most recent installation-wide soil survey dates from 1976 (Ref# 079). The scale of the information in the 1976 survey is coarse and not generally useable at a site-specific scale. It also has limited information on soil characteristics (e.g., chemistry and engineering properties). A new soil survey is underway for WSMR, but only updated information within the Southeast Multi-Use Area is currently available. The new soil survey data incorporates new and more detailed map units which characterize physical, chemical, and engineering properties, as well as limitations for military uses and ecological site descriptions, which provide a useful baseline for comparison of the effects of planned future construction and test and training activities. The existing soil survey (Ref# 080) provides more limited soils information, including erosion hazards, soil profile descriptions, drainage and runoff classes, and land capabilities.

For this EIS, the new soil survey data, which are currently in draft form and subject to change, are available for almost 193,000 acres and cover the entire Southeast Multi-Use Area. To develop a comprehensive characterization of all of WSMR, these data were merged with the older soil survey data on the rest of WSMR using GIS software and a geodatabase. As a result, the current soil conditions and limitations described in this section are more detailed for the Southeast Multi-Use Area, while summarizing all of WSMR soils for a few key characteristics. As new soil survey data are developed, they will be utilized to characterize conditions, identify potential areas of adverse impacts, and manage soils to maintain soil health and productivity.

In general, most soils on WSMR are well drained to excessively drained with the depth to bedrock ranging from shallow to very deep. Thirty-one percent of the soils are rated as having moderate or severe susceptibility to water erosion; 54 percent have moderate to severe susceptibility to wind erosion (Ref# 076, 080). Soil characteristics such as susceptibility to erosion are a function of many physical and chemical properties of each soil, in combination with the climate, topography, and vegetation. These basic characteristics for all WSMR soils are shown in Table 3.6-1. The distribution of erodible soils is displayed in Figures 3.6-1 and 3.6-2.

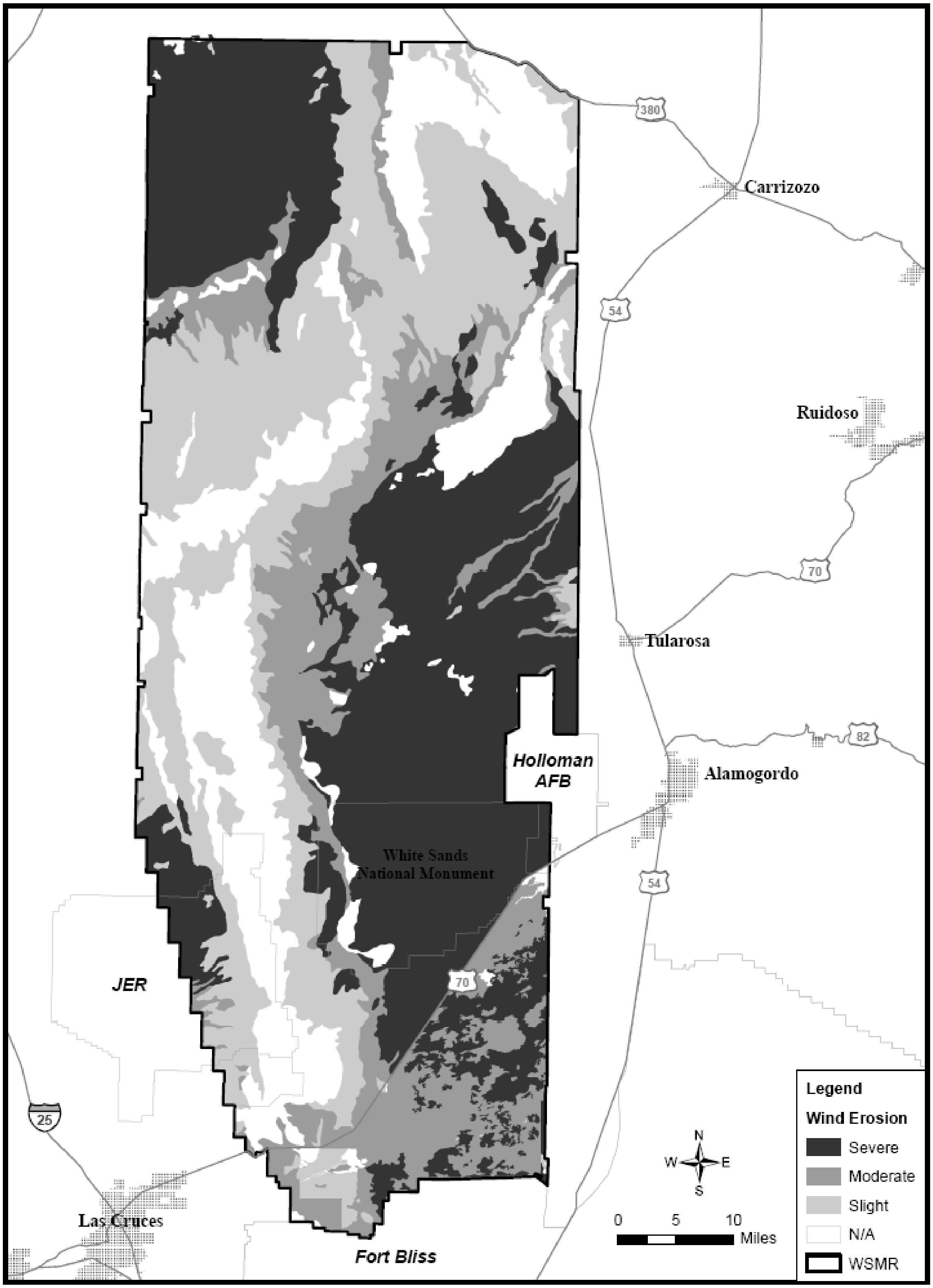
Table 3.6-1. Erodibility of Soils on WSMR

Erosion Type	Slight (percent)	Moderate (percent)	Severe (percent)	Unknown or Not Rated (percent)
Wind Erosion	27	18	36	19
Water Erosion	48	14	17	21

Source: Ref# 080, 081

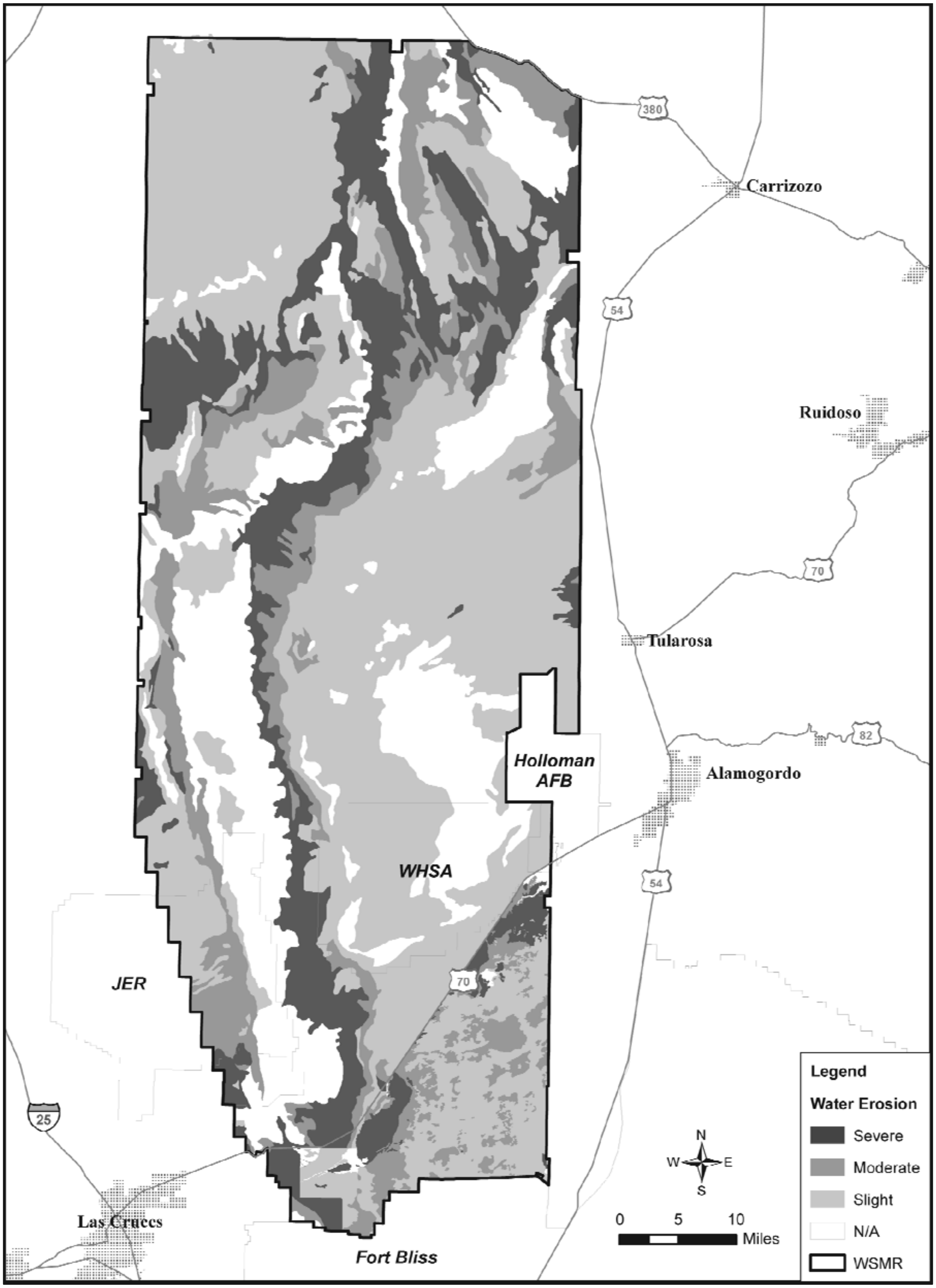
The majority of the Southeast Multi-Use Area is located on alluvial flats and basin floors, with an estimated 65 percent on coppice dunes. The updated soil survey (Ref# 081) in the Southeast Multi-Use Area provides interpretations for specific land uses which are relevant to proposed HBCT (or comparable unit) training. These include suitability ratings for trafficability using a range of vehicles under wet and dry conditions, suitability for excavations for fighting positions, and estimates of the quantity and types of soil cover.

The 2008 soil survey characterizes the percentage of the soil which has biological or physical crusts, and the percent of bare soil and plant canopy on just over half of the Southeast Multi-Use Area. The soil cover, if undisturbed, stabilizes the soil surface and resists erosion. Of the 53 percent which has been evaluated for soil cover, approximately 20 percent has biological crust, eight percent contains a physical crust composed of either gypsum or salt; and most of the area evaluated has a plant canopy ranging from 10 percent to 60 percent cover. Aboveground crust thickness can reach up to 10 centimeters. Because they are concentrated in the top one to four mm of soil, crusts primarily affect processes that occur at the land surface or soil-air interface. These include soil stability and erosion, atmospheric nitrogen-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seedling germination, and plant growth (Ref# 082).



Note: N/A areas shown on the figure represent those locations in which NRCS data is currently being developed (i.e., soil engineering data is not available at this time).

Figure 3.6-1. Susceptibility to Wind Erosion



Note: N/A areas shown on the figure represent those locations in which NRCS data is currently being developed (i.e., soil engineering data is not available at this time).

Figure 3.6-2. Susceptibility to Water Erosion

Table 3.6-2 summarizes areas in the Southeast Multi-Use Area associated with selected soil ratings, hazards, and limitations which are relevant to the proposed land use changes. Moderate limitations can be overcome or minimized by special planning, design, or installation. Severe limitations indicate that the soils are unfavorable and generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Vehicle types and soil ratings are defined in the text following the table. Erosion Hazard ratings indicate the susceptibility of soils to accelerated wind or water erosion.

Table 3.6-2. Soil Limitations for Use in Southeast Multi-Use Area[1]

Land or Training Use	Percent of Soils with Designated Rating or Limitation				
	Excellent/ Few/Slight Limitations	Good[2]	Fair/Moderate Limitations	Poor/Severe Limitations	Not Rated[3]
Wind Erosion	6	N/A	57	34	3
Water Erosion	57	N/A	27	13	3
Path and Trail Construction	51	N/A	37	9	2
Trafficability, Vehicle Types 1 and 2	12 (wet) 97 (dry)	85 (wet) 0 (dry)	<1 (wet) <1 (dry)	1 (wet) <1 (dry)	2 (wet) 2 (dry)
Trafficability, Vehicle Types 3 and 4	12 (wet) 97 (dry)	85 (wet) 0 (dry)	1 (wet) 0 (dry)	<1 (wet) <1 (dry)	2 (wet) 2 (dry)
Excavations for Vehicle Fighting Positions	0	0	56	42	2

1. Excludes approximately 1,300 acres within the Southeast Multi-Use Area which are unmapped.
2. Applies only to vehicle trafficability ratings.
3. Includes unmapped areas and miscellaneous map units such as rock outcrops.

Source: Ref# 081

A rating of slight indicates that erosion is unlikely under ordinary climatic conditions with natural vegetation and ground cover intact; moderate indicates that erosion is likely and erosion control measures may be needed; severe indicates that erosion is very likely and erosion control measures are advised. If soils with moderate to severe erosion hazards are disturbed and left untreated, significant erosion may be expected, resulting in loss of soil productivity and offsite damage. There is a close correlation between soil blowing and the size and durability of surface crust, rock fragments, and organic matter. This rating considers the natural vulnerability of the soils, with erosion most likely to occur if vegetation, crust, or other ground cover is reduced or removed. For example, if repeated disturbance causes damage to vegetation or removal of ground cover like leaves, biological crusts, or other litter, areas with the highest percentage of soils with severe erosion hazards would be the most likely to erode, causing onsite and offsite damage and possibly resulting in unstable conditions.

Biological crusts are formed by living organisms and their by-products (primarily various cyanobacteria, lichens, mosses, and fungi), creating a surface crust of soil particles bound together by organic materials.

Limitations for path and trail construction are developed by considering soil properties which could cause problems for roads of minimal design and construction. This category is used to alert managers to areas where user-created trails should be rerouted or where mitigation measures would be needed to minimize maintenance needs. Moderate to severe limitations are assigned if soils are too dusty, sandy, or steep, or due to frequent ponding of surface water.

Trafficability is the capacity of soils to support military vehicles. Trafficability is affected by soil strength, slope, stickiness, slipperiness, vegetation, and natural obstacles. It is subdivided by vehicle type, depending on the contact pressure of tires or tracks and vehicle weight, and considers the effect on the surface soil layer under wet or dry conditions. The new soil survey information provides trafficability ratings under wet conditions (high soil moisture) for one pass and 50 passes during a wet season. The ratings listed in Table 3.6-2 are the same for one pass and 50 passes. An excellent rating means that soil features are very favorable for off-road vehicle use; good indicates moderately favorable soil conditions; fair indicates significant soil limitations which are likely to require adjustments to the vehicle spacings or route; poor indicates soil features which cannot be overcome. Areas with fair to poor trafficability may require greater vehicle maintenance. Vehicle types are described in the soil survey as follows:

1. Lightweight vehicles with low contact pressure (less than 2.0 pounds per square inch)—vehicles such as carrier, cargo, tracked, M116.
2. Tractors with average contact pressures, tanks with comparatively low contact pressures, and certain trailed vehicles with very low contact pressures—high-speed tracked vehicles like M2A1, M2A2, and trucks like HMMWV.
3. Most medium tanks, tractors with high contact pressures, and all-wheel drive trucks and trailed vehicles with low contact pressures—tracked vehicles like 155-mm, Howitzer, and M1A1 tanks.
4. Most medium tanks, tractors with high contact pressures, and all-wheel drive trucks and trailed vehicles with low contact pressures—most medium tanks like M1A2.

The limitations on excavations for vehicle fighting positions provide an indication of the suitability of the soils for this type of training. All of the Southeast Multi-Use Area is identified as limited for excavations, primarily due to the potential for caving of sidewalls, cemented pans which are very difficult to dig through, ponding of surface water, clay layers, or steep slopes.

The new soil survey in the Southeast Multi-Use Area (Ref# 081) describes ecological sites and applies the principles of the transition state concept to characterize changes in the ecosystem structure and function. The state and transition model provides a framework for understanding vegetation dynamics which incorporates current ecological knowledge from many different sources. State and transition models in the ecological site, also called "ecosite", describes the ecological states (vegetative and ecological conditions) and transitions (ecological dynamics) which lead to changes in vegetative and ecologic conditions. An ecological site is defined as "a kind of land with specific physical characteristics, which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management" which is correlated with soil map units (Ref# 083). This concept was developed by a task force for the Society of Range Management to provide improved methods of tracking and monitoring rangeland health while providing sensitive and useful tools to manage for sustainability. Since 1997, agency leaders for the three agencies with primary responsibility for assessing rangeland health (BLM, U.S. Forest Service, and NRCS) participated in a committee to promote the use of the ecological site concept and to develop indicators and protocols for assessment (Ref# 083).

Each ecological site description defines a desired plant community and uses a threshold concept to characterize changes in the system. There are 17 standard indicators which are used to evaluate soil and site stability, hydrologic function, and biotic integrity, and their degree of departure from the potential plant community and optimum ecological condition. These indicators primarily include measures of erosion by water and wind, plant community composition and production, and soil cover (Ref# 084).

The various plant community types possible on an ecological site correspond to the condition or transition state of the vegetation and soil which can help identify the management actions which may cause a transition from one plant community to another. Each ecosite description which follows the new format adopted by the lead Federal agencies includes a description of the historic climax plant community species composition, ground cover, and production in its optimum state, as well as other transition states which result due to degradation of the optimum system. At WSMR, the departure from the historic plant community typically involves a reduction in grasses, increasing shrub components and bare ground, and accelerated soil erosion. This condition also exists in other areas of the Chihuahuan Desert which have been disturbed. In general, transitions to shrub-invaded and shrub-dominated ecosites are considered very difficult to convert back to higher level states dominated by grasses, even with active management (Ref# 085).

The ecosite description attempts to attribute possible causes for transitions within each ecosite, such as overgrazing, drought, or surface-disturbing activities, but it does not identify specific causes and effects. Considering the transition states of the ecosites that dominate each of the major segments of the Fort Bliss Training Complex, provides a way to characterize current conditions and evaluate the likelihood of change as more of the training areas are affected by off-road vehicle maneuvers. The occurrence of coppice dunes is one indicator of a lower transition state, especially on Sandy and Deep Sand ecosites.

The dominant ecological sites in the Southeast Multi-Use Area are summarized in Table 3.6-3 and shown in Figure 3.6-3. Data collected by the ITAM Program, Range and Training Land Assessment component, could be used by the WSMR Garrison land manager to determine transition states for maintaining sustainability of ecosites throughout the installation.

Table 3.6-3. Ecological Sites in the Southeast Multi-Use Area

Ecological Site Name	Ecosite ID	Percent of Area	Brief Description
Loamy 8 to 10.5 inches	R042XB014NM	48.6	This ecosite intergrades with Sandy, Clayey, and Gravelly or Gravelly Loam ecosites, without sharp boundaries. The presumed historic plant community is dominated by black grama and tobosa with some alkali sacaton. Survey data and vegetation mapping indicate relatively low perennial grass cover, high percentages of bare ground, and the beginning of mesquite invasion with some coppice dune formation.
Deep Sand 8 to 10.5 inches	R042XB011NM	33.0	This ecosite often intergrades with either the Sandy or Gravelly Sand ecosites. The historic plant community of this ecosite is dominated by dropseeds and a significant cover of black grama and bush muhly. Coppice dunes are similar to the mesquite-dominated state in the Sandy ecosite. This site is often associated with dunes in the soil survey data, primarily on either Copia or Nations soil map unit components. Causes of the transition from the historic plant community are unknown, but may relate to destruction of plants by trampling or vehicles with consequent erosion.
Unmapped or unknown	—	6.0	Not applicable.
Gyp Hills	R042XB013NM	5.7	This ecosite occurs on hills, escarpments and breaks between higher and lower plains or terraces, and canyon sides between deep desert drainageways. The historic plant community is dominated by black grama, gyp dropseed, and fourwing saltbush.

Table 3.6-3. Ecological Sites in the Southeast Multi-Use Area (continued)

Ecological Site Name	Ecosite ID	Percent of Area	Brief Description
Gyp Upland	R042XB006NM	3.6	This ecosite is often associated with Loamy sites, depending on soil texture, gypsic horizon depth and amounts of gypsum. May intergrade with Salt Flats sites depending on salinity levels. The historic plant community is dominated by alkali sacaton, black or blue grama, gyp grama, gyp dropseed, tobosa, burrograss, and saltbush. Sites are susceptible to erosion when vegetation cover is reduced by drought and overgrazing. Mesquite may invade soils with deeper gypsic horizons in areas dominated by tobosa or burrograss.
Salt Flats	R042XB036NM	1.5	This ecosite is associated with Gyp Upland and Loamy sites, depending on levels of gypsum and sodicidy/salinity and can also be associated with barren playas. The historic plant community is dominated by alkali sacaton and scattered small shrubs, esp. fourwing saltbush and iodinebush. Large patches of bare ground may be common. Drought and/or overgrazing may lead to plant mortality and reductions of water infiltration through soil surface may inhibit reestablishment.
Sandy 8 to 10.5 inches	R042XB012NM	1.1	This ecosite is often associated with the Shallow Sandy ecosite depending on the depth of caliche and intergrades with Deep Sand and Gravelly Sand. The historic plant community is dominated by black grama and other grasses, especially dropseeds. Shrub invasion is very common, and mesquite invasion is documented by the average mesquite canopy cover on 27 plots. The causes for transition to coppice dunes are attributed to drought and surface disturbance, including grazing.
Salty Bottomland	R042XB033NM	0.4	This ecosite occupies drainageways and floodplains and is commonly subject to overflow, both from within the drainageway and from surrounding upland sites. The historic plant community is characterized by salt-tolerant grasses and shrubs such as alkali sacaton, giant sacaton, and fourwing saltbush.
Draw	R042XB016NM	0.1	This ecosite may intergrade with the Clayey site and draws are often upslope from Bottomland sites. The historic plant community is dominated by tobosa and to a lesser extent by alkali sacaton and vine mesquite, with blue grama dominant in the past. Transitions to bluegrass may occur in response to water redistribution and mesquite may invade. Overgrazing may reduce tobosa cover, resulting in mesquite woodland state.
Clayey	R042XB023M	~0.1	This ecosite is often associated with Draw and Bottomland sites and may intergrade with Loamy sites with which it may share dominant species. The historic plant community is dominated by tobosa, and to a lesser extent, by black grama. A shift to dominance by tobosa and then burrograss may occur in response to grazing or drought.

Source: Ref# 081, 085

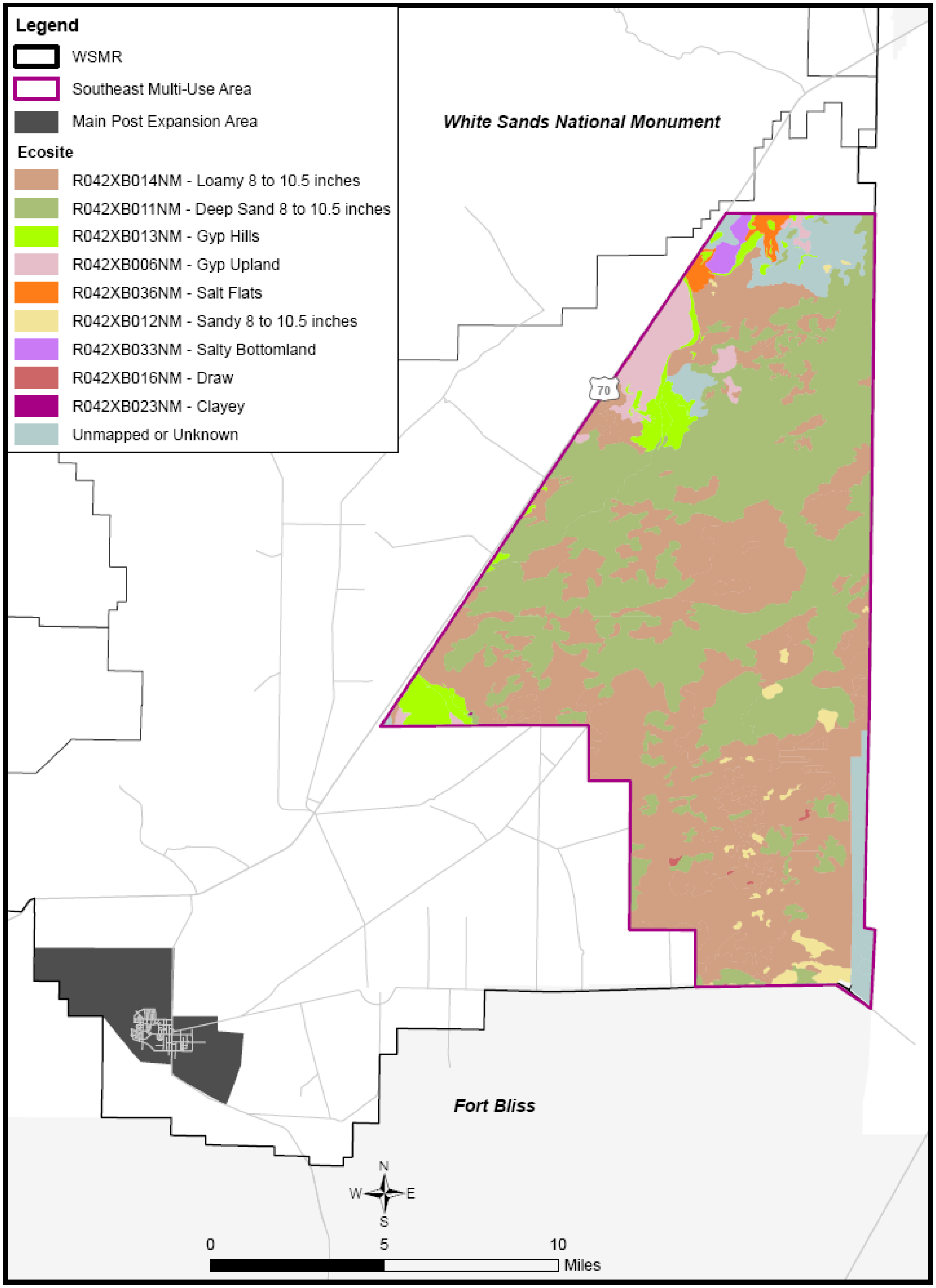


Figure 3.6-3. Location of Ecosites in the Proposed Southeast Multi-Use Area

3.7 Biological Resources

3.7.1 INTRODUCTION AND DESCRIPTION

Biological resources consist of native or naturalized plants and animals and their habitats. This section focuses on plant and animal species, vegetation types and wildlife habitat which typify or are important to the function of the ecosystem, are of special societal importance, or are protected under Federal or State law or statute. For purposes of this evaluation, sensitive biological resources are defined as those plants and animal species listed by the USFWS, under different levels of concern by the State of New Mexico, or considered sensitive by WSMR. The ROI for biological resources encompasses all lands within WSMR boundaries, including those portions of the Tularosa Valley Basin, northern portions of the Jornada del Muerto Basin known locally on WSMR as the Stallion Range ,the San Andres Mountains and Oscura Mountains. The ROI also includes areas within WSMR boundaries occupied by White Sands National Monument, JER, and SANWR. Detailed descriptions of these areas are provided in the 2002 INRMP (Ref# 074), which is incorporated by reference. Section 3.7.2 provides a brief synopsis of Army management regarding biological resources. Section 3.7.3 and 3.7.4 discusses vegetation and wildlife occurring on WSMR, Section 3.7.5 discusses Federal and/or State species of concern and Section 3.7.6 discusses wetland resources within WSMR.

3.7.2 ARMY MANAGEMENT OF BIOLOGICAL RESOURCES

Environmental stewardship is an integral part of the Army's *U.S. Army Environmental Strategy into the 21st Century* which defines the Army's leadership commitment and its philosophy for meeting present and future environmental challenges. It provides a framework to ensure that environmental considerations are integral to the Army mission and that an environmental stewardship ethic governs all Army activities (Ref# 086). As part of environmental stewardship, WSMR oversees management of 2.2 million acres. The primary WSMR document for managing and protecting its natural resources is the INRMP which complies with standards set by NEPA, the Endangered Species Act, and DoD and Army documents such as "Guidelines to Prepare Integrated Natural Resource Management Plans for Army Installations and Activities", AR 200-1 "Environmental Protection and Enhancement" (Ref# 087), and 34 CFR Part 651 "Environmental Analysis of Army Actions". The INRMP describes natural resource values specific to WSMR, prescribes actions to facilitate the management of those resources, and outlines procedures for monitoring resources to continue to understand the effects of WSMR activities on its natural environment. Hunting for large and small game is allowed on WSMR in accordance with New Mexico state laws and WSMR policies, when not in conflict with mission activities.

In addition to environmental stewardship, the Army has prioritized sustainable use of its lands. AR 350-19 "Army Sustainable Range Program" defines the Army's role in maintaining its range lands for the future. An established component of the SRP program is the ITAM program. A subcomponent of the ITAM program, Range and Training Land Assessment - is a tool to collect information about test and training areas which are used to monitor the impacts resulting from day to day military activities. The data collected by Range and Training Land Assessment is used to determine and prioritize land rehabilitation/maintenance activities, which in turn support sustainability of military lands. The Army has also developed SOPs and utilizes BMPs to help maintain sustainability and foster environmental stewardship (see Section 4.20).

3.7.3 VEGETATION

WSMR is located within the Bolson sub-section, Mexican Highlands section of the Basin and Range physiographic province (Ref# 088). In general, vegetation on WSMR follows an elevational gradient with a small area at the upper elevations supporting a limited pondersosa pine (*Pinus ponderosa*) forest and woodlands, mid to upper elevations supporting pinyon pine (*Pinus edulis*) and juniper (*Juniperus* spp.) woodlands, and the valleys and mid-elevational slopes supporting Plains-Mesa Foothill grasslands, Chihuahuan Desert grasslands, and Chihuahuan Desert shrublands (Ref# 074, 088). In 2000, a vegetation classification was developed for WSMR, resulting in 71 major plant associations. These plant associations were in turn combined into 35 major Map Units (MU) of floristically and physiographically similar areas (see Figure 3.7-1). Appendix F provides further information regarding WSMR major vegetation MUs.

Of the 71 plant associations, 22 are considered imperiled across their distribution, with an additional 41 associations considered vulnerable. The majority of the imperiled and vulnerable plant communities are Chihuahuan Desert grasslands. A long history of grazing and drought in the southwest has led to the conversion of many grasslands to shrublands, resulting in a reduction in overall plant species diversity (Ref# 089). Shrublands on WSMR have fewer higher ranked associations since the majority of these communities are considered a result of desert grassland invasion (Ref# 088). Since grazing has been prohibited on WSMR for over 50 years, WSMR has some of the highest quality grassland occurrences remaining in the southwest (Ref# 088).

WSMR also has designated SNAs which contain some of these globally and regionally important plant associations in addition to other biological and physical components. These areas also warrant special attention and often call for different management strategies.

The most abundant vegetative community on WSMR is grasslands (approximately 598,000 acres or 27 percent of WSMR). On WSMR, grasslands occur in the foothills, interior valleys, and on the alluvial fan piedmonts. The Lowland Basin Grassland (MU 19) (approximately 196,000 acres) and Mixed Foothill-Piedmont Desert Grassland (MU 12) (approximately 185,000 acres) are the two most abundant map units (Ref# 074, 088).

The Lowland Basin Grasslands are found in the bottoms of the Tularosa and Jornada Basins on heavy clay soils between 3,800 to 5,800 feet. Flora generally lacks species richness and structural diversity, with dominant flora consisting of alkali sacaton (*Sprorobolus airoides*), tobosa grass (*Pleuraphis mutica*), and burrograss (*Scleropogon brevifolius*) (Ref# 074, 088).

The Mixed Foothill-Piedmont Desert Grasslands are found on mountain slopes, foothills, and upper alluvial fan piedmonts from 4,000 to 6,500 feet. Soils are generally thin and moderately to very rocky. Dominant grasses include black, blue, hairy, and sideoats gramas (*Bouteloua* spp.) and curlyleaf muhly (*Muhlenbergia setifolia)*. In addition, there is often a diverse shrub element which may include mariola, ocotillo (*Fouquieria splendens*), sotol (*Dasylirion wheeleri*), Bigelow's sage (*Artemisia bigelovii*), and creosotebush (*Larrea tridentata*) (Ref# 074, 088).

Patchy areas of vegetation are communities that have large intercanopy spaces with very little vegetation (Ref# 090). These areas make up the second largest vegetative areas on WSMR (approximately 511,000 acres or 23 percent of WSMR). The most abundant of the patchy areas are the Mesquite Shrublands (MU 11) which occur principally on the expansive dunefields of the Tularosa and southern Jornada del Muerto Basins (266,000 acres) (Ref# 074). These shrublands are dominated primarily by honey mesquite (*Prosopis glandulosa*) with some scattered littleleaf sumac (*Rhus microphylla*). In the majority of its range, the mesquite traps sand resulting in the formation of coppice dunes, which have very little understory vegetation. Evidence shows that mesquite coppice dunes have increased over the past decades as a result of wildlife overgrazing and drought (Ref# 074, 088).

Shrublands also occupy a significant portion of WSMR, comprising approximately 474,000 acres, or 22 percent of WSMR (Ref# 088). The most expansive shrubland community, and overall vegetative

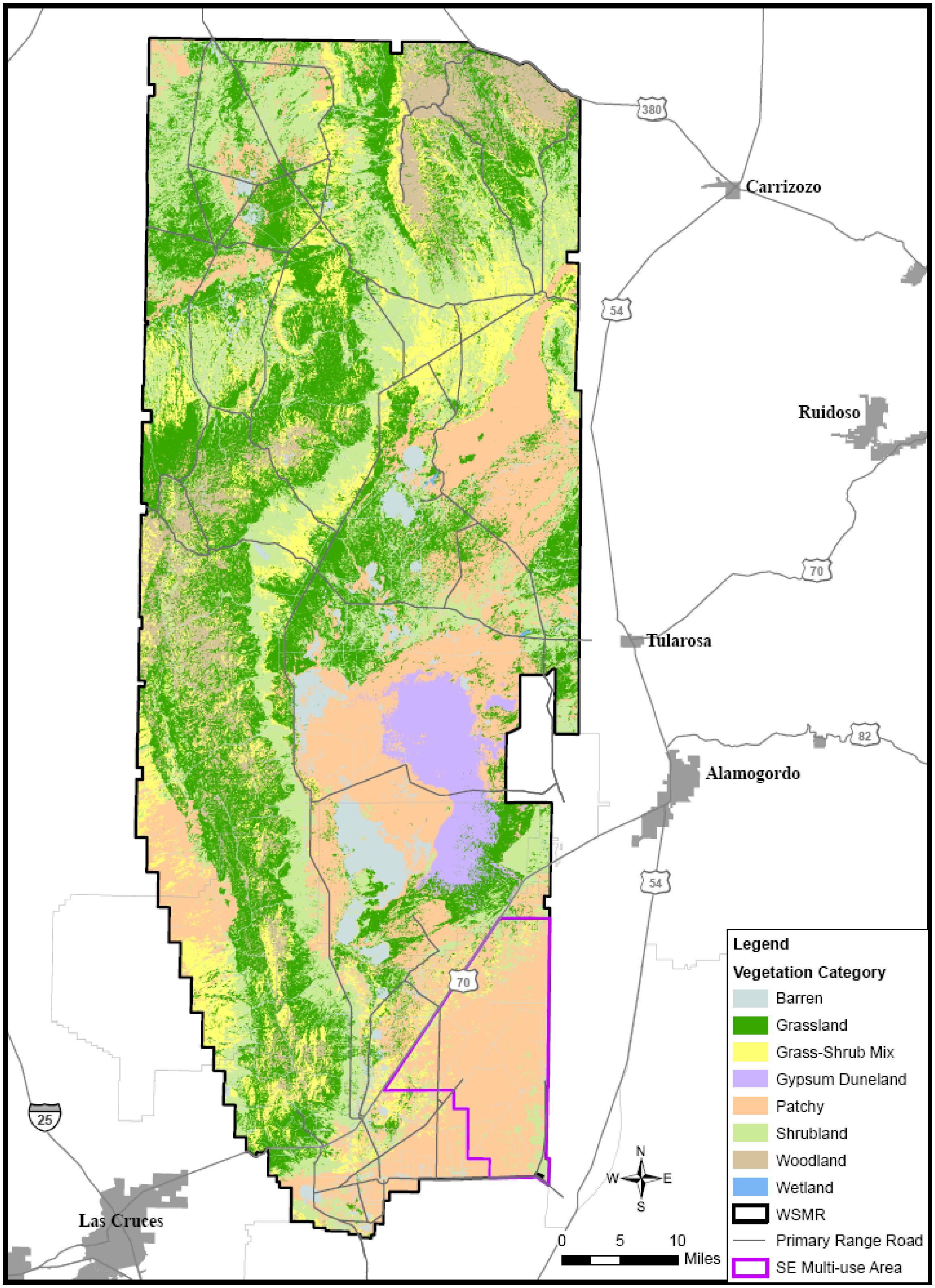


Figure 3.7-1. Vegetation on WSMR

shrublands are found in a variety of environments on WSMR from basin bottoms (3,900 feet) to piedmont bajadas and into the foothills (5,700 feet). Vegetation composition of creosotebush shrublands is diverse, with ten plant associations associated with this type. They range from dense to sparse shrub canopy to sparse to moderate grassy understory (Ref# 074).

Grass and shrubland mixed communities comprise approximately 260,000 acres (12 percent of WSMR). The largest of this community is the Mixed Lowland Desert Scrub which is dominated by creosotebush, fourwing saltbush (*Atriplex canescens*), and tarbush (*Flourensia cernua*) shrubs with bush muhly (*Muhlenbergia porteri*) and alkalai sacaton (*Sporobolus airoides*) in the understory. It is found from elevations of 3,800 to 5,600 feet on alluvial flats (Ref# 074, 088).

Woodlands comprise approximately 135,000 acres, or six percent of WSMR, and consist of Ponderosa Pine Forests (220 acres), Pinyon Pine Woodlands (54,000 acres), Juniper Woodlands (81,000 acres), and Montane Valley Dune Woodlands (860 acres). Pinyon Pine Woodlands are found at 5,800 to 8,500 feet and are most common on the backslopes of Oscura and northern San Andres Mountains. They are dominated by pinyon pine with associated oneseed juniper (*Juniperus monosperma*) or alligator juniper (*J. deppeana*) as elevation decreases. The lower elevations are generally open and savanna-like with grassy understories dominated by grama grasses and curlyleaf muhly. At higher elevations, tree stands have understories consisting of Gambel oak (*Quercus gambelii*), wavyleaf oak (*Quercus undulata*), and desert mountain mahogany (*Cercocarpus breviflorus*). Grasses such as Scribner's needle grass (*Stipa scribneri*) and New Mexico muhly (*Muhlenbergia pauciflora*) are also present where shrubs are not as thick (Ref# 074, 088).

Juniper Woodlands are found at elevations from 4,800 to 7,500 feet and are usually found in the ecotone between pinyon pine woodlands and foothill grasslands below. They are usually savanna-like with grass understories dominated by sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*) and hairy grama (*B. hirsuta*), New Mexico needlegrass (*Stipa neomexicana*), and New Mexico muhly grasses. Pinyon pine may be found in low amounts (Ref# 074, 088).

The majority (74 percent) of the Southeast Multi-Use Area is comprised of patchy Mesquite Coppice Dune Shrublands (approximately 88,000 acres). The remaining 26 percent of this area is Creosotebush and Fourwing Saltbush shrublands, Mixed Lowland Desert Scrub, Lowland Basin Grasslands, and disturbed areas (see Table 3.7-1).

Table 3.7-1. Plant Communities found within the Southeast Multi-Use Area

Plant Community	Map Unit Name	Acres
Barren	Military Disturbance	60
Barren	Road Disturbance	4,250
Grassland	Lowland Basin Grasslands	1,000
Grass-Shrub Mix	Mixed Lowland Desert Scrub	5,200
Patchy	Mesquite Shrubland	88,370
Patchy	Vegetated Gypsum Outcrop	7,800
Shrubland	Creosotebush Shrubland	8,100
Shrubland	Fourwing Saltbush Shrubland	5,200
Unclassified		20
Total Acres		**120,000**

Source: Ref# 074, 088, 091

For further information on plant communities on WSMR see the ecosite descriptions and transition states in Section 3.6.

3.7.3.1 Noxious Weeds

Of the over 1,000 species of plants on WSMR, 115 are considered exotic (i.e., non-native) species; however, not all of them are considered noxious (i.e., non-native species which are harmful to native communities). Eight noxious or potentially noxious species on WSMR have been identified by current management as target species which could threaten the integrity of habitats on WSMR (Ref# 092) (see Table 3.7-2). Each species has been given an invasive potential score which is based on the number of sites the species was detected at, the number of acres each species occupies, and the potential for the exotic species to affect the natural ecosystem. Tamarisk (*Tamarix ramosissima*) is the most widely spread noxious species and has the highest invasion potential on WSMR at most areas with water at the surface or near the surface. This species forms dense canopies and interferes with surface water flows by being able to absorb over 200 gallons of water per plant per day, which results in low-flow conditions (Ref# 092, 093).

Table 3.7-2. Noxious Weeds found on WSMR

Scientific Name (Common Name)	New Mexico State	# Sites	Invasion Potential[1]
Acroptilon repens (Russian knapweed)	B	1	4
Centaurea melitensis (Napa thistle)	B	1	2
Elaeagnus angustifolia (Russian olive)	C	1	6
Eragrostis lehmanniana (Lehmann lovegrass)	-	7	15
Lepidium latifolium (Broad leaf pepper plant)	A	1	2
Peganum harmala (African rue)	B	17	13
Sorghum halepense (Johnson grass)	Other	3	10
Tamarix ramosissima (Saltcedar or Tamarisk)	C	246	60

1. Invasion Potential: Low = 1-5; Moderate = 6-10; and High >11.
Other - listed as noxious in other states but not in New Mexico.
Class "A" - noxious plants are limited in distribution or not found in the State at the present time, but have the potential to cause serious problems.
Class "B" - noxious plants are limited to one portion of the State and management is directed to prevent the movement into new areas.
Class "C" - noxious plants are widespread in the State and management of these species is determined at the local level based level of infestation and likelihood of control.
Source: Ref# 074, 092

The remaining noxious weeds all have invasion potentials substantially lower than that of Tamarisk, 15 or below. Lehman grass (*Eragrostis lehmanniana*) and African rue (*Peganum harmala*) have invasive potentials that are considered high (> 11), and are found in disturbed areas such as roadsides. Johnson grass (*Sorghum halepense*), which has a moderate invasive potential of 10, is also found in disturbed sites, forest edges and along stream banks. Russian olive (*Elaeagnus angustifolia*) also has a moderate invasive potential and is found in the Tularosa Creek drainage. Russian knapweed (*Acroptilon repens)*, Napa thistle (*Centaurea melitensis)*, and broad leaf pepper plant (*Lepidium latifolium)* all have low invasive potentials (from one to five) and have only been observed at one location each, along roadsides (Ref# 092).

3.7.4 WILDLIFE

This section summarizes terrestrial and aquatic habitat and wildlife which occur within WSMR. Further descriptions of animal species present on WSMR can also be found in the following documents:

- Mammal Checklist of WSMR (2007) documents 73 mammal species which occur on WSMR (Ref# 094).
- A Checklist of Birds for WSMR (2007) documents 291 bird species which occur on WSMR (Ref# 095).
- Amphibians and Reptiles of the WSMR (2008) documents seven species of amphibians and 47 species of reptiles which occur on WSMR (Ref# 096).
- Ecological Importance of "Waters of the United States" and Associated Wetlands to Wildlife (2004), describes wetland mammals, birds, herpetofauna, fish, and aquatic invertebrates and their preferred habitats (Ref# 097).
- The INRMP, WSMR (2002) discusses the variety of species and habitats within WSMR and discusses management strategies (Ref# 074).

3.7.4.1 Habitats

Aquatic habitats within WSMR can be broadly categorized as streams, ponds/lakes, and wetlands. Section 3.8 (Water Resources) describes surface water features in further detail. Besides providing sources of water for wildlife, these habitats are essential to the native pupfish at WSMR and to the life cycles of various invertebrate, amphibian and reptile species. Stream habitat is found throughout the length of Salt Creek, from the source at Salt Springs downstream to Big Salt Lake. Several perennial tributaries to Salt Creek are in the stream habitat category, though they are too saline to support any fish species other than White Sands pupfish (*Cyprinidon tularosa*) (Ref# 001). Pond habitat is found at most of the springs on the basin floor within WSMR, except at Salt Springs and Alkali Spring. Most of the spring ponds have low salinity and thus have been or are susceptible to invasion by exotic fishes (Ref# 001). Water levels and salinity of the ponds and lakes often fluctuate seasonally, creating an environment inhospitable to nonnative fishes, but one in which White Sands pupfish can survive (Ref# 001). Salinity within wetlands varies and tends to increase in spring-fed systems with distance from the headspring (Ref# 001).

Vegetation associations and terrestrial habitats include numerous plant associations of woodland, shrubland, patchy, grass-shrub mix, grassland, and barren communities. These were further discussed in Section 3.7.3.

The INRMP contains more details on species and their preferred habitat types including (Ref# 074):

- *invertebrates* – soil habitats, sand habitats, terrestrial vegetated habitats, and parasites/parasitoids;
- *amphibian and reptiles* – forest and woodland, chaparral, shrubland and desert scrub, grasslands, playas/alkaline flats, malpais, rock outcrops/talus, duneland, arroyo riparian, wetland aquatic;
- *birds* – woodlands, shrublands, grasslands, wetland and riparian; and
- *mammals* – forest, woodland and montane scrub, shrubland, grassland, malpais, rock outcrop and talus, gypsum duneland, arroyo riparian, wetland and riparian.

The 2004 "Ecological Importance of 'Waters of the United States' and Associated Wetlands to Wildlife" report evaluates species diversity trends in both terrestrial and aquatic habitats at WSMR. This report concluded that the abundance of resident bird species groups did not differ significantly between upland and lowland habitats (Ref# 097). The presence of Neoptropical migrants did, however, result in substantially more bird species at lowland areas with the exception of unvegetated playas which had the lowest number of species and species diversity (Ref# 097). The richest and most abundant small mammal species communities are associated with artesian springs and ephemeral and intermittent streams (Ref# 097). The report also recommended that artesian springs, vegetated playas, salt marsh, and ephemeral and intermittent streams be considered as priority management areas based on vertebrate fauna species richness and abundance values.

3.7.4.2 Invertebrates

Invertebrate fauna of WSMR play a major role in such processes as pollination, soil aeration, decomposition, and seed dispersal. Invertebrates are also an important source of nutrition for many vertebrate species. A complete inventory of invertebrate species for WSMR has not been documented (Ref# 098). Common orders of insects found on WSMR include Coleoptera (beetles), Hemiptera (true bugs), Hymenoptera (ants, bees, and wasps), Lepidoptera (butterflies and moths), and Diptera (flies). A bee study to assess native bee biodiversity on WSMR was conducted between August 2003 and September 2005. This study documented 187 total bee species at WSMR (Ref# 099). Other common arthropod orders include Scholopenromorpha (centipedes), Pedipalpida (vinegaroons), Scorpionida (scorpions), and Araneida (spiders). Twenty three species of land snails have been identified on WSMR, many of which occur in the San Andres Mountains (Ref# 098). One species of snail, the Tularosa springsnail (*Juturnia tularosae*), is endemic to WSMR occurring within soft sediment areas of Salt Creek. This species also is presumed to act as an intermediate host to a trematode which parasitizes the White Sands pupfish (Ref# 100). This species overlaps with pupfish habitat, however, has a more restricted range than the pupfish occurring in locations of Salt Creek with moderate to lower salinity levels (Ref# 100).

3.7.4.3 Amphibians and Reptiles

WSMR has a wide assortment of herpetofauna, mostly comprised of snake and lizard species. Seven species of amphibians and 47 species of reptiles, representing three orders and 12 families have been documented on WSMR (Ref# 096). There are six species of toads (three spadefoot toads and three true toads), one salamander, one turtle, 19 lizards and 27 snakes. Five rattlesnake species occur on WSMR and bites from all are potentially lethal. All other snakes occurring on WSMR are either non-venomous or mildly venomous and are not dangerous to humans (Ref# 096).

3.7.4.4 Fishes

The only fish species native to WSMR is the White Sands pupfish. This small fish is endemic to the Tularosa Basin; natively occurring Salt Creek and Malpais Spring and has been introduced to Mound Spring within WSMR, and Lost River on Holloman AFB (Ref# 098). They occupy a variety of microhabitats, ranging from deep spring ponds to shallow pools and calm spring runs varying in salinity from freshwater (salinity of three parts per thousand) to saltier than seawater (salinity of 50 parts per thousand) (Ref# 101). Within its limited habitat, populations are often dense, but their numbers can experience wide fluctuations due to natural climatic perturbations such as flood or drought (Ref# 098). The White Sands pupfish is omnivorous, feeding mainly on aquatic insects and larvae, algae, and organic detritus. Other nonnative fish species include largemouth bass (*Micropterus salmoides*), mosquitofish (*Gambusia affinis*), goldfish (*Carassius auratus*), and sunfish (*Lepomis* spp.) which have been introduced into springs and ponds (Ref# 098) and can pose a threat to native White Sands pupfish populations. The location of the White Sands Pupfish Habitat is shown on Figure 3.7-2. Additional information on this species can be found in Section 3.7.5.

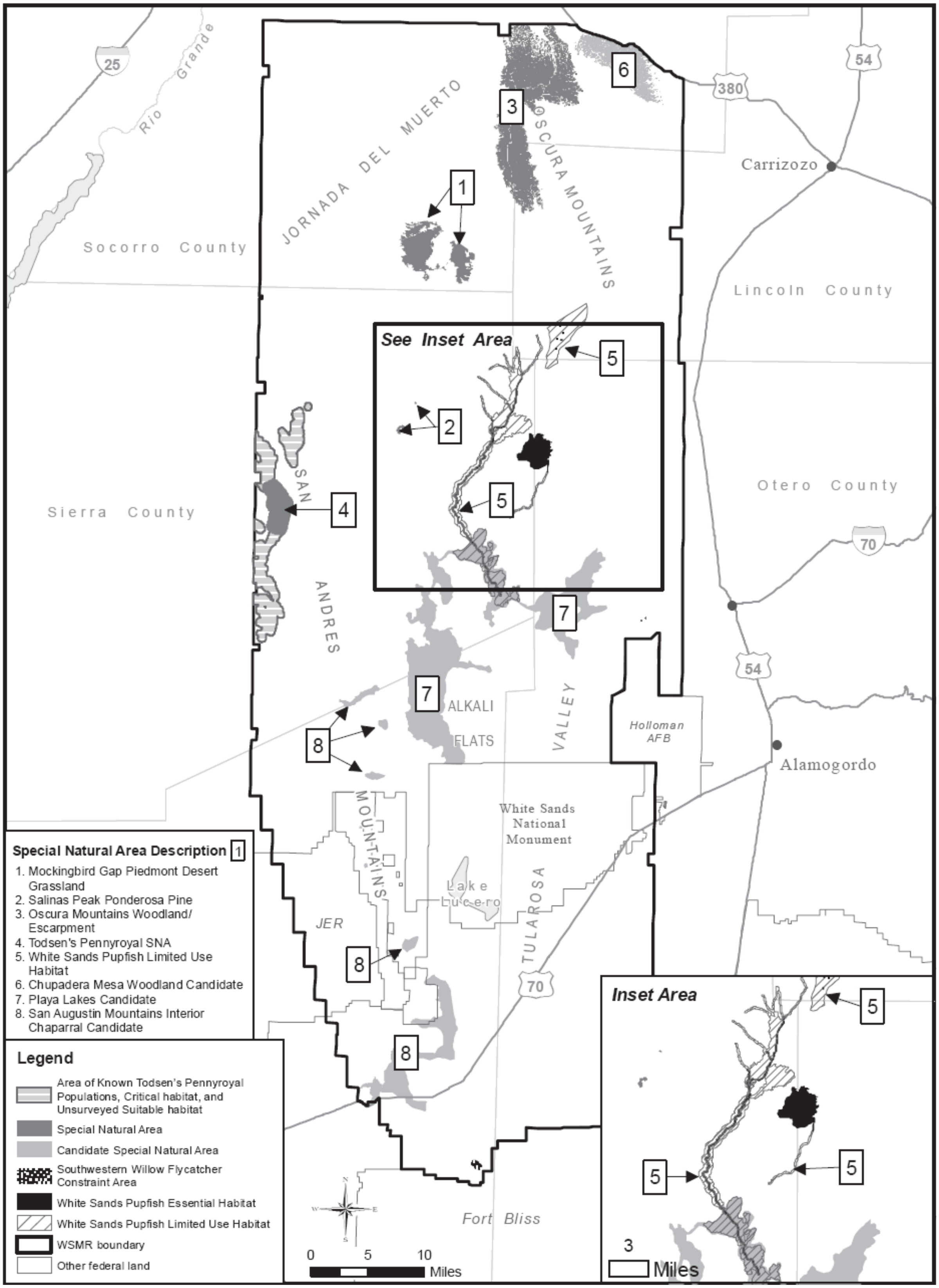


Figure 3.7-2. Special Natural Areas on WSMR

3.7.4.5 Avifauna

Habitats within WSMR support 291 documented avian species, many of which are seasonal or year-round residents (Ref# 095). WSMR has resident populations of raptors, game birds, and songbirds. Raptor species common on WSMR include red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), and Swainson's hawk (*Buteo swainsoni*). Game birds found on WSMR include Gambel's quail (*Callipepla gambellii*), scaled quail (*Callipepla squamata*), white-winged dove (*Zenaida asiatica*) and mourning dove (*Zenaida macroura*). Songbirds common to WSMR include black-throated sparrow (*Amphispiza bilneata*), pyrrhuloxia (*Cardinalis sinuatus*), and horned larks (*Eremophila alpestris*).

3.7.4.5.1 Migratory Bird Management

All native migratory birds in New Mexico are protected under the Migratory Bird Treaty Act (MBTA, United States Code [USC] Title 16 Section 703) which prohibits the taking, killing, or possessing of migratory birds unless permitted by regulations promulgated by the Secretary of the Interior. In addition the Bald and Golden Eagle Protection Act (USC Title16 Section 668) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. Section 315 of the 2003 National Defense Authorization Act provided that the Secretary of the Interior prescribe regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities. In accordance with 50 CFR Part 21, (Migratory Bird Rule) the regulation does not allow an installation to take migratory birds indiscriminately during readiness activities but requires that installations consider the protection of migratory birds when planning and executing military readiness activities. Readiness activities have been further defined as activities that are related specifically to the active training of Soldiers. The Bald and Golden Eagle Protection Act prohibits the taking (pursuit, wounding, killing, molestation or disturbance) of any bald or golden eagle, or any part, nest, or egg of these eagles. By permit WSMR is required to report any eagle carcass to USFWS within 48 hours.

In July 2006, an MOU between the DoD and USFWS to promote the conservation of migratory birds was signed. This MOU identifies specific activities and cooperation between the DoD and USFWS to contribute to the conservation of migratory birds and their habitats. The MOU outlines DoD principals which strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent or minimize the loss or degradation of habitats on DoD managed lands.

3.7.4.6 Mammals

WSMR is home to 73 documented game and non-game mammal species (Ref# 094). Large herbivores found on WSMR include mule deer (*Odocoileus hemionus*), elk (*Cervis canadensis),* collared peccary (*Pecari tajacu),* pronghorn antelope (*Antilocapra americana*), bighorn sheep (*Ovis Canadensis),* and non-native species including feral horse (*Equus caballus*), oryx (*Oryx gazella*), and Barbary sheep (*Ammotragus lervia).*

Predator species commonly found on WSMR include coyotes (*Canis latrans*), bobcats (*Lynx rufus*), mountain lions (*Felis concolor*), and badgers (*Taxidea taxus*). Small mammals occurring on WSMR include three species of rabbits, one species of shrew (*Notiosorex crawfordi*), 31 species of rodents, and 17 species of bats. Rodents make up the most diverse order of mammals occurring on WSMR, representing five different families: Sciuridae, Geomyidae, Heteromyidae, Muridae, and Erethizontidae. Bats are represented by two families: Vespertillionidae and Molossidae families. Most bat species at WSMR roost in caves, buildings, and a few are tree-roosting species (Ref# 098).

3.7.4.6.1 Large Mammal Management

WSMR and the NMDGF have conducted public big game hunts on the installation cooperatively since the late-1950s (Ref# 102). Big game species hunted include oryx and pronghorn antelope. Big game hunting licenses are awarded using a lottery draw system and consist of the following types: once-in-a-lifetime, veteran, youth, oryx population reduction hunt, security-badged oryx hunts, and pronghorn hunts. The annual pronghorn hunt is conducted in the Stallion Area of the range. Cougar hunting occurs on the range within NMDGF-designated hunting season and subject to NMDGF harvest quotas. Oryx hunts take place in one of several established hunt areas and throughout the San Andres and Oscura Mountains. These hunts occur on non-duty days and are monitored by NMDGF and WSMR law enforcement patrols. Recreational hunting is authorized on WSMR only so long as it does not interfere with WSMR mission-related activities. To avoid conflict with military testing and training events, big game hunts are typically conducted on weekends and scheduled well in advance (Ref# 102).

The New Mexico Department of Game and Fish Oryx Management Plan, signed by WSMR, has a goal to substantially reduce the oryx population to a manageable level in an effort to reduce potential mission and environmental impacts. Oryx population management is important from a mission-support standpoint because high population levels result in an increase of potential mission impacts such as: vehicle collisions, interference with runway operations, damage to government property, and cost of management. Hunting is the primary management tool used to control oryx populations (Ref#074)

Restricted badge hunt of oryx is permitted south of US 70 (Ref# 103). Within WSMR, oryx hunting has contributed to a reduction of the oryx population from an estimated 5,000 animals in 2000 to an estimated 3,000-3,500 animals immediately prior to the 2006 hunt. In the 2006 hunting season 1,060 oryx were harvested, of which 47 percent were cows. The number of cows harvested (499) exceeds the minimum harvest of 350 cows per year estimated as necessary to reach population goal of 1,500 individuals. The hunting program is expected to continue at its current level of intensity until population management goals are reached, at which point, management policies will be adjusted (Ref# 104). Hunting on SANWR, White Sands National Monument, and Holloman AFB are limited to oryx depredation hunts and the number of oryx taken in these areas annually is small in comparison with the number taken on WSMR. In 2006, 25 oryx were killed on SANWR and 18 were killed on Holloman AFB (Ref# 054). Off-road travel is authorized for retrieval of harvested game only.

Mule deer were hunted on WSMR historically, but have not been hunted in recent years due to dramatic population declines which began in the mid-1990s. Mule deer populations are most common in mountain and foothill habitats and occur in desert shrub and grassland vegetative types.

Desert Bighorn Sheep are listed as an endangered species by the State of New Mexico (Section 3.7.5.1). Habitat management for Desert Bighorn Sheep is prioritized in the San Andres, Chupadera, and Oscura Mountains. This includes thinning and prescribed burning of these areas by the USFWS and BLM. Populations of Desert Bighorn Sheep have been increasing on WSMR (Ref# 103).

3.7.5 SENSITIVE, THREATENED AND ENDANGERED SPECIES

WSMR contains plant and animal species which are Federally-protected under Section 7 of the Endangered Species Act and/or State-protected under the Wildlife Conservation Act of 1978. WSMR has also recognized other "sensitive" species which are not listed as threatened or endangered but require special conservation to maintain sustainable population levels.

The three categories of protection status mentioned above can be further defined as (Ref# 074):

- **Federally-Listed Threatened and Endangered Species.** The Endangered Species Act provides protection to species Federally-listed as endangered or threatened. Endangered species are those species which are at risk of extinction in all or a significant portion of their range. Threatened species are those which could be listed as endangered in the near future. In addition, WSMR is required to confer with the USFWS regarding proposed species. Proposed endangered and threatened species are those proposed for listing as endangered and threatened, respectively, and for which formal ruling is in progress.
- **State-Listed Threatened and Endangered Species.** The States of New Mexico and Texas maintain their own lists of State endangered and threatened plant and animal species.
- **Other Sensitive Species.** These include Federally- and State-listed species of concern. Candidate species are those for which the USFWS has sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened, but issuance of proposed rules for these species is precluded by higher priority listing actions. Species of concern are those identified to receive attention for planning purposes. At present, none of those species receive legal protection under the Endangered Species Act. Species at risk are a species of concern which present a conservation concern due to rarity, endemic populations, and the potential of the species to impact testing and training missions if it were to become listed.

Appendix F lists the 61 Federal and/or State sensitive species of flora and fauna known to occur, or having the potential to occur, on WSMR and describes their respective habitats. Of the 61 sensitive species, four species (two birds and one plant) are listed as Federally-endangered, one bird species is listed as endangered (nonessential experimental population), one bird species is listed as a Federal candidate species, nine species (four birds, one mammal and four plants) are listed as State endangered and 10 species (eight birds, one mammal, and one fish), are listed as State threatened. The remaining species of concern (which are not protected by Federal or State statute but must be considered under CFR Part 651) are also listed in Appendix F. One mammal species of concern, the Oscura Mountain Colorado Chipmunk (*Neotamias quadrivittatus oscuraensis*), is endemic to the Oscura Mountain range within WSMR. Due to its endemic range, both NMDGF and WSMR consider this species a species at risk and manage this species accordingly (see Section 3.7.5.1). In addition, two bird species, the gray vireo (*Vireo vicinior*) and the pinyon jay (*Gymnorhinus cyanocephalus*) are considered species at risk due to their declining populations and loss of habitat. The Mexican spotted owl (*Strix occidentalis lucida*) is listed as Federally-threatened and occurs to the east of WSMR.

During preparation of this EIS (June 2009), an individual southwestern willow flycatcher (*Empidonax traillii extimus* – Federally-endangered) was observed in the area of Davies Tank, located in the southern tip of WSMR. Southwestern willow flycatchers typically nest in dense riparian vegetation; suitable nesting habitat may be present around the edge of Davies Tank. Due to the recent observation of this species, a “Southwestern Willow Flycatcher Constraint Area” has been created for Davies Tank and its adjacent riparian habitat (see Figure 3.7-2). WSMR will continue to conduct additional surveys within this area to determine if any resident population of the species is present and will coordinate with USFWS if the surveys determine suitable habitat exists at Davies Tank.

3.7.5.1 Existing Management and Agreements

In order to effectively protect locally or regionally important resources, WSMR has designated SNAs and candidate SNAs (see Figure 3.7-2) (Ref# 074). These areas have been acknowledged by WSMR as requiring special management in order to protect sensitive biological communities or cultural and geologic resources. The INRMP identifies 16 SNAs; of which the following eight have been established to protect biologically sensitive communities: White Sands Pupfish Habitat, Mockingbird Gap Piedmont Desert Grassland, Oscura Mountains Woodland/Escarpment, Salinas Peak Ponderosa Pine, Todsen's Pennyroyal Critical Habitat, Chupadera Mesa Woodland, Playa Lakes, and San Augustin Mountains Interior Chaparral (see Figure 3.7-2). The INRMP provides further description of these SNAs, including their management.

WSMR has maintained a proactive approach for managing its biological resources. The following examples were recognized by the USFWS in a March 31, 2008 article *White Sands Missile Range Receives Prestigious Award from Fish and Wildlife Service* (2007 Military Conservation Partner of the Year) which illustrate WSMR's protection of rare and endangered wildlife of the Chihuahuan desert (Ref# 105):

- In the summer of 2007, WSMR reintroduced 23 captive-bred Northern Aplomado falcons to the missile range. The endangered Northern Aplomado falcon (*Falco femoralis septentrionalis*) is designated as an experimental population in New Mexico and Arizona. WSMR is entering into a cooperative agreement with The Peregrine Fund with the intent to continue this project until this species is recovered and delisted.
- WSMR and the USFWS led the creation and implementation of the new Army/USFWS/New Mexico Department of Game and Fish Conservation Partnership Team in 2007. The team will focus on conservation and management of species at risk (such as the gray vireo [*Vireo vicinior*], Oscura Mountain Colorado chipmunk [Neo*tamias quadrivittatus oscuraensis*] and pinyon jay [*Gymnorhinus cyanocephalus*]. Current management and construction efforts for these species includes annual chipmunk surveys funded by WSMR to track population distributions; three WSMR funded seasons of pinyon jay studies regarding population and nesting distributions; and studies of the gray vireo to learn more about WSMR populations and distribution. Gray vireo surveys conducted in the summer of 2009 in the San Andres mountains detected 237 individuals. The team will also focus on ongoing conservation and management efforts of endangered species such as the Todsen's pennyroyal (*Hedeoma todsenii*).
- WSMR manages over 95 percent of the world's population of the White Sands pupfish in its remote springs and creeks. A cooperative agreement with the USFWS, Holloman AFB, NMDGF, and White Sands National Monument ensures conservation of the White Sands pupfish in lieu of listing the species.
- WSMR actively manages the restoration and conservation of the State threatened desert bighorn sheep with the adjacent SANWR.
- WSMR works proactively with the USFWS's Division of Migratory Bird Management towards the conservation of migratory birds and to ensure compliance with the Migratory Bird Treaty Act.
- WSMR worked with Bat Conservation International to secure a signed MOU for the conservation of bats at military installations.
- WSMR plays an active role in educating its workforce and residents on local wildlife through a series of educational posters and guidebooks on amphibians and reptiles. They also write articles for the WSMR newspaper, "The Missile Ranger", to address wildlife issues of interest to the public.
- WSMR is a signatory to the MOU among State and Federal Agencies in New Mexico for the conservation and management of the black-tailed prairie dog.

Existing Endangered Species Management Plans (ESMPs) and Cooperative Agreements for species which outlines goals, objectives and management strategies at WSMR include:

- 2007 ESMP Northern Aplomado Falcon. (Ref# 106). This plan was created in response to the 2006 USFWS final rule to establish a Nonessential Experimental Population in New Mexico and Arizona in accordance with Section 10(j) of the ESA. As part of the ESMP, WSMR conducts range-wide surveys for the falcon three-times each year (February, May, and August) along seven permanent survey routes and submits an annual report to USFWS. In addition the ESMP has established objectives which support recovery of the species including WSMRs participation in the reintroduction program and conservation of desert grasslands. Any Aplomado falcon sighting is to be reported to the USFWS within 24 hours.
- 2006 Cooperative Agreement for Protection and Maintenance of White Sands Pupfish between U.S. Army - WSMR, U.S. Air Force - Holloman AFB, NPS - White Sands National Monument, USFWS and NMDGF (Ref# 107).
- 2002 ESMP for Todsen's Pennyroyal at WSMR (Ref# 108). Note, this plan was published as an appendix to the INRMP (Ref# 074).

WSMR initiated informal consultation with the USFWS regarding the alternatives proposed changes to existing land use, possible addition of a HBCT (or comparable unit), and HBCT training at WSMR on July 7, 2008. Based on this informal consultation, WSMR has prepared a Biological Assessment (BA) to determine potential effects to resident populations of Federally-protected species occurring within WSMR including the Todsen's pennyroyal and the Northern Aplomado falcon. The BA is provided in Appendix E. In addition, USFWS requested WSMR evaluate the potential effects to the Mexican spotted owl. Although this species has not been documented on WSMR, it occurs beneath the airspace to the east of WSMR (Ref# 109). The BA was updated following the publication of the Draft EIS to reflect the sighting of an individual southwestern willow flycatcher in the area of Davies Tank.

3.7.6 WETLAND AND ARROYO RIPARIAN DRAINAGES

Wetlands provide a variety of functions, including groundwater recharge and discharge, flood attenuation, sediment stabilization, sediment and toxicant retention, nutrient removal and transformation, aquatic and terrestrial diversity and abundance, and aesthetic values. Three criteria are necessary to define wetlands: vegetation (hydrophytes), soils (hydric), and hydrology (frequency of flooding or soil saturation). Although no wetlands within WSMR are subject to regulatory authority under Section 404 of the Clean Water Act, they are protected under E.O. 11990, Protection of Wetlands. According to WSMR GIS mapping (Ref# 110) approximately 5,000 acres of WSMR can be classified as wetland, 29,500 acres as seeps/springs, arroyo drainages, and streams (see Section 3.8, Water Resources) and an additional 54 acres as combined wetland and seep/spring, arroyo or stream. Figure 3.7-3A shows the location of these resources within WSMR. The WSMR wetland GIS layer was created using a combination of National Wetland Inventory Mapping, USGS hydrographic surveys and WSMR Environmental Division expertise. All wetland features within the figure are subject to field verification. A majority of the wetland areas within WSMR are located within the Tularosa Valley and are associated with Salt Creek and the Alkali Flats. The following is a summary of hydrologic or topographic features at WSMR which support wetlands and a description of common wetland communities (Ref# 001):

- Springs and Seeps – Springs and seeps occur throughout WSMR and are relatively abundant in the San Andres Mountains (see Figure 3.7-3B). Section 3.8 (Water Resources) further discusses the hydrology associated with these features. At least 133 springs and seeps, approximately half of which are perennial, have been identified (Ref# 074). The two most important springs providing habitat for wildlife occur in the Tularosa Basin: Malpais Spring and Mound Springs

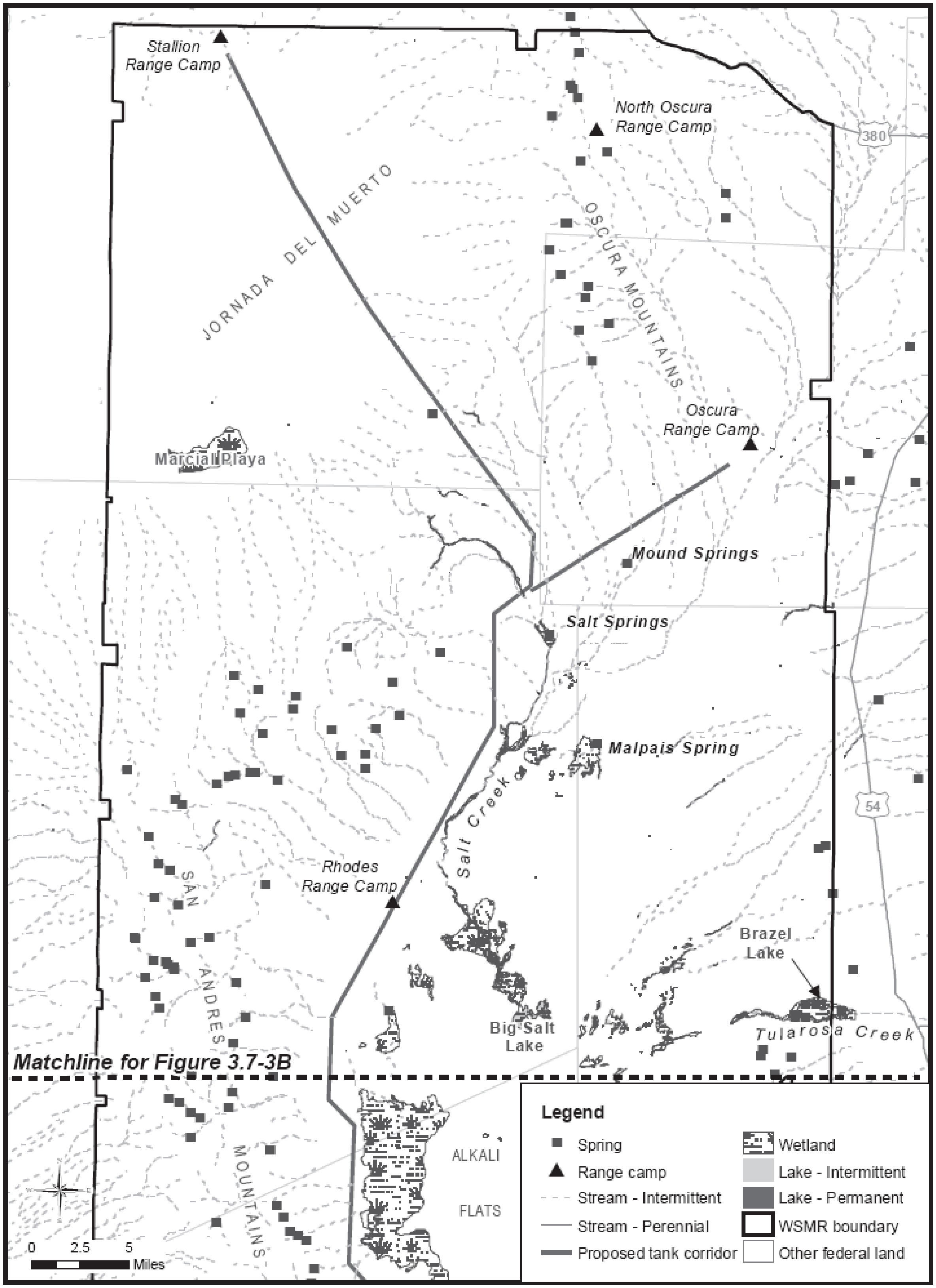


Figure 3.7-3A. Wetlands and Water Features

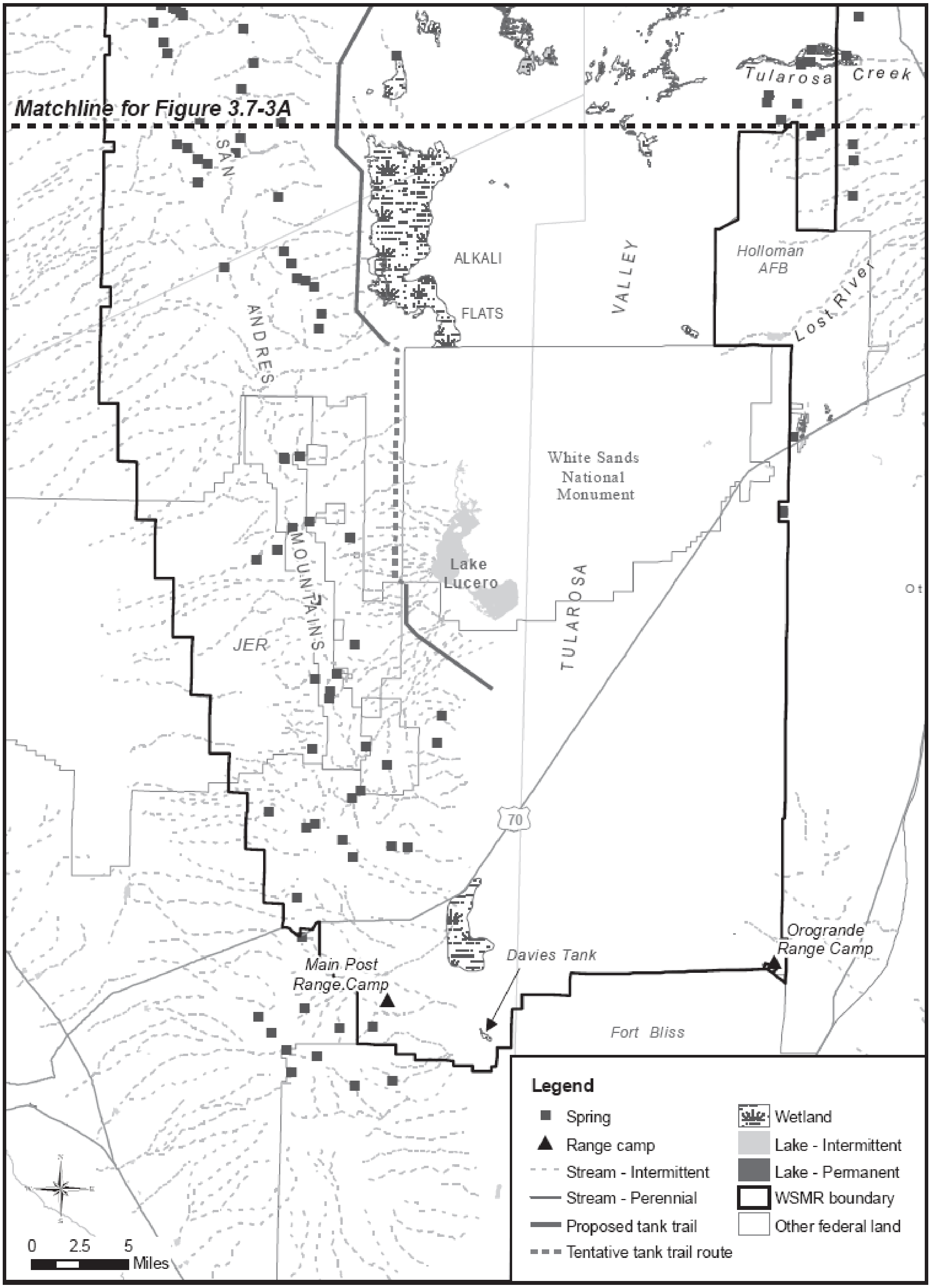


Figure 3.7-3B. Wetlands and Water Features

(Ref# 074). These springs also provide hydrology which is essential for maintaining many of the existing wetlands found at WSMR. These systems can create perennial pools of water which contain dense stands of woody and herbaceous plants immediately surrounding the pool which support rich faunal species diversity (Ref# 097). Some have historically been highly used as watering holes by horses and oryx, and have consequently been extensively disturbed from grazing and trampling of vegetation (Ref# 097).

- Arroyo[1] and Riparian Areas – Often wetlands are found in lower arroyos and within riparian areas along streams. Riparian areas occur in the lower reaches of arroyos draining outward from the San Andres and Oscura Mountains. Some of these waters eventually empty into the extensive system of playa and alkali flat habitats which are found within low-lying areas of the Tularosa Basin. These features can either have intermittent channels which contain water seasonally and are primarily affected by rainfall events or have perennial sources and contain water year-round. Dense shrubby growth and grassy thickets (90 to 100 percent cover) can occur within the floodplains of these features (Ref# 097). Typically, wetlands are located within these areas where water is permanent or predictably periodic and contain cottonwood (*Populus fremontii*) – willow (*Salix spp.*) communities (Ref# 001). Vegetation density is often reduced (75 percent to less than 10 percent) within soils containing higher salt concentrations, such as those areas along Salt Creek (Ref# 097).

- Saline Permanent Water Wetlands – Saline permanent water exists in Malpais and Mound Springs and in Salt Creek and Malone Draw/Lost River. The wetland associated with Malpais Spring forms a relatively large salt marsh on the western edge of the lava flow. Dense stands of rushes (*Juncus spp.*), bullrushes (*Scirpus spp.*), sedges (*Carex spp.*), and cattails (*Typha spp.*) are typical of the inundated marsh area. Drier land adjacent to the marsh supports salt cedar (*Tamarix ramosissima*), saltgrass (*Distichlis spicata*), common reed (*Phragmites australis*), iodine bush (*Allenrolfea occidentalis*), and alkali sacaton (*Sporobolus airoides*) (Ref# 001). *Chara spp.*, spikerush (*Eleocharis rostellata*), *Potamogton pectinatis*, gentian (*Eustoma exaltatum*), marsh rosemary (*Limonium limbatum*), Limewater brookweed (*Samolus cuneatus*), and salt cedar also have been observed growing at Malpais Springs (Ref# 001).

- Playa Lakes – Playas are periodically flooded basins which often contain standing water long enough to prevent the establishment of perennials in their center. The larger of the playas may form marshlike ponds which rarely are completely dry. Other areas are highly variable seasonal wetlands. These depressional areas meet wetland criteria during the wetter portion of the growing season, but may lack indicators of wetland hydrology and/or vegetation during the drier part of the growing season. Marcial Playa, located in the northwest portion of WSMR, is an example of a vegetated playa (Ref# 097). Big Salt Lake, an example of an unvegetated playa, is a saline lake located downstream from the salt springs at Salt Creek which are essential habitat areas for the White Sands pupfish (see Table 4.7-1 for definitions). Big Salt Lake is part of the largest system of playa lakes in New Mexico and provides valuable habitat for numerous species, including foraging and nesting habitat for the western snowy plover (*Charadrius alexandrines*) and the interior least tern (*Sterna antillarum*) (Ref# 111). Davies Tank is a natural playa which serves as an effluent pond for the WSMR Main Post. Despite the use as an effluent pond, Davies Tank is associated with a rich abundance of both avian and small mammal species (Ref# 097).

[1] Arroyos are usually dry creek beds or gulches that temporarily fill with water after a heavy rain, or seasonally.

- Alkali Flat Wetlands – This habitat occupies the lowest portion of the Tularosa Basin. The saline groundwater aquifer lies extremely close to the surface, and rains produce huge shallow lakes which disappear through evaporation rather than percolation (Ref# 001). Vegetation, if present, typically consists of iodine bush (*Allenrolfea occidentalis*), saltbush (*Atriplex canescens*), saltgrass (*Distichlis stricta*), sacaton grasses (*Sporobolus airoides*, S. *wrightii*), and seepweeds (*Suaeda* spp.). These species may occur in mixed or nearly pure low-density stands (Ref# 001). Other species which may occur in alkali sink associations are quailplant (*Heliotropium curassavicum*), marsh rosemary (*Limonium limbatum*), Bigelow glasswort (*Salicornia bigelovii*), and sea purslane (*Sesuvium verrucosum*) (Ref# 001). Often lowland areas within the Alkali Flat wetlands consist of less than 10 percent shrub cover (Ref# 097).

3.8 Water Resources

This section addresses groundwater and surface water in and around WSMR. The ROI for water resources includes the surface and groundwater resources which supply and exist on WSMR, as well as, the watersheds located within WSMR's boundaries.

3.8.1 INTRODUCTION AND DESCRIPTION

Water quality standards are regulated by the NMED under the New Mexico Water Quality Regulations (20 NMAC 6.2) and by the U.S. EPA, under the Federal Safe Drinking Water Act (SDWA). WSMR is located within EPA Region 6. Drinking water supplies are monitored and protected under the National Primary Drinking Water Regulations, 40 CFR Part 141; National Secondary Drinking Water Regulations, 40 CFR Part 143; and New Mexico Water Quality Control Commission (NMWQCC) standards. New Mexico drinking water regulations, issued by the Environmental Improvement Board, can be found in NMAC 20.7.1 (Ref# 098).

WSMR's Regulatory Compliance and Energy Office coordinates with WSMR's Installation Support Directorate, several other of WSMR'S Directorates, and outside organizations to ensure that environmental and safety issues are addressed. All are involved in protecting WSMR's natural resources for the programs and projects the directorate supports through its various divisions. They support the development of environmental documentation for various Installation Support Directorate projects and for the drinking water and wastewater systems for the installation. The Installation Support Directorate also is responsible for WSMR water rights issues and operations of the wastewater treatment plant; however, water, as a natural resource, is the responsibility of the Environment and Safety Directorate, as is compliance with the Clean Water Act, SDWA, and other such regulations mentioned above (Ref# 074).

Federal reserved water rights can be asserted on most lands managed by the Federal government. Reserved rights are, for the most part, immune from State water laws and, therefore, are not subject to diversion and beneficial use requirements and cannot be lost by non-use. The Federal government; however, under the McCarran Amendment, 43 USC 666, may be required to participate in general water rights adjudication under State law. In addition, Federal reserved water rights are nontransferable. By law, these rights can only exist on lands owned by the Federal government. If a land transfer occurs, any existing Federal reserved water right becomes invalid (Ref# 112).

In the absence of a declared and defined underground basin, groundwater may be appropriated without need for a permit from the State Engineer. The State Water Code located in Section 72-12-1, New Mexico Statutes Annotated (NMSA) provides that waters of underground streams, channels, artesian basins, reservoirs or lakes having reasonably ascertainable boundaries are declared to be public waters and are subject to appropriation for beneficial use. The State Engineer is empowered to determine the boundaries and declare a basin. Once part of a declared basin, water may be appropriated only upon application and permit from the State Engineer, as is the case of surface waters. The State Engineer again must provide for public notice and hearing to assist in determining if water is available for appropriation and assure that the rights of the other appropriators from the same basin are not impaired (Ref# 113).

Appropriations of surface water are governed by the Surface Water Code found in Chapter 72, Article 5 of the NMSA. Under this code, adopted in 1907, surface water in New Mexico may not be appropriated without application to and a permit from the State Engineer. Permits are issued only after published notice, and public hearing if required, and a determination by the State Engineer that there is unappropriated water available for the benefit of the applicant. Following such a determination, a permit may be issued prescribing the time within which the construction shall be completed and within which water shall be applied to beneficial use. There remains little, if any, unappropriated surface water in the various drainage basins in the State of New Mexico (Ref# 113).

3.8.2 GROUNDWATER

This section is an overview of the general hydrogeologic setting and characteristics of groundwater underlying WSMR. Water-resource features including supply wells used for access to groundwater are described in relation to the hydrographic areas in which they lie.

3.8.2.1 Compliance

Through the SDWA, EPA sets standards for public water systems to provide safe drinking water to its consumers by limiting the levels of contaminants in drinking water. The SDWA also allows EPA to establish regulations and guidelines for protecting precious drinking water resources. As an owner and operator of many public water systems, the Army has the responsibility of providing the same level of water quality to its tenants as municipal suppliers provide to their consumers under SDWA standards (Ref# 114). In order to comply with provisions outlined in the SDWA and the Primary Drinking Water Regulations, WSMR conducts sampling of all drinking water supply systems. WSMR is also developing a Wellhead Protection Plan (WHPP) based on the State of New Mexico's approved WHP Program. This project plan will provide management of land surface around a well or well field where activities might result in contamination of the groundwater drawn by the well (Ref# 114).

Two Army regulations and one DoD instruction provide guidelines for water-quality management: AR 200-1, AR 420-49, and DoD I 4715.6. AR 200-1 ensures the availability, conservation, and protection of water resources and ensures that drinking water provided by the Army meets standards specified in the SDWA and in applicable State and local regulations. AR 200-1 establishes policies, procedures, and standards for the conservation, management, and restoration of land and natural resources. AR 420-49, Utility Services, establishes policies and procedures for the production, pumping, treatment, and distribution of water and the collection and disposal of sewage and industrial waste. DoD I 4715.6, Environmental Compliance, implements policy, assigns responsibility, and prescribes procedures for achieving compliance with Executive Orders as well as Federal, State, interstate, regional, and local environmental requirements (Ref# 074).

Much of the water found on WSMR contains high levels of minerals and salts. Groundwater at WSMR has been classified according to concentration of total dissolved solids (TDS) (Ref# 098):

- Freshwater: < 1,000 mg/L TDS.
- Brackish water: 1,000 to 10,000 mg/L TDS.
- Saline water: 10,000 to 100,000 mg/L TDS.
- Brine water: >100,000 mg/L TDS.

Water containing less than 10,000 mg/L TDS is considered a drinking water source and is protected and regulated by the New Mexico Environmental Department (Ref# 098).

3.8.2.2 Hydrogeologic Setting

Groundwater on WSMR can occur in all lithologic units, ranging from Precambrian to Quaternary in age. Large amounts of water are contained in the Tertiary to Quaternary unconsolidated basin-fill and alluvial deposits in the Tularosa Valley Basin and Jornada del Muerto Basin watersheds (Section 3.8.3.1 and Figure 3.8-1); these locally yield large amounts of water to wells and springs (see Figures 3.7-3A and

3.7-3B). A majority of this water contains high concentrations of TDS and is of poor quality. Rocks of Permian and Cretaceous ages yield small to moderate amounts of water from joints and fractures in a few localities. The major source of recharge to the groundwater system occurs in areas adjacent to the mountain ranges. Runoff resulting from snowmelt or rainfall on relatively impermeable mountainous watersheds infiltrates the relatively permeable alluvial basin-fill deposits and recharges the groundwater system. Any discharge from the groundwater system occurs from evaporation, evapotranspiration, wells, springs, seeps, and Salt Creek (Ref# 098).

There are two main basin-fill aquifers which underlie WSMR. They are the Rio Grande aquifer and the Tularosa Basin aquifer. The Rio Grande basin-fill aquifer is composed of Quaternary and Tertiary sediments of the Santa Fe Group. The aquifer flanks the Rio Grande in a very irregular pattern and may be more than 6,000 feet deep. Freshwater is found at depths ranging from 10 to 3,500 feet. Large volumes of saline water usually occur near the edges or in deeper parts of the aquifer. Large sodium concentrations in this aquifer are found in association with the large salinity values. Very saline water may be moving upward into different parts of the basin-fill aquifer through faults. Water quality in the shallow part of the aquifer commonly is indistinguishable from that in the overlying aquifer because the two are hydraulically connected. The Tularosa basin-fill aquifer is smaller than the Rio Grande but is locally important. It contains saline water which is the result of the concentration of salts by evaporation in the topographically lower parts of this closed basin aquifer. This aquifer also contains relatively soluble calcium-sulfate minerals, which also contribute to the large salinity values (Ref# 115). The thickness of this basin-fill aquifer ranges from less than 27 feet over areas of uplifted bedrock to greater than 1,197 feet. The Tularosa Basin is a downfaulted intermountain closed basin formed by faulting along the southern Rio Grande Rift. Exposure of rocks of Precambrian to Tertiary age in escarpments surrounding the basin floor is a result of this faulting. Unconsolidated alluvial-fan deposits rim this basin (Ref# 116).

The main sources of groundwater for WSMR are regional aquifers located within the basin-fill aquifers. There are numerous regional aquifers, however little is known about them and many have not been named. Hydrologic characteristics of regional aquifers vary widely with the degree of compaction and the extent of fine-grained layers within the basin-fill. The flow may become sluggish near the ends of regional flow paths resulting in the aquifers commonly containing unflushed saline water. The Main Post cantonment area is within the vicinity of the Bolson aquifer. The depth to this regional aquifer is 70-75 feet, with a flow direction towards the southeast. Other potential groundwater sources include a series of perched aquifers, recharged through coarse, unconsolidated alluvial fan deposits or fractured bedrock. WSMR groundwater travels through alluvium and becomes progressively more mineralized down its gradient toward the interior of the Tularosa Basin aquifer. Groundwater towards the center of the aquifer contains more than 10,000 mg/L of total dissolved solids (Ref# 117). Water for WSMR is supplied almost exclusively by wells which tap alluvial aquifers. Most potable water occurs near the edge of the Tularosa Basin where runoff from the mountains percolates through alluvial fan deposits.

The total estimated volume of water in the Tularosa Basin aquifer is 4.2 billion acre-feet. This includes freshwater from the alluvial fans, a transition zone of slightly saline to very saline water, and the remaining majority of the basin which is saturated with brine. The freshwater portion is only approximately four percent of the total volume. The water quality of many of the freshwater aquifers is decreasing due to increasing salinity. Freshwater aquifers are in a state of overdraft resulting in declining water tables and degraded water quality (Ref# 118).

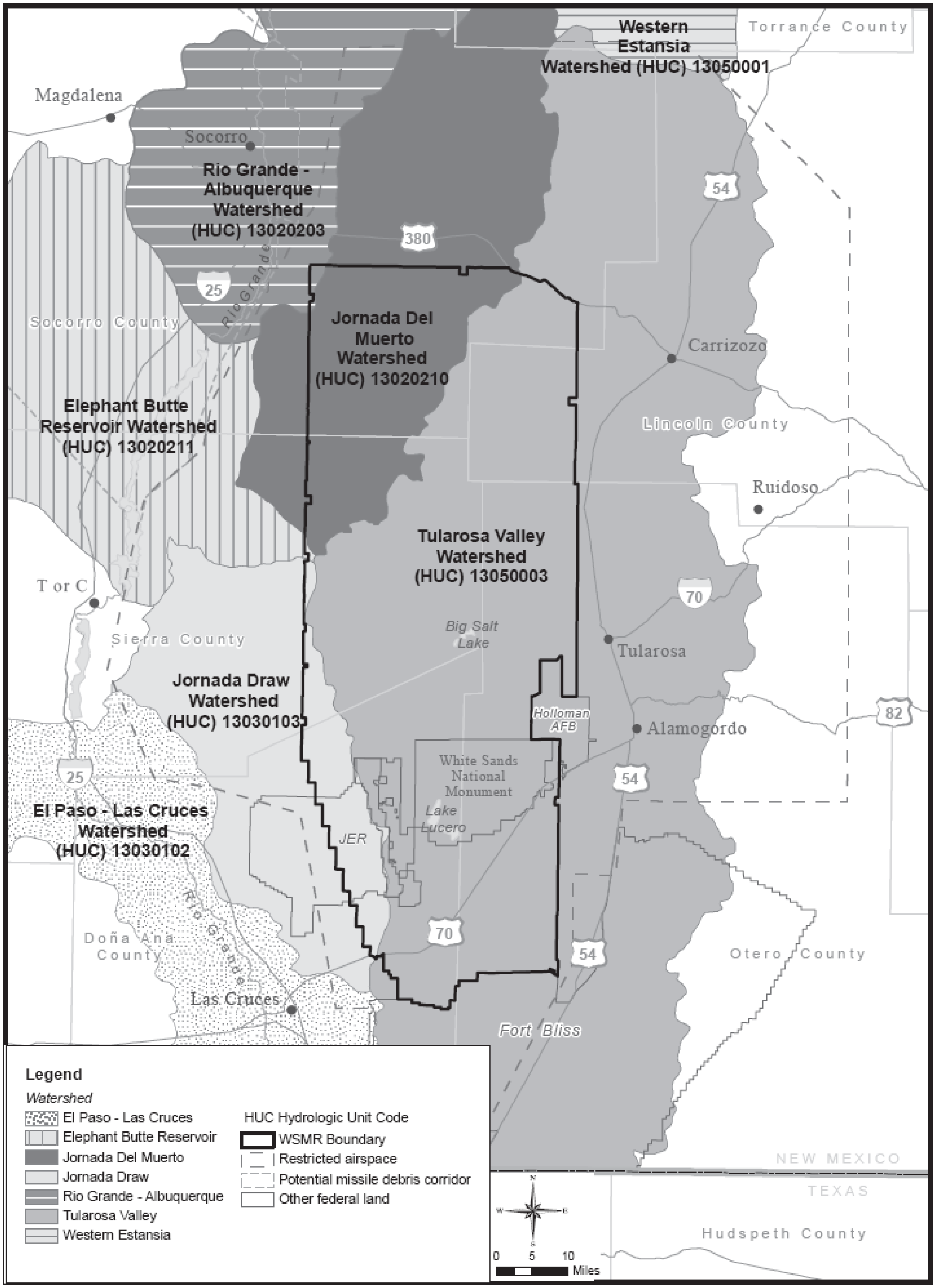


Figure 3.8-1. Watersheds Surrounding WSMR

Uprange sites are situated primarily on unconsolidated Quaternary/Tertiary alluvial deposits of the Tularosa Valley and Jornada del Muerto watersheds. Groundwater recharge in each of these areas occurs through unconsolidated alluvial fan deposits along the flanks of mountain ranges (Ref# 117).

3.8.2.3 WSMR Groundwater Resources

Water supply sources are a critical concern at WSMR. For many areas of WSMR, surface water resources are nonexistent and groundwater resources are at a great depth below land surface and are often too saline for direct potable water supply purposes. On-site sources of potable water are distributed randomly and principally involve localized groundwater sources, although investigations for capturing surface runoff from selected arroyos have been conducted. Water use for areas other than the Main Post fluctuates according to the WSMR missions in operation. Water declines in a particular well may vary from year to year as a result of the staggered schedule of pumping established to minimize excessive drawdown in a single well. The water system at WSMR was originally built to serve a relatively small temporary installation. Since the early 1970's, water pumped from installation wells has gradually decreased. This decline is due to water conservation measures and a decrease in the number of personnel. Groundwater sources provide all potable water for domestic and industrial uses at WSMR. WSMR draws water from several well fields which are located throughout the Range. A Draft 2009 Potable Water Resources Report (Ref# 251) indicated that with some modifications to WSMR's water supply infrastructure, wells on the Main Post and in Soledad Canyon can produce up to 717 million gallons per year of potable water, while limiting continuing aquifer drawdown enough to maintain the production yields of the wells and prevent saline water intrusion.

The HELSTF, SMR, and HTA obtain water from mountain-front wells and all other facilities on WSMR receive hauled water (Ref# 074). For information regarding water rights utilized by WSMR see Section 3.8.4.

Groundwater resources are further described in the following sections based on six geographic regions. The boundaries of these areas and the groundwater resources existing within each of these regions are described below.

3.8.2.3.1 Northwest Section

The northwesternmost section of WSMR is located within the Jornada del Muerto watershed (Section 3.8.3.1 and Figure 3.8-1). In 1965 the most comprehensive evaluation to date of the water resources in the Jornada del Muerto watershed was conducted. Groundwater in this area was found to have high concentrations of sulfate (1,000 to 3,000 mg/L) and TDS (Ref# 151).

Impacts to the groundwater resources of the Jornada del Muerto watershed are reduced by hauling water to sites of major activity and by providing portable toilet facilities. Potable water is supplied to facilities in this region by three electrodialysis reversal systems. The influent water for this system is approximately 4,000 mg/L TDS, and the output water is approximately 700 mg/L TDS. Brine waste from the electro-dialysis reverse systems is discharged to a constructed lagoon for evaporation. Sewage facilities consist of a wastewater collection system which carries waste to a septic tank facility and then to wastewater ponds (see Section 3.12 for further details). The drinking water and sewage at Stallion Range Center are monitored in accordance with the SDWA and NMWQCC guidelines (Ref# 074).

3.8.2.3.2 Northeast Section

The northeasternmost section of WSMR is dominated by the Oscura Mountains (see Figure 3.7-3A). During a groundwater study, several wells were drilled within the Oscura Mountains. One of the wells yielded small amounts of water but contained high nitrate concentrations in the shallow productive zones. Many of the other wells had sulfate concentrations above 1,900 mg/L and TDS above 2,900 mg/L. These wells were finished and used as nonpotable supply wells (Ref# 074).

All of the springs sampled in this region had small discharges of one to three gallons per minute (gpm), and water quality of springs was good, except Lower Willow Spring, which contained sulfate above 1,000 mg/L and TDS above 2,500 mg/L. This spring is on the interface with the Abo and Yeso Formations. The water quality is good in all of the wells drilled in the Permian rocks below the Yeso Formation. The Yeso, San Andres, and Glorieta formations have gypsum zones, which degrade the water quality (Ref# 074).

3.8.2.3.3 Central East Section

The central east section of WSMR, which is bounded by the Oscura Mountains and San Andres Mountains, is home to Big Salt Lake, Salt Creek and Malpais Spring (see Figure 3.7-3A). To date, there have been no seepage runs or studies to quantify the perennial, ephemeral, or intermittent contributions of groundwater to the flow of Salt Creek. Exploration for new water sources within this area were conducted by the Air Force in 1949. Wells were drilled to 200 feet and several are currently used for purposes not requiring potable water, such as extinguishing fires. All of the wells drilled in this section of WSMR resulted in low yields, poor quality, high TDS, and high chloride and sulfate concentrations. A desalination unit was installed but is not operational. No additional exploration for water has occurred (Ref# 074).

3.8.2.3.4 Central West and Southwest Section

The central west section of WSMR contains the San Andres Mountains and the southwest portions of the Jornada Draw watershed (Section 3.8.3.1 and Figure 3.8-1). Both the Electro-Magnetic Radiation Effects (EMRE) site and HTA facilities are provided water by wells located in this region and have septic tanks for waste. The water provided by these wells is used for sanitary purposes only. The San Augustin Mountains, where the Open Burn–Open Detonation (OBOD), HTA, and EMRE facilities are located, are composed of granitic rock that have high levels of natural radioactivity, which is also present in the groundwater in the area. Springs, seeps, and wells discharging this water are used by regional wildlife in the area (Ref# 074).

Access to the San Andres Mountains is limited, except in those areas containing the facilities mentioned above. When streams (arroyos) run, water seeps into the ground, providing recharge to fresh groundwater within the alluvial fans. Water probably also moves from the fractures in the San Andres Mountains, within the subsurface, into alluvial material. There are no plans to develop new water sources in the area because the present sources are considered adequate for the near future (Ref# 074).

Exploration for water occurred in the early 1960s. The U.S. Geological Survey (USGS) drilled several wells; however, only a couple yielded enough water to be developed as water supply wells. The WSTF located within the Jornada Draw watershed obtains water from wells located within the southwest section of WSMR. The water from the wells is extremely hard (267 to 630 mg/L calcium carbonate) and has sulfate concentrations between 227 and 713 mg/L.

3.8.2.3.5 South Central Section

The south central section of WSMR contains Lake Lucero within the Tularosa Valley watershed (Section 3.8.3.1 and Figure 3.8-1). Major facilities within this region include White Sands National Monument, White Sands Space Harbor, SMR, and HELSTF. White Sands National Monument obtains water from the Alamogordo-Holloman AFB system. The White Sands Space Harbor, SMR, and HELSTF obtain water from supply wells located throughout the remainder of WSMR (Ref# 074).

Development of water supplies occurred primarily during the 1960s and all of the wells drilled within the south central section of WSMR had good water quality. However, the USGS conducted a groundwater study of the HELSTF area in 1994. This study showed that the HELSTF area is underlain by brackish to brine waters and that TDS increase with depth. TDS ranged from 5,940 mg/L to 11,500 mg/L in depth zones from 70 to 500 feet and 111,000 mg/L at 815 feet (Ref# 074).

3.8.2.3.6 Southeast Section

The southeast section of WSMR contains the Main Post which is located in the southern section of the Tularosa Valley watershed (Section 3.8.3.1 and Figure 3.8-1). This region includes four haul tanks used for storage and drinking systems which do not have mechanisms for collecting water and must be filled by water hauled from another location. The southeast section has been the subject of more hydrologic inventory, monitoring, and research than any other area on WSMR. Groundwater data and geohydrologic data have been compiled for more than 100 wells and test wells (Ref# 074). Twelve supply wells provide potable water for the Main Post and surrounding facilities (Ref# 252).

Historically, groundwater pumping was substantially higher than it currently is, peaking at about 2,900 acre-feet in 1971, which has caused a drawdown of these aquifers. The trend since 1971 has generally been a reduction in pumping and overall aquifer use resulting from the implementation of water conservation measures and reductions in WSMR personnel. The combined withdrawal from Main Post water supply wells was 1,300 acre-feet in 2008. Natural groundwater recharge rates in the region are highly variable due to climate cycles. An average recharge rate for the area around the Main Post supply wells has been estimated at 1,920 acre-feet per year, which accounts for both periods of drought and surplus precipitation (Ref# 251).

3.8.3 SURFACE WATER

This section is an overview of the surface water systems typically defined in terms of watersheds, as well as important hydrologic resources located throughout WSMR including lakes, springs, ponds, streams, creeks, and sinks.

3.8.3.1 Watersheds

Surface water systems are typically defined in terms of watersheds also called a basin or subbasin. A watershed is a land area bounded by topography which drains water to a common destination. Watersheds drain, capture, filter, and store water and determine its subsequent release. A watershed divides the landscape into hydrologically defined areas whose biotic and abiotic components function interactively. The watershed can be large or small because every waterway (stream, tributary, wash, and river) has an associated watershed and smaller watersheds combine to form larger watersheds. The watershed boundary will more or less follow the drainage divide or the highest ridgeline around the stream channels, which will meet at the bottom or lowest point of the land where water flows out of the watershed, commonly referred to as the mouth of the waterway. Any activity which affects water quality, quantity, or rate of movement at one location within a watershed has the potential to affect the characteristics of locations downstream (Ref# 116).

Watersheds are delineated by the USGS using a nationwide system based on surface hydrologic features. This system divides the country into 21 regions, 222 subregions, 352 accounting units, and 2,262 cataloging units. The WSMR boundary intersects three watershed cataloging unit boundaries as described by the national USGS system which defines each by a hydrologic unit code (HUC): Jornada del

Muerto (HUC 13020210), Tularosa Valley (HUC 13050003), and Jornada Draw (HUC 13030103) (Ref# 119) (see Figure 3.8-1). All three watersheds are closed basins. A closed basin has no drainage outlet for surface water flow and essentially surface water is lost to evaporation or percolates into the underlying aquifers. Dissecting the lower mountain slopes and splaying outward, ephemeral arroyos and washes drain eastward toward the Tularosa Valley watershed and westward into the Jornada del Muerto watershed (Ref# 116).

The Jornada del Muerto watershed, nearly half of which is located within the northwest portion of WSMR, is a closed basin and drains an area comprising 1,893 square miles. The highest topographic relief of this watershed is within WSMR's boundaries and the Northern Call-Up Area and includes portions of the San Andres Mountains, Mockingbird Mountains, Little Burro Mountains, Oscura Mountains, and Chupadera Mesa. The Jornada del Muerto watershed contains extensive grasslands. The basin is divided into an upper portion which extends into the northwest corner of WSMR and a lower portion which flanks the southwest WSMR border. There are many ephemeral lakes (playas) in the Jornada del Muerto watershed, and these provide seasonal water sources for wildlife. The Jornada del Muerto watershed is a broad, gently sloping alluvial plain in the northwest section of WSMR which consists of sand sheets, low-lying dunes, and playa lakebeds. The San Andres and Oscura Mountains separate the Jornada from the Tularosa Valley watershed (Ref# 098).

The Tularosa Valley watershed covers 4.2 million acres in south central New Mexico in the northern Chihuahuan Desert and is a closed basin. This watershed drains 6,604 square miles of land which constitutes the majority of WSMR. More than a third of this basin lies within WSMR's boundaries and is described as a faulted intermontane depression. Both the San Andres and Sacramento Mountains form the high elevation points and headwaters which contribute to this basin system. This hydrogeologically closed basin receives recharge from the mountain front with discharge to evaporation occurring in the lowest portion of the basin at Lake Lucero. The Tularosa Valley watershed is bounded on the west by the Organ and San Andres Mountains and bounded north to south by the Jicarilla, Sierra Blanca, and Sacramento Mountains. The interior of the basin contains an extensive area of alkali flats and gypsum sands, which lie approximately 4,000 feet above mean sea level. The lowest elevation on WSMR lies in the Tularosa Valley watershed at Lake Lucero, 3,887 feet above sea level. Numerous playa lakes and brackish springs are located in the Tularosa Valley watershed, which is internally drained by Salt Creek, a perennial waterway for part of its length (Ref# 117).

A narrow portion of the Jornada Draw watershed, a closed basin, lies within WSMR's boundaries and drains 1,268 square miles. The San Andres Mountains are the high-elevation boundary within this watershed (Ref# 098).

Portions of another four watersheds fall within the WSMR call-up areas: El Paso–Las Cruces, Elephant Butte Reservoir, Rio Grande–Albuquerque, and Western Estancia (Ref# 117) (see Figure 3.8-1).

The drainage of the northern Jornada del Muerto watershed is poorly integrated and defined except where the centripetal drainage crosses peripheral pediments of the basin. Most drainages empty into or terminate at the edge of the central area of subsidence. A major drainage area slopes southwestward from the northern end of the basin and terminates in a large depression just east of the Armendaris lava flows.

The drainage of the northern Tularosa Valley watershed is better integrated than that of the Jornada del Muerto watershed. For the most part, the San Andres Mountains drain into the Tularosa Valley watershed, and many of the mountain streams have a rectangular drainage pattern. Fourteen large canyons drain into the Tularosa Valley watershed. Most of these canyons have formed perpendicular to the strike of the beds of sedimentary rocks along fault zones; tributary canyons have formed parallel to the strike of the beds of sedimentary rocks which are less resistant to erosion.

3.8.3.2 WSMR Surface Water Resources

The water resources of the area are varied and complex. Surface water resources within WSMR are limited due to low rainfall, high evaporation rates, and high soil infiltration properties. None of the surface waters on WSMR are potable. Most streams, lakes, ponds, and rainwater catchments which occur on WSMR are ephemeral, and their occurrence depends on snowmelt and precipitation runoff events. Average annual precipitation for WSMR is approximately 10 inches, with over half of this occurring from June to September. Nearby mountains receive more precipitation, 18-20 inches. Surface water generally occurs as overland flow from occasional intense thunderstorms during the summer, accumulating in natural or manmade depressions. The potential for flash flooding exists, for which the greatest concern has involved the Main Post, but floods have occurred infrequently. USACE has completed reports from floods which occurred on August 19, 1978 (Ref# 120).

Surface water quality is variable and is measured as the concentration of dissolved minerals in the water. It depends on the amount of snow accumulation in the mountainous areas, as well as the amount, intensity, and number of precipitation events. The quality of surface water can range from fresh to brine, and the concentration of TDS increases over time as a result of evaporation (Section 3.8.2.1) (Ref# 098).

The only major perennial stream on WSMR is Salt Creek. Tularosa Creek and Three Rivers have flows which reach WSMR during periods of high precipitation and runoff from the Sacramento Mountains. Salt Creek is perennial in the northwestern part of the Tularosa Valley watershed and flows from north to south. The source of its water is brackish to saline shallow groundwater flowing through the underlying alluvium. There are both losing and gaining sections of the stream channel (no detailed seepage studies have been completed to date), and the stream flow eventually disappears into the ground or empties into the playas and alkali flats north of Lake Lucero. The rate of flow can change rapidly during precipitation runoff events. Measurements of stream flow taken at the USGS gauging station on Salt Creek, located at Range Road 316 since 1995, show a high of 88 cubic feet per second and a low of zero (Ref# 074).

Most of the perennial ponds on WSMR are near Mound Springs and Malpais Spring. There are seven perennial ponds associated with the various springs at Mound Springs. Malpais Spring provides water to a wetland and associated ponds. For more on wetlands see Section 3.7 (Biological Resources). Lake Lucero contains water most of the time, usually saline to brine. Brazel Lake, located on the eastern side of WSMR near the junction of Range Road 6 and Range Road 9, is the terminus of Rio Tularosa. The lake has been dry much of the last few years due to drought and diversion of water east of the WSMR boundary. Water is also depleted from these areas by percolation of water to the subsurface, evaporation, and evapotranspiration. Over 275 isolated springs and seeps however, have been identified on WSMR (Ref# 117).

Surface water resources are further described in the following sections based on six geographic regions. The boundaries of these areas and the surface waters existing within each of these regions are described below.

3.8.3.2.1 Northwest Section

The uppermost northwest section of WSMR is located within the Jornada del Muerto watershed (see Figure 3.8-1). Surface waters here originate in the San Andres and Oscura Mountains, which form the southern and eastern boundaries (see Figure 3.7-3A). Approximately 240 miles of intermittent surface flows occur within this area. The vegetated gypsum outcrop which trends southwest contains numerous ephemeral playa lakes. These provide seasonal water sources for wildlife. There are approximately 40 developed water sources dispersed throughout this area, such as wells, tanks, and windmills. In 1965 the most comprehensive evaluation of water sources in the Jornada del Muerto watershed was conducted but no perennial springs or surface water sources were reported (Ref# 074).

Lowland areas of this region of WSMR provide sinks for surface runoff, and therefore, are susceptible to accumulation of contaminants transported by water. Lowland areas typically occur within the belt of lowland basin grasslands which border the east and south side of the vegetated gypsum outcrop at the center of the basin. A large playa (2,795 acres) resides within this area as well (Ref# 074).

3.8.3.2.2 Northeast Section

The uppermost northeast section of WSMR is dominated by the Oscura Mountains (see Figure 3.7-3A). A study conducted in 1915 provided the first evaluation and inventory of the springs and wells in and around the Oscura Mountains. In 1965, 20 wells and nine springs were subsequently inventoried. Water sources in the Oscura and San Andres Mountains have since then been mapped and classified, including springs, vegetation associations, and water chemistry. The Geographic Names Committee of the USGS has mapped surface water features and containments, such as wells and tanks, for the continental United States; this source indicates that there are 46 scattered springs and 52 other water sources, such as wells, tanks, and windmills, with intermittent surface flows located within the Oscura Mountains region (Ref# 074).

3.8.3.2.3 Central East Section

The central east section of WSMR which is bounded by the Oscura Mountains and San Andres Mountains is home to Big Salt Lake, Salt Creek and Malpais Spring (see Figure 3.7-3A). The hydrologic system within this area is locally and regionally important. Although water resources in the basin are scarce, the basin contains a unique system of interconnected springs. The basin also contains habitat for the endemic White Sands pupfish (*Cyprinodon tularosa*). Approximately 500 miles of surface water occur in this area, along with 1,600 acres of playas with varying salinity and fluctuating water levels. Scattered throughout are 21 documented springs, almost 4,000 acres of wetlands, and 53 tanks or wells. (Ref# 074) (see Section 3.7, Biological Resources for more detail regarding wetlands).

Salt Creek, from Salt Springs downstream to Big Salt Lake, provides stream habitat for the White Sands pupfish, State listed as threatened and Federally-listed as a Species of Special Concern (see Section 3.7, Biological Resources for details). Although water from Salt Springs contributes to the perennial flow of Salt Creek, most of the flow is from groundwater along the creek. Barrel and Guilez Springs in the southeastern part of the area are human-altered springs which have been identified as potential replicate sites for the White Sands pupfish; however, nonnative fish currently inhabit these features (Ref# 114).

Outflow from Malpais Spring produces a large area of flooded vegetation and a network of channels, some of which have been human-altered. Salinity increases with distance from the headspring. Mound Springs and other springs in the Mound Springs complex have been human-altered, first for watering livestock and later during road-building activities. The White Sands pupfish occurs at Malpais Spring and the main Mound Spring (Ref# 074) (see Section 3.7, Biological Resources for details).

Brazel Lake, just west of Tula Gate, approximately 150 acres in area, is the largest body of freshwater on WSMR. The lake is fed by Tularosa Creek. The Village of Tularosa has surface water rights to Tularosa Creek and relies exclusively on surface flows from the creek for drinking water (Ref# 074).

3.8.3.2.4 Central West and Southwest Section

The central west section of WSMR contains the San Andres Mountains and the southwest portions of the Jornada Draw watershed basin (see Figure 3.7-3B). Surface water within the San Andres Mountains flows into the Tularosa Valley watershed on the east and the Jornada del Muerto watershed, Jornada Draw watershed, and Elephant Butte watershed on the west (see Figure 3.8-1). Approximately 600 miles of intermittent surface flows occur within this area. A variety of mechanisms force water to the surface within the San Andres Mountains. Some seeps and springs are in shallow alluvium, gravity-type springs associated with faults and fractures, and contact springs. Over 200 very small (less than a gallon per minute) springs are located within the San Andres Mountains, where water is rapidly taken up by the surrounding vegetation or lost through evaporation. Springs found within this area are an important water source for wildlife (Ref# 074).

Few water resource studies have been done in the San Andres Mountains, and very little is known of spring flows, type, or quality. The most comprehensive work in the area was a study of wildlife water units conducted in 1992; the study identified 22 human-altered springs, 16 windmills/wells, eight earthen tanks, and six rain catchments. In a survey of the biotic and physical attributes of springs within the San Andres Mountains 244 springs were detected (Ref# 074).

Surface flows in the Southern Jornada are intermittent and drain into Jornada Draw, a closed surface-water basin. There are approximately 200 miles of surface drainages, 18 tanks and wells, and one spring. The spring is located within 0.25 miles of a road and development within the NASA facilities area in the southern portion of WSMR. A small spring and pool located east of the area comprise the only surface water features in the area (Ref# 074).

3.8.3.2.5 South Central Section

The south central section of WSMR contains Lake Lucero within the Tularosa Valley watershed (see Figure 3.7-3B). The Tularosa Valley watershed is a closed, surface-water basin system, with no outlet. Upland precipitation runs into the basin and either recharges groundwater resources at the margins of the basin or is carried down to the basin to pool in low spots in the playas. One of the lowest points in the Tularosa Valley watershed is Lake Lucero, a large playa. Water in the playa comes from winter snowmelt and rainstorm events. In a survey conducted in spring 1993, the playa lake was found to be less than 6.5 feet deep; however, the study concluded that it could be as deep as 13.1 feet during overfill events. The northern part of Lake Lucero was found to be less saline than the southern part, this difference in salinity was probably due to increased water depth as a result of water impoundment by Range Road 7. The dry lakebed fills with water, and as the water evaporates the dissolved gypsum is deposited on the surface. During overfill events, the playa extends to the alkali flats, resulting in relatively fresh water quality and providing habitat for temporary populations (Ref# 074).

A number of on-fan drainages totaling approximately 300 miles disjunct from the mountain pediment fall within the western margins of this area. The relatively dense assemblage of playas within the northern part of the area is grouped with the southern extent of Salt Creek and Big Salt Lake (Ref# 074).

3.8.3.2.6 Southeast Section

The southeast section of WSMR contains the Main Post which is located in the southern section of the Tularosa Valley watershed (see Figure 3.8-1). Most of the streams in the Main Post area originate in the mountains and flow to the east (see Figure 3.7-3B). Other surface drainages occur on alluvial fans of the Jarilla Mountains. Surface water includes 58 miles of ephemeral drainages, three reservoirs, 76 wells, two springs within Texas Canyon of the Organ Mountains, and four haul tanks. There are three reservoirs: Davies Tank, West Dry Lake Tank, and Hood Tank. Davies Tank is located at the mouth of Anvil Creek, a stream whose headwaters are in the Organ Mountains (Ref# 074).

3.8.4 WATER RIGHTS

When the United States reserves public land for uses such as Native American reservations, military reservations, national parks, or monuments, it also implicitly reserves sufficient water to satisfy the purposes for which the reservation was created. Both reservations made by presidential Executive Order and those made by an act of Congress have implied reserved rights. The date of priority of a Federal reserved right is the date the reservation was established (Ref# 112).

In 1952 Congress passed legislation waiving sovereign immunity of the Federal government from proceedings to comprehensively adjudicate the water rights of a river system or other source. The legislation was known as the "McCarran Amendment". Therefore, the Federal government may be required to participate in system-wide adjudications to assert any water rights it claims in that system (Ref# 112).

Today, Federal reserved water rights can be asserted on most lands managed by the Federal government. Reserved rights are, for the most part, immune from State water laws and therefore, are not subject to diversion and beneficial use requirements and cannot be lost by non-use (Ref# 112). Since Federal reserved rights are only those sufficient for the government to meet the purpose of the reservation, they only exist for Federal lands.

Groundwater sources provide all potable water for domestic and industrial uses at WSMR. WSMR draws water from several well fields for five State-permitted water systems. These systems are located throughout the range.

There are no hauled water programs at WSTF. Water is drawn from the Jornada aquifer through a permanent water withdrawal right with BLM and the water is chlorinated at the WSTF facility. While 5,200 acre-feet water withdrawal rights apply, presently, only 300 acre-feet per year are used (Ref# 001).

The Village of Tularosa located within the restricted airspace north of Alamogordo has surface water rights to Tularosa Creek and relies exclusively on surface flows from the creek for drinking water. The quality of available groundwater is poor, and it is used only in emergency situations. The Tularosa Community Ditch diverts surface water from the creek for approximately 2,000 acres of irrigated lands. Use is seasonal, and much less diversion occurs in winter than at other times of the year. Water is also diverted upstream from Tularosa at Bent and the Mescalero Apache Reservation. All of the waters are allocated and may be fully diverted from Tularosa Creek, although no one user takes all of the allocation. Pumping of groundwater in this area is controlled by water use rights (Ref# 074).

3.9 Safety

3.9.1 INTRODUCTION AND DESCRIPTION

This section addresses existing conditions at WSMR related to health and safety risks to the military and civilian workforce and the local public, as well as the procedures and resources which WSMR uses to reduce these risks. Section 3.9.2 describes health and safety issues associated with active installation use for test and training activities. Section 3.9.3 describes risks associated with UXO from previous test and training activities. Section 3.9.4 describes health and safety issues associated with occupational and natural hazards which WSMR personnel may encounter in performing their duties. Section 3.9.5 describes health and safety issues associated with sources of ionizing and non-ionizing radiation at WSMR.

Health and safety risks associated with hazardous substances, hazardous wastes, and solid wastes are further described in Section 3.11 and 4.11 (Hazardous Materials and Hazardous Waste) of this EIS. Public safety and emergency response assets on WSMR and the surrounding communities are addressed in Sections 3.14 and 4.14 (Socioeconomic Resources) of this EIS.

For all of these health and safety issues, WSMR has implemented a comprehensive program to eliminate, avoid or reduce the associated risks to its workers and the public. This program includes the following basic components:

- Compliance with all applicable Federal, State, DoD, and Army laws and regulations addressing health, safety, and risk management.
- Development of local regulations and detailed SOPs which further implement these laws and regulations, and focus on unique risk factors and mission requirements at WSMR.
- Establishing a local installation safety office with the proper resources and authority to effectively implement the WSMR health and safety program, and that is properly integrated with other WSMR and local civilian safety and emergency response organizations.
- Providing effective, mission-focused training and guidance to all WSMR personnel.
- Encouraging proactive employee participation in safety and health programs, and charging leaders at all levels with the responsibility for planning and conducting mission activities in a safe manner.

The WSMR health and safety program operates in compliance with a number of regulations and guidance documents, including:

- OSHA of 1970 (29 USC 651-678) and implementing regulations at 29 CFR;
- WSMR Regulation 385-18. Command Safety Program;
- AR 40-5. Preventive Medicine;
- AR 75-15. Policy for Explosive Ordnance Disposal;
- AR 200-1. Environmental Protection and Enhancement;
- AR 385-10. The Army Safety Program;
- AR 385-63. Range Safety;
- AR 385-64. U.S. Army Explosives Safety Program;

- AR 210–21. Army Ranges and Training Land Program;
- Field Manual 100–14. Risk Management;
- Department of the Army Pamphlet 40-501. Hearing Conservation Program;
- Department of the Army Pamphlet 40-503. Industrial Hygiene Program;
- DoD Directive 4715.11. Environmental and Explosives Safety Management on DoD Active and Inactive Ranges within the United States;
- DoD Directive 6055.9–STD. DoD Ammunition and Explosives Safety Standards;
- DoD Directive 5030.19. DoD Responsibilities on Federal Aviation and National Airspace System Matters;
- Federal Aviation Regulation 73. Special Use Airspace; and
- Institute of Electrical Engineers. Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

These regulations have guided the development of SOPs which all installation users are required to follow. WSMR also participates in the Emergency Operations Plan with other Federal, State, and local agencies as part of an extended response network for safety.

3.9.2 INSTALLATION SAFETY

WSMR has over 500 military sites dispersed across the installation; most of which serve as missile launch sites, tracking sites, communication sites, or testing facilities for defense systems. Most of the test and training activities on WSMR have hazardous elements to them, and could pose safety risks to participants and the local public if not properly planned and controlled.

Undeveloped lands on WSMR are used as SDZs or Quantity-Distance Safety Areas during testing of high yield explosives, directed energy, and ionizing radiation, or for storage of munitions. WSMR Range Control coordinates multiple SDZs across the installation on a daily basis. The land area actively used as a SDZ on a daily basis varies with the number and type of testing being conducted. On average, WSMR conducted 239 missions per year from 2003 to 2008 that required the establishment of a SDZ.

> **Surface Danger Zones** (SDZs) refer to the ground and airspace designated within a training complex for vertical and horizontal containment of projectiles, fragments, debris, and components resulting from the firing, launching, or detonation of weapon systems. (from AR 385-63)
>
> **Quantity-Distance Safety Areas** refer to delineated safety areas where the relationship between the quantity of explosive material and distance separation from affected persons (tabulated in Q-D tables) provide acceptable levels of protection. (from DoD 6055.9 STD)

WSMR has approximately 15,400 acres of land that is managed as active Impact Areas (based on the definitions of the proposed Land Use and Airspace Strategy Plan), on which only properly trained and authorized personnel may enter these areas for the purpose of data collection, diagnostics efforts, and installation clean-up. Impact Areas present the most extreme safety hazards of all land use classifications, due to the potential for both active detonation of munitions and the presence of UXO and hazardous debris from previous test and training activities.

WSMR has 1,635,000 acres of land (84 percent of the total WSMR area) that falls under the definition of Primary Test Zone area, and 207,200 acres as Augmented Primary Test Zone area. Primary and Augmented Test Zone areas are defined as those that support a wide range of test mission activities, including missile testing. Missile testing has historically required large SDZs in order to limit ground-based safety hazards during firing events. Other Land Use Classifications (e.g., Jornada Experimental Range, White Sands National Monument Co-Use Area, and tenant Dedicated Use Areas) are also designated for test missions, and portions of them may also be managed as SDZs during firing events.

In addition to land space designated for potentially hazardous activities, WSMR also manages restricted airspace on and off the installation's land boundaries. WSMR Flight Safety has the authority to terminate flight tests to protect personnel and equipment. WSMR Flight Safety is required to approve all flight tests, based on a comprehensive review of safety factors, risk analysis, and relevant SOPs. A more detailed discussion of airspace management is provided in Sections 3.3 and 4.3 of this EIS.

WSMR conducts multiple mission-related activities (defined in Table 2.2-2) within the various Land Use Classifications which have significant hazardous components associated with them, including weapons testing and weapons training missions. Weapons Test activities include firing munitions, missiles, rockets, or high yield explosives from ground-based or airborne platforms into targets, designated impact areas, or into airspace for the purpose of testing measures and countermeasures. Activities in this category can be surface-to-surface, surface-to-air, air-to-air, or air-to-surface. Weapons Training activities include firing munitions at targets in a designated range for the purpose of training and qualification. Activities in this category are typically surface-to-surface, surface-to-air, or air-to-surface. High yield explosives are not used for Weapons Training (Ref# 004)**.** Tables 2.2-4 and 2.2-5 of this EIS present information on the numbers of these hazardous events from 2003 through 2008. Of particular significance are installation activities deemed "hot missions," which are hazardous events which require evacuation of personnel and all non-participants from the surface area and clearance of airspace during the period of the event. From 2003 to 2008, WSMR conducted an average of 254 hot missions per year (high of 360 missions in 2008), which made up seven percent of the total mission events (1,525 events) for that time period.

Other installation activities with a lesser potential for safety hazards include air vehicle operations, instrumentation and communication activities, dismounted operations, mounted (vehicular) operations, field operations, UXO and debris recovery operations, construction and development, maintenance activities, Directed Energy activities, and nuclear effects activities. Note that health and safety issues associated with Directed Energy and nuclear effects activities are discussed in Section 3.9.5.

Based upon a combination of Land Use designations, prevalent Activity Categories and previous mission uses, many areas within WSMR are assigned operational constraints which greatly limit (primarily for safety reasons) the types of activities and personnel access which can occur within them. These constraints may vary geographically and/or temporally and include Specialized and Dedicated Use Areas (277,860 acres), UXO areas (177,210 acres), Impact Areas (15,400 acres), and Quantity - Distance Arcs/Ammunition Supply Points (53,476 acres).

As described in Section 3.9.1 above, WSMR has implemented a broad and aggressive safety management program to minimize the risks associated with test and training activities and to control personnel access to range areas.

Nearly all installation activities are subject to thorough coordination, review and approvals, operating procedures, scheduling and location assignments, and in certain cases, conditions or restrictions. These modification factors are found in WSMR regulations, permits, SOPs, mitigation measures defined in environmental documentation, and test plans. Operating conditions and restrictions may be developed or refined on a mission-by-mission basis.

WSMR lands are generally restricted from public access and public use due to potential safety hazards. For missions that may pose risks to the public outside the installation, WSMR has the ability to enact local highway closures and evacuation of certain private lands. WSMR established an MOU with the

New Mexico DOT to allow closures of up to an hour on US 54 and US 70 (up to 80 minutes in an emergency) and up to two hours on US 380, with 48 hours prior notice. During FY07, 32 highway closures occurred (22 for US 70 and 10 for US 380). WSMR also has agreements with certain landowners in designated "call-up" areas to allow evacuation when a test may cause unsafe conditions on the ground. Between 2001 and 2006, there has been an average of 44 evacuations per year, with the highest number (73 evacuations) occurring in 2006 (Ref# 010, 074). Section 2.2.1.2.2 of this EIS presents additional statistics and restrictions associated with highway closures and evacuations.

WSMR's Range Control, Safety, Fire Department, and Environmental Division offices all play key roles in safety planning, training, oversight and response activities. WSMR also participates in the Emergency Operations Plan with other Federal, State, and local agencies as part of an extended response network for emergencies (fires, hazardous material spills, mishaps, or multi-hazard events) which requires an expanded team of trained responders, whether on a local or broader regional level.

3.9.3 UNEXPLODED ORDNANCE

UXO is one of the most prolific and severe safety hazards at WSMR. UXO exists throughout WSMR, and is particularly likely to occur in areas which have been used historically for weapons impact missions or long-term test sites. Examples of current and historic programs which include weapons impact include Joint Air to Surface Standoff Missile, ATACMS, STANDARD missile testing, and penetrator and unitary bombs. On average, WSMR conducted 99 weapons impact missions per year from 2003 to 2008, with a peak of 127 missions in 2003.

Unexploded Ordnance (UXO): Explosive ordnance that has been primed, fuzed, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause. (DoD 6055.9 STD)

UXO hazards are likely to occur in areas designated as Phase I and II Warhead Impact Target (WIT) sites. Phase I impact areas have been used exclusively to test submunitions which have live detonators in the fusing system, but contain an inert main charge, telemetry-type-submunitions, totally inert submunitions with no detonators in the fusing system, or mass model type submunitions. Submunitions are no longer tested at WSMR. The submunitions tested in Phase I WIT sites are non-lethal; and recovery and analysis operations were allowed after firing events. Phase I WIT areas are generally maintained in a mowed grassland condition. Former Phase I WIT areas may be accessible to WSMR test personnel who have received the appropriate levels of safety and UXO training.

Phase II WIT sites are used for "live" test articles and munitions, and can only be used as impact areas due to the high-risk levels of UXO. Phase II WIT areas are specifically designed for testing tactical configuration submunitions where the fusing system will detonate the lethal mechanism as intended in the weapon's design. The weapons tested in these impact areas are lethal (live), and recovery or any type of handling of unexploded elements is normally not allowed, rather dud munitions are exploded in place. These areas are maintained in a bare ground (bladed) condition.

WSMR has designated 177,210 acres of land as restricted from many types of training or other access due to known or suspected UXO hazards. It is highly likely, however, that there are additional areas on WSMR where active UXO hazards may exist, and ongoing study is needed to fully document hazards and recommend clearance of additional locations.

WSMR has an EOD unit stationed at the Main Post. The EOD unit performs visual surveys of areas prior to new use, and clears away or dismantles any potentially hazardous items from the surface. UXO can continue to come to the surface due to the ongoing action of wind and water, so UXO awareness is required by all persons on the installation. UXO safety briefings are provided to all personnel and visitors prior to entering the installation. These briefings educate installation users and visitors about hazards on the installation and each person's responsibility to avoid dangerous situations and to avoid and notify EOD if any potential UXO is discovered (Ref# 121).

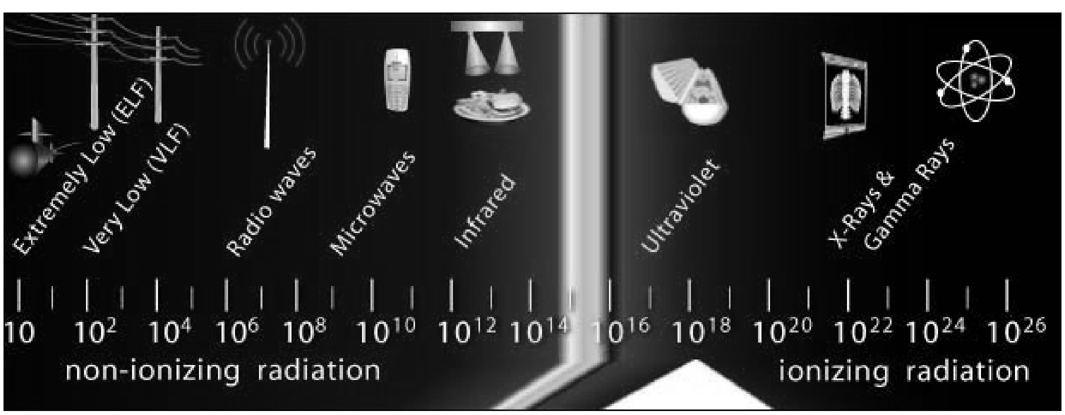
3.9.4 OCCUPATIONAL AND NATURAL HAZARDS

Staff at WSMR may encounter varying degrees of occupational hazards in their assigned duties. Examples of occupational hazards include exposure to hazardous noise levels, trip and fall hazards, electrical hazards, moving/energized machinery, motor vehicle/heavy equipment accidents, ergonomic and repetitive motion stress, ionizing and non-iodizing radiation, lasers, and hazardous chemicals and wastes. A more detailed discussion of risks associated with hazardous materials and hazardous wastes is presented in Sections 3.11 and 4.11 (Hazardous Materials and Hazardous Waste) of this EIS. All operations and maintenance at WSMR must comply with applicable Occupational Safety and Health Act (OSHA) standards and regulations (Section 3.9.1), as well as local regulations and procedures governing safe handling and use of materials and equipment. All persons performing work or with access to WSMR must receive all required training and briefings regarding safety associated with their activities.

The WSMR work environment, particularly activities occurring outside the Main Post, may potentially expose individuals to other natural and biological hazards. Potential natural hazards include seasonal exposure to temperature extremes, lightning strikes, and flash flooding in arroyos and other low-lying areas. Biological hazards include exposure to thorny plants; bees and wasps, spiders, and scorpions; and several species of rattlesnake. Additional biological hazards include the documented presence of the hantavirus pulmonary syndrome (carried in rodent feces and deer mice urine), rabies (transmitted through infected skunks, bats, and foxes), and the West Nile Virus (detected in a 2004 soil sample near Davies Tank) (Ref# 122).

3.9.5 RADIATION (IONIZING AND NON-IONIZING)

Radiation comes from many sources on WSMR. Radiation has a wide range of energies which forms the electromagnetic spectrum, see Figure 3.9-1. The spectrum has two major divisions, non-ionizing radiation and ionizing radiation. Typical sources of radiation come from radar, electrical power lines, cellular phones, and the sun's rays. There are many different types of radiation that have a range of energy forming an electromagnetic spectrum (Ref# 123). This spectrum is part of the affected environment.



Source: (Ref# 124)

Figure 3.9-1. The Electromagnetic Spectrum

Non-ionizing radiation deposits energy in the materials through which it passes but it does not have sufficient energy to break molecular bonds or remove electrons from atoms. Non-ionizing radiation consists primarily of visible light, infrared, microwave, and thermal wavelengths (Ref# 125). Potential sources of non-ionizing radiation include lasers and radars. Lasers emit high-intensity light and are used for tracking and sighting purposes. Radar units produce microwave radiation in addition to x-ray (ionizing) radiation (Ref# 098).

Ionizing radiation is more energetic than non-ionizing radiation, therefore, when ionizing radiation passes through material; it deposits enough energy to potentially cause changes in living cells of plants, animals, and people (Ref# 125). There are three main kinds of ionizing radiation:

- Alpha particles, which include two protons and two neutrons;
- Beta particles, which are essentially electrons; and
- Gamma rays and x-rays, which are pure energy (photons) (Ref# 123).

Background radiation is naturally occurring radiation from cosmic rays, from radioactive substances in the earth, and from naturally occurring radiation in our bodies. The typically quoted average individual exposure from background radiation is 360 millirems per year.

The Nuclear Regulatory Commission gave New Mexico authority as an Agreement State to regulate the use of byproduct, source, and small quantities of special nuclear material. Federal activities involving radioactive materials in Agreement States, including those on WSMR are regulated by the Nuclear Regulatory Commission (Ref# 001). Radiation safety issues are the responsibility of the WSMR Radiation Protection Division, which ensures compliance of rules and regulations outlined by the U.S. Nuclear Regulatory Commission and Army Regulation 11-9 (1999). These regulations focus on establishing policies and procedures for the use, licensing, disposal, transportation, safety design, and inventory control of ionizing and non-ionizing radiation sources. Radiation exposure standards and accident reporting instructions are also addressed. When necessary, safety buffers are activated (through the Range Scheduling process) as needed to protect persons both on and off the installation. The WSMR Radiation Protection Division checks and approves all vehicles and equipment prior to use on the installation, including test vehicles and operational and maintenance vehicles and equipment (Ref# 098).

3.9.5.1 Ionizing Radiation Sources

This section describes the current sources of ionizing radiation at WSMR.

3.9.5.1.1 Directorate for Applied Technology, Test, and Simulation

The Directorate for Applied Technology, Test, and Simulation began operation in 1957 as the Nuclear Effects Directorate. Its mission is to provide the simulated nuclear environments and technical expertise necessary to perform complete nuclear weapon, effects test, and evaluation programs on military systems. Major nuclear weapon effects test facilities include a Fast Burst Reactor, a Linear Electron Accelerator, a Relativistic Electron Beam Accelerator, a Gamma Radiation Facility, and a Solar Thermal Test Facility (Ref# 126), see Table 3.9-1.

3.9.5.1.2 Thorium in Alloys

Magnesium/thorium alloys are sometimes found in drone airframes used for missile targets. The alloy is used because of its high tensile strength and resistance to heat. The thorium in this alloy is an alpha emitter with a half-life of 1.45 x 10^{10} years. A typical amount of thorium in the drones would be five pounds (Ref# 001).

Table 3.9-1. Directorate for Applied Technology, Test, and Simulation Facilities

Facility Name	Description
Fast Burst Reactor	The Fast Burst Reactor is a cylindrical assembly of uranium and molybdenum alloy that produces high-yield pulses of steady state radiation to closely simulate the neutron radiation environment produced by a fission weapon (Ref# 127).
Linear Electron Accelerator	The Linear Electron Accelerator simulates the high-intensity gamma spike associated with a nuclear weapon detonation by producing high-intensity, short-duration pulses of high-energy electron radiation for simulated threat level exposures (Ref# 127).
Relativistic Electron Beam Accelerator	The Relativistic Electron Beam Accelerator is a high-energy, pulsed electron-beam or x-ray source. It provides an energy source of short duration for determining material response to rapid surface and in-depth energy deposition (Ref# 127).
Gamma Radiation Facility	The Gamma Radiation Facility is designed to provide the total gamma dose and residual dose environments needed for nuclear effects testing. It is also used for radiography, shielding experiments, calibration, and operational testing of military radiation instrumentation (Ref# 127).
Solar Thermal Test Facility	The Solar Thermal Test Facility produces intense thermal pulses to simulate the thermal radiation from detonation of a nuclear weapon (Ref# 126).
Semiconductor Test Laboratory	The Semiconductor Test Laboratory enables discrete, active, and custom semiconductors to be characterized and then tested by exposure in the appropriate facility (Ref# 127).
The Eldorado Irradiator Facility	The Eldorado Irradiator Facility is used for gamma dose simulation testing. The facility can operate in an extended operation mode to fulfill the unique requirements of Space Radiation Environment tests (Ref# 127).
Nuclear Dosimetry Laboratory	The Nuclear Dosimetry Laboratory provides extensive dosimetry support for all radiation testing at the Directorate for Applied Technology, Test and Simulation (Ref# 126).

3.9.5.1.3 Depleted Uranium

Uranium has to be "enriched" in the Uranium-235 isotope in order to produce fuel for certain types of nuclear reactors and nuclear weapons. After the enriched uranium has been removed through the enrichment process, the by-product uranium mixture is known as depleted uranium (Ref# 128). Depleted uranium is uranium made up of more than 99.8 percent of the Uranium-238 isotope which has a half-life of 4.59 x 10^9 years. Alpha radiation is the predominant radiation from depleted uranium although very low gamma radiation also is present.

Missiles carrying depleted uranium have been tested at WSMR over the history of the installation. Prior to 1979 these missiles were not completely recovered from their impact site. A study was completed in 1991 at Pershing missile impact sites on WSMR. Subsurface soil core samples were taken at various sites and analyzed for total uranium. Chess Site, located in a gypsum flat in the lower part of the valley north of White Sands National Monument, showed elevated levels of depleted uranium in the subsurface soil. All other sites sampled showed only natural uranium with no indication of depleted uranium. (Ref# 129) Further studies indicated that the elevated levels of depleted uranium found would have no impact on human health or on the environment.

3.9.5.1.4 Research Rockets

Research rockets are used at WSMR by universities, private industry, and the U.S. Air Force for a variety of missions. Research rockets may contain radioactive sources for the purpose of calibrating onboard sensing devices. Only the use of sealed sources is permitted. These sources may emit alpha, beta, gamma, or neutron radiation. The radioactive sources must not leak in excess of 0.005 microcuries using standard leak test procedures. At different stages of an operation, the radioactive sources may be located at the Vehicle Assembly Building, LC-36, U.S. Navy building N-200, LC-35, the SMR, and various impact areas (Ref# 001).

3.9.5.1.5 Self-luminous Devices

Many types of standard military equipment contain self-luminous devices such as compasses, watches, artillery sights, vehicle gauges, dials, and switches, Light Anti-Armor Weapon rocket sights, and muzzle reference sensors. Such devices contain radioactive tritium, radium-226, or promethium-147. Radium-226 is no longer authorized for use in military equipment. These devices typically contain 100 millicuries or less of radioactive material with a few containing several curies of tritium (Ref# 001). These types of radioactive sources are decreasingly being used in these types of activities.

3.9.5.1.6 Trinity Site

On July 16, 1945 the first atomic bomb was tested at the Trinity Site, 15 miles southeast of Stallion Range. The blast completely vaporized the 100-foot steel tower and the surface of several acres of surrounding desert.

The site is currently enclosed by an outer fence at a 1,600-foot radius from ground zero and an inner fence approximately 200 feet on a rectangular side surrounding the spot where the tower existed and where the monument now stands. The site was first opened to the public in 1953, and is now open to the public once per year.

The intense heat from the blast at Trinity fused the desert sand together with fission and activation products into a greenish glass-like substance called Trinitite, which was found to be a major source of gamma radiation (mostly Cesium-137, Europium-152, and Cobalt-60). In 1973, local environmentalists asked the Atomic Energy Commission (now called the Department of Energy) to issue a warning of potential radioactive danger from the Trinitite to persons who tour the area, some of whom carried away pieces of Trinitite. The Atomic Energy Commission conducted a study and after which testified before the New Mexico State Environmental Improvement Board that the amount of radioactivity in the small Trinitite souvenirs did not constitute a significant health hazard or public warnings. The remaining Trininite has been evaluated at Los Alamos National Laboratory and found not to be hazardous (Ref# 001).

3.9.5.1.7 Other Radiation Sources

Other ionizing radiation courses at WSMR include industrial equipment, and medical diagnostic X-ray machines at WSMR. The majority of the radiation industrial radioisotopes in use are small sealed sources used for standards in the calibration of radiation detection equipment and dosimetry systems. The Radiation Protection Division maintains a database of all sealed sources in use on the installation.

All radiation surveys as well as receipt, control, and shipment of radioactive materials; personnel dosimetry issue, exchange, and records administration; and personnel overexposures are the primary responsibilities of the Radiation Protection Division. These health physics activities are performed in compliance with existing U.S. Nuclear Regulatory Commission and U.S. Army Regulations (Ref# 001).

3.9.5.2 Non-ionizing Radiation Sources

This section describes the current sources of non-ionizing radiation at WSMR.

3.9.5.2.1 Directorate for Applied Technology, Test, and Simulation

The Directorate for Applied Technology, Test, and Simulation began operation in 1957 as the Nuclear Effects Directorate. Its mission is to provide the simulated nuclear environments and technical expertise necessary to perform complete nuclear weapon, effects test, and evaluation programs on military systems.

The test facilities include the Electromagnetic Pulse and Electromagnetic Radiation facilities, the Pulsed Laser Vulnerability Test System, and the Lightning Test Facility (Ref# 126), see Table 3.9-2.

Table 3.9-2. Directorate for Applied Technology, Test, and Simulation Facilities

Facility Name	Description
Electromagnetic Pulse and Electromagnetic Radiation Facilities	Five separate transmitters at the Electromagnetic Radiation facilities perform Electromagnetic Radiation Operational and Electromagnetic Radiation Hazard wholebody, open-space testing. This testing is completed to ensure that weapon systems will perform their intended missions while exposed to electromagnetic radiation and that electro-explosive devices will not unintentionally detonate from current induced by an electromagnetic field (Ref# 126).
Pulsed Laser Vulnerability Test System	The Pulsed Laser Vulnerability Test System is the largest pulsed CO_2 laser in the US. It is designed to support susceptibility and vulnerability testing of electro-optical/ infrared tactical weapon systems. It is fully transportable and self-contained (Ref# 126).
Lightning Test Facility	To facilitate the study and mitigation of the effects of lightning, this facility simulates the direct and indirect effects of lightning strikes. Direct effects of lightning include burning, eroding, blasting, and structural deformation. Indirect lightning effects are predominantly those resulting from the interaction of the electromagnetic fields accompanying lightning with electrical devices (Ref# 126).

3.9.5.2.2 Lasers

Potential sources of non-ionizing radiation on WSMR include lasers, LADAR (laser detection and ranging), and radars. LADAR is an advanced sensor system using eye-safety laser for tracking and guidance of certain missile systems. Approximately 150 lasers are in use at WSMR, including 100 portable units (Ref# 001). Radars are discussed in detail in Section 3.17.

In 1999, there were 39 laser tests at WSMR. Laser firings produce hydrogen fluoride and other gaseous emissions; see Section 3.4 for further details on emissions. The Army Space and Missile Defense Command operate the HELSTF which tests and evaluates high-energy laser systems, subsystems, and components. The lasers are used to test the survivability and vulnerability of various missile systems to laser attack (Ref# 074). The HELSTF operates the most powerful laser in the US in support of DoD laser research, development, test, and evaluation (Ref# 126). In addition, the Anti-Missile Radar Defense (also referred to as Athena Measurement Radar) Site, located in the southeast corner of WSMR, performs laser-sighted weapon system testing (Ref# 130).

Ground and airborne lasers are used for guidance and tracking of weapon systems at WSMR. Typically, a ground target is illuminated with a laser and an air-delivered munition “fixes” upon the target during its flight and ultimate impact. Surface-to-surface weapons can also be guided to their targets using lasers Ref# 098).

WSMR is responsible for missile flight and laser beam safety. Engineering, installation, modifications, and overall integrity are provided to the Command Control/Flight Termination System. The Command Control/Flight Termination System provides range safety and project personnel the capability to control and/or terminate missile trajectories and unmanned vehicle flight paths. It is also used to inhibit the high energy laser at the HELSTF (Ref# 126). As with other hazardous activities, laser safety is governed by appropriate SOPs and radiation sources must comply with the U.S. Nuclear Regulatory Commission and Army Radiation Safety Program.

3.10 Noise

The following section describes existing noise levels experienced in those geographic areas on and in the vicinity of WSMR that could potentially be exposed to elevated noise levels resulting from US military training activities.

3.10.1 INTRODUCTION AND DESCRIPTION

Noise is considered to be unwanted sound which interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses (e.g., housing tracts, industrial plants, or specific military training facilities). Transient noise sources move through the environment, either along relatively established paths (e.g., highways, defined tracks, etc.), or randomly (e.g., an expanse of land area which supports military maneuver activities or an aircraft operating in military training airspace). There is wide diversity in responses to noise which not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft, an explosion, or a heavy vehicle) and the receptor (e.g., a person or animal).

The physical characteristics of noise, or sound, include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces minute pressure waves which travel through a medium, like air, and are sensed by the eardrum. This may be likened to the ripples in water which would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increase, and the ear senses louder noise. Sound intensity varies widely (from a soft whisper to a jet engine) and is measured on a logarithmic scale to accommodate this wide range. The logarithm, and its use, is nothing more than a mathematical tool which simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is six, and the logarithm of the number 0.000001 is -six (minus six). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations which use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of “weighting.”

The human ear can detect sounds that range in frequency from approximately 20 Hz to 15,000 Hz. All non-instantaneous sounds throughout this range, however, are not heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and sounds measured with these instruments are termed “A-weighted”, and are shown in terms of A-weighted decibels (dBA).

In contrast, when describing large amplitude impulsive sounds such as a clap of thunder, a gunshot, or an explosion, the actual total amount of acoustic energy created by the event is an important consideration. Sounds of this nature are normally measured on the "C-Weighted" scale, which gives nearly equal emphasis to all frequencies, but suppressing the very low and very high bands. Values of C-weighted noise are shown in terms of C-weighted decibels (dBC).

Since A-weighted and C-weighted noise is measured on different scales, it is not appropriate to add them together. Therefore, they will be documented separately in this document.

The durations of noise events and the number of times they occur are also important considerations in assessing noise impacts.

The word “metric” is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning or interpretation and each was developed by researchers to represent the effects of environmental noise.

The metrics supporting the assessment of noise from activities considered at WSMR are the Sound Pressure Level (SPL), the maximum sound level (L_{max}), the SEL, and Day-Night Average Sound Levels. Each metric represents a “tier” for quantifying the noise environment, and is briefly discussed below.

The SPL metric is the metric used for the direct assessment of noise impacts resulting from impulsive noise. This is the actual noise level, in decibels, and is identified as dBP. This metric reflects the actual sound pressure associated with the event.

Meteorological conditions also influence noise propagation, especially impulsive noise. Variations such as changes in wind speed and temperature inversions have a distinct influence on the behavior of sound as it moves through the atmosphere. These climatic variables may concentrate or focus sound waves in a particular direction or reflect or refract sound energy.

The L_{max} metric is used to define peak noise levels. L_{max} is the highest sound level measured during a single noise event. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the noise source passes closest to the observer, and then returns to the ambient level as the noise source recedes into the distance. Maximum sound level is important in judging the interference caused by a noise event with conversation, sleep, or other common activities.

L_{max} alone may not represent how intrusive a noise event is because it does not consider the length of time that the noise persists. The Sound Exposure Level (SEL) metric combines both of these characteristics into a single measure. It is important to note, however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event, as though it was present for one second. Therefore, for sound events which last longer than one second, the SEL value will be higher than the L_{max} value. Conversely, for instantaneous noise events which last less than one second, the SEL value will be lower.

The number of times noise events occur during given periods is also an important consideration in assessing noise impacts. Two “cumulative” noise metrics support the analysis of multiple time-varying noise events. Both are the Day-Night Average Sound Level (L_{dn} for A-weighted noise and L_{Cdn} for C-weighted noise).

The L_{dn} metric sums the individual noise events and averages the resulting level over a specified length of time. Thus, it is a composite metric representing the maximum noise levels, the duration of the events, the number of events which occur, and the time of day during which they occur. This metric adds 10 dB to those events which occur between 10:00 P.M. and 7:00 A.M to account for the increased intrusiveness of noise events which occur at night when ambient noise levels are normally lower than during the day time. This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Day-Night Average Sound Level may be thought of as the continuous or cumulative A-or C-weighted sound level present if all of the variations in sound levels occurring over the given period were smoothed out so as to contain the same total sound energy. While Day-Night Average Sound Level does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the number of noise events or the specific individual sound levels experienced. For example, a Day-Night Average Sound Level of 65 dB could result from very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent the total sound exposure. Scientific studies and social surveys have found the Day-Night Average Sound Level to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (Ref# 131, 132, 133, 134).

Finally, it should be noted that ambient background noise is not considered in any noise calculations which are discussed below. There are two reasons for this. First, ambient background noise, even in wilderness areas, varies widely, depending on location and other conditions. For example, in general, while ambient noise is usually considered to average approximately 40 dBA, studies conducted in an open pine forest in the Sierra National Forest in California have measured up to a 10 dBA variance in sound levels simply due to an increase in wind velocity (Ref# 135). Therefore, assigning a value to background noise would be arbitrary. Secondly, and probably most important, is that it is reasonable to assume that ambient background noise in the regions involved would have little or no effect on the calculated Day-Night Average Sound Levels. In calculating noise levels, louder sounds dominate the calculations and, overall, noise associated with military activities would be expected to be the dominant noise source characterizing the acoustic conditions in the immediate region.

3.10.2 ARMY NOISE MANAGEMENT

To assess noise effects, the U.S. Army Center for Health Promotion and Preventive Medicine has defined four noise zones to be considered in land use planning. These zones are described by the noise levels to which they are exposed, and, based on sociological considerations, compatible land uses are recommended. These zones are summarized in Table 3.10-1. In general, within the Land Use Planning Zone (LUPZ), no adverse impacts would be expected. The LUPZ was established as a planning tool for working with communities to prevent encroachment. In Zone I, where very few people will be bothered by noise levels, unrestricted land use is indicated. In Zone II, as outdoor noise levels increase, and more people become annoyed by the noise, restrictions or qualifications are placed on certain land uses, specifically regarding residential development. In Zone III, as noise levels escalate, fewer and fewer compatible land uses are indicated.

Table 3.10-1. Land Use Planning Guidelines: Noise Limits for Noise Zones

Noise Zone	Noise Limits (dBA) [1]	Noise Limits (dBC) [2]	Noise Limits (dBP)
	Aviation (ADNL)	Impulsive (CDNL)	Small Arms
LUPZ	60 – 65	57 – 62	N/A
I	< 65	< 62	< 87
II	65 – 75	62 – 70	87 – 104
III	> 75	> 70	> 104

1. "dBA" and "ADNL" indicate A-weighted noise levels.
2. "dBC" and "CDNL" indicate C-weighted noise levels.
3. Reflects PK 15(met) = Single Event Peak Level Exceeded by 15 Percent Of Events.

Source: (Ref# 087)

3.10.3 NOISE LEVELS

Numerous activities supported on and proximate to WSMR contribute to both A-weighted and C-weighted noise levels on the installation.

Aircraft operations conducted by F-22As stationed at Holloman AFB will be a prime contributor to A-weighted noise on WSMR once the beddown is complete (scheduled for FY 2011). Time-averaged subsonic aircraft noise levels will increase by less than 1.5 dB DNL over noise levels experienced just prior to initiation of the F-22A beddown. These levels remain below 53.5 L_{dnmr}, however, and would be considered essentially insignificant (Ref# 136). Sonic booms under WSMR airspace are expected to increase from five per month (prior to F-22A beddown) to 25 per month once beddown of both squadrons of F-22As is complete. This increase was expected to result in a slight increase in the percentage of the population beneath WSMR airspace that is highly annoyed (approximately one percent to four percent (Ref# 136).

Other activities creating A-weighted noise include logistical support for testing, ground maneuvers, off-road vehicle use, construction, and site maintenance. The prime sources of noise are vehicular traffic and other human activity. While noise from aircraft operations occurs regularly, other activities are more sporadic, dispersed geographically, transient, and temporary, occurring only during the operation. It is often possible that multiple activities occur on WSMR during the same day. Noise from these activities does not spread far from the site where the activity is occurring. Also, as noted above, the geographic separation of sites makes the "merging" of noise from multiple sites unlikely.

Higher levels of noise are associated with other testing performed on WSMR. These include missile testing, surface-to-surface testing, surface-to air testing, and air-to-surface testing. Although the noise is rapidly dissipated during the conduct of the event, levels at the initiation and termination of the event are often such that hazard zones must be developed, and hearing protection is often required; however, these events do not occur frequently (Ref# 137).

Sonic booms resulting from supersonic aircraft flight also contribute to the noise environment on WSMR. C-weighted noise levels resulting from booms have been calculated at a maximum of 55 L_{cdn}, created by an estimated 20 to 25 booms per month (Ref# 136). Impulsive noise generated by activities on Fort Bliss, Texas, (located south of WSMR), is estimated to create a Noise Zone II condition in the southwest portion of WSMR (Ref# 138). Sonic booms also occur during missile flights. Their intensity varies with the actual speed of the missile and the mass properties of the vehicle. The overpressure associated with the event spreads in a conic projection along the flight path of the source. Thus, the altitude of the source (e.g., straight-up, angled up, or straight and level) influences the noise actually sensed on the ground. Target impact areas may also be a source of impulsive noise. The Holloman High Speed Test Track, located just east of the eastern boundary of WSMR, occasionally conducts tests that result in sonic booms or subsonic noise. Noise levels near the test track during tests are high enough that hearing protection is required for persons involved in the tests.

Finally, activities on live-fire ranges contribute to noise created on WSMR. Use of these ranges, too, incorporates all required hearing safety and protection specified by Army Regulations.

As discussed, human annoyance is a prime consideration in assessing noise impacts. On WSMR, events creating elevated noise levels are congruent with designated land uses (Ref# 111). The areas surrounding WSMR have relatively low population densities, with isolated homesteads and small population centers (Ref# 111). Population densities are estimated at less than one person per square mile (Ref# 136). The majority of noise-creating activities on WSMR are conducted in the general interior of the installation.

3.11 Hazardous Materials and Hazardous Waste

This section describes the current hazardous materials and hazardous waste use, storage, disposal and management activities at WSMR.

3.11.1 INTRODUCTION AND DESCRIPTION

Hazardous materials and wastes are identified and regulated under various regulations including the CERCLA; OSHA; the Emergency Planning and Community Right-to-Know Act (EPCRA) and RCRA. Hazardous waste is defined by the RCRA as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or does pose a substantial hazard to human health or the environment. Waste may be classified as hazardous because of its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are listed (i.e., identified) as hazardous in 40 CFR Part 263. The ROI for hazardous materials and hazardous waste would encompass all areas on WSMR potentially exposed to an accidental release of hazardous material during the described exercises and during the regular maintenance of vehicles used in the exercises.

3.11.2 ARMY HAZARDOUS MATERIALS MANAGEMENT

The Directorate of Logistics is responsible for assuring that all hazardous material on WSMR is accounted for, inventoried/documented, and properly stored (Ref# 126). The WSMR Environmental Compliance Handbook addresses the mandatory requirements governing the management of hazardous material and hazardous waste. This handbook provides guidelines for safe handling and environmentally acceptable management of hazardous material and hazardous waste from its initial use to its ultimate disposition. WSMR Regulation 200-1, Environmental Protection and Enhancement, provides guidelines for the handling and management of hazardous waste and facilitates compliance with all Federal, State, and local laws regulating generation, handling, treatment, storage, and disposal of hazardous wastes. WSMR has developed an Environmental Disaster Plan as part of the WSMR Disaster Control Plan to prevent and/or control (i.e., minimize the impact) accidental discharges of oil and hazardous substances and includes all actions taken before, during, and after the spill event to reduce the probability of damage, minimize its effects and initiate recovery.

The following subsections describe the hazardous materials used, storage locations, and base users.

3.11.2.1 Pesticide and Herbicide Use

Pesticides and herbicides are used to control or eliminate various plants and animals that are considered undesirable. These organisms affect, or have the potential to adversely affect, human health and safety; the installation mission; and other more desirable plants and animals including lawn grasses, ornamental plants, garden vegetables, native species, and sensitive habitats (Ref# 139).

Federal Agencies are mandated by Public Law (Section 136r-l of title 7, USC) to use Integrated Pest Management (IPM). IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. The Army is committed to IPM at its facilities and installations as the best approach to control pests and reduce pesticide reliance and resistance. The WSMR IPM Plan outlines the resources necessary for surveillance and control of pests including any administrative, safety or environmental requirements (Ref# 140).

Although the goal of pest management is to reduce reliance on pesticides/herbicides, the need for chemical control exists. The majority of pest control activities at WSMR are focused on the household and nuisance pests (Ref# 139). Pesticides are used in the maintenance of the Main Post and uprange facilities, the maintenance of the golf course and to keep unwanted vegetation under control in landscaped areas on Post. The White Sands Golf Course is the primary application area for herbicides. These chemicals are applied in accordance with all applicable Federal and State regulations, including DoD instructions and ARs, as laid out in the IPM Plan. WSMR has also developed a Pesticide Spill Prevention and Management Technical Memorandum which outlines spill prevention procedures and spill emergency planning.

Building 1708 was specifically constructed to store and mix pesticides and herbicides. Material Safety Data Sheets for pesticides and herbicides are kept in this building. Contractors are not allowed to store or mix pesticides on the installation (Ref# 141).

Proper procedures are followed during outdoors application of pesticides to protect personnel and the public. Personnel are not permitted in a treatment area during pesticide application unless they have met the medical monitoring standards and are appropriately protected.

Sensitive areas are considered before pest control operations are conducted. No pesticides are applied directly to wetlands or water areas unless use in such sites is specifically approved on the label and the proposed application is approved by the Environmental Division (Ref# 140).

A report on pesticide use at WSMR is prepared for the Army Environmental Command on an annual basis. Pesticide use on WSMR in 2008 was 360 pounds of active ingredients. The most commonly used pesticide in 2007 was Ranger Pro, which contains the active ingredient glyphosate, and targets mixed grasses and weeds (Ref# 141).

3.11.2.2 Polychlorinated Biphenyls

Polychlorinated Biphenyl (PCB) belongs to a broad family of man-made organic chemicals, the manufacture of which was banned under the TSCA. They may, however, be present in products and materials (e.g., transformers and capacitors, plastics and cable insulation produced before TSCA was enacted) (Ref# 142). In addition, PCBs are found in fluorescent light ballasts; however, amounts are relatively small (a few milliliters vs. gallons for electrical transformers). These ballasts, also regulated under 40 CFR Part 761, are removed by an off-site contractor for disposal.

All transformers and capacitors with PCB concentrations have been removed from WSMR. PCBs at WSMR were previously transported and disposed of by United States Pollution Control at Grassy Mountain in Clive, Utah, and Aptus Environmental Services in Coffeeville, Kansas (Ref# 001).

3.11.3 OTHER REGULATED WASTES

3.11.3.1 Asbestos

Asbestos is a mineral fiber that has been used commonly in a variety of building construction materials for insulation, as a binder, and as fire proofing. Asbestos-containing materials are located in most buildings constructed prior to 1980. Because there is only a limited ban on asbestos containing materials it is not uncommon to discover them in buildings and structures built after 1980. Asbestos management is regulated under 40 CFR Part 61, 40 CFR Part 763, 29 CFR Part 1910, 29 CFR Part 1926, AR 200-1, and AR 420-1.

The WSMR Asbestos Management Program tracks and accounts for all asbestos-disturbing work performed on facilities and buildings (permanent, semi-permanent, temporary, portable, and trailers) located on the installation. The Directorate of Public Works oversees most asbestos-disturbing work. The Environmental Division is responsible for program oversight, processing of paperwork to the regulatory authority, annual reporting, and maintenance of the State-issued Installation Asbestos Operations (Ref# 126). Proposed Actions and Work Orders are reviewed by this office to determine if proposed actions will impact asbestos containing materials.

An active asbestos notifications program currently exists throughout WSMR. Prior to the start of any work, buildings are required to be inspected/surveyed to ensure asbestos containing materials are not to be disturbed or if they are to be disturbed, that they are abated, handled, transported, and disposed off in accordance with all applicable Federal, State, local, and industry, environmental/safety laws, regulations, and standards. If abatement is required, WSMR requires that all abatement work be done by firms or personnel that are qualified, trained, and certified to perform the work in accordance with all applicable Federal, State, and local regulations and standards. Prior to the start of any abatement work, an abatement plan must be submitted, no work can start until the abatement plan is approved. After the abatement plan is approved, notifications are submitted to the State of New Mexico Environment Department, if required. Visual inspections are conducted through the abatement process. Once the visual inspection is passed, clearance samples are taken to ensure that the air inside the work site meets or exceeds EPA clean air standards. The laboratory results must be approved by the Environmental Division, upon receipt of such approval the work can commence.

3.11.3.2 Other Building Materials

In addition to asbestos, there are other hazardous building materials, which must be managed in a similar manner. These include lead-based paint, paint containing lead, components containing lead, mercury containing devices, and ozone depleting substances in air conditioning and fire suppression equipment.

Demolition and removal of these materials is governed by regulations to protect workers, the environment, and the public against health hazards. The WSMR Environmental Compliance Handbook provides a concise description of procedures and responsibilities that installation users and tenants must follow for regulated materials and functions. All of these would be managed, controlled, and abated in a similar method as for asbestos, thus ensuring they are abated, handled, transported, and disposed of properly (Ref# 143).

In order to suppress dust and control erosion, WSMR approved dust suppressants, such as liquid copolymers, are used. Some commercially available dust palliatives are biodegradable and environmentally safe to use.

3.11.3.3 Petroleum, Oils, and Lubricants

POLs are the most commonly generated hazardous materials. POLs have the potential to be released from test equipment. Vehicles, generators, and test equipment containing POLs utilize spill containment systems in accordance with the WSMR Spill Prevention Plan. The Site-Specific Spill Plan is designed to address actions to be taken by employees to respond effectively to a spill of petroleum products or hazardous substances/materials.

There are 18 above ground storage tanks at WSMR containing either diesel or unleaded gas.

3.11.4 SOLID WASTE MANAGEMENT AND RECYCLING

Currently, WSMR manages its solid waste by disposing it off-site using contractor support. WSMR’s existing landfill (Main Post Landfill) is closed pending certification, and its operating permit expired on

August 8, 2008 (Ref# 013). Contractors use the Otero-Lincoln County Regional Landfill to dispose of WSMR's solid waste. This landfill accepted a total of 71,086 tons in 2008 (Ref# 144). In February 2009, the landfill reported its remaining capacity at 4.5 million cubic yards (e.g., able to accept 1.67 million tons more waste) with an expected lifespan of another 23.5 years. Currently there are two construction and demolition debris landfills at WSMR.

Recycling refers to the use or reuse of a waste stream by-product, or the reclamation of a waste material. WSMR has drafted a Pollution Prevention Plan, which attempts to quantify generation and recycling rates for various waste streams. WSMR recycles the following waste streams:

- Waste asphalt is currently collected and stockpiled in an area near the Las Cruces Gate. The intent is to utilize the crushed product, when feasible, as a road building amendment. When applicable, contracted road projects include a recycled component to limit waste generation.
- All used oil is sent off-site to be recycled.
- The majority of crushed concrete is landfilled as construction and demolition waste. Some is stockpiled with the asphalt for future use or used in drainage channels for erosion control.
- Scrap metal is collected for recycling.
- Rocket and missile testing fallout is recovered and recycled as part of the installation range residue program.
- Old toner cartridges are sent for recycling.
- The commissary recycles their cardboard as part of the larger effort directed by the Defense Commissary Agency.
- Currently newspaper, glass, cardboard, and plastic are not part of a range-wide recycling program.

An active and effective recycling program has not yet been established due to WSMR's remote location, the lack of a sufficient market for recyclable materials, and low disposal costs at landfills in the region. Large-scale recycling is not consistently practiced at WSMR. According to WSMR's 2007 and 2008 annual solid waste reports, between these years an annual average of approximately 580 tons of materials were recycled, including antifreeze, lead-acid batteries, tires, used motor oil, aluminum, brass, high temperature alloys, steel, and other metals. DoD Instruction 4715.4 "Pollution Prevention" directs military installations to establish a recycling program that is cost-effective and economically feasible (Ref# 114). At this time, a more robust recycling program is not economically feasible.

3.11.5 STORAGE AND DISPOSAL OF HAZARDOUS WASTE (INCLUDING RECOVERY OF TESTING DEBRIS)

As described in Section 3.11.1, hazardous waste is any material listed under 40 CFR Part 261 Subpart D, or any material possessing any of the hazardous characteristics of toxicity, corrosivity, ignitability, and/or reactivity as defined in 40 CFR Part 261 Subpart C, or any material contaminated by or mixed with any of the materials described in 40 CFR Part 261.3. WSMR Regulation 200-1 "Hazardous Waste/Material Management" provides guidelines for the handling and management of hazardous waste (from point of generation to ultimate disposition) and facilitates compliance with all Federal, State, and local laws regulating generation, handling, treatment, storage, and disposal of hazardous wastes.

The use of certain chemicals on WSMR results in the generation of hazardous waste. The transportation, storage, and disposal of hazardous wastes are regulated by the DOT, OSHA, EPA, and the New Mexico

Environment Department. Hazardous waste generated at WSMR is regulated by New Mexico Environment Department with the EPA providing oversight and supplementary assistance.

RCRA is the primary law governing the disposal of solid and hazardous waste. Congress passed RCRA on October 21, 1976 to address the increasing problems faced from the growing volume of municipal and industrial waste. RCRA gave EPA the authority to control hazardous waste from the "cradle-to-grave" including generation, transportation, treatment, storage, and disposal. The EPA has authorized the State of New Mexico to implement and enforce Subtitle C requirements, including corrective action requirements, under its own hazardous waste management program. The Hazardous Waste Act (NMSA §§ 74-4-1 to 74-4-13) regulates hazardous waste management and control in the State of New Mexico. The 1992 Federal Facilities Compliance Act (FFCA), which amended RCRA, required the EPA, in consultation with DoD and the States, to publish regulations that specify when munitions become hazardous waste, subject to subtitle C, and provide for the safe storage and transportation of such waste. As a result, EPA promulgated the Military Munitions Rule (62 FR 6621) in 1997, which is now codified at 40 CFR, Subpart M, Sections 266.200 to 266.206.

WSMR currently holds a RCRA Part B permit to store hazardous waste, and has implemented systems to ensure compliance with RCRA, the New Mexico Hazardous Waste Act, and other appropriate regulations. Under RCRA, facilities are classified as Large Quantity, Small Quantity or Conditionally Exempt Small Quantity Generators of hazardous waste depending upon the type and quantity of hazardous wastes generated on a monthly basis. WSMR is categorized as a large quantity generator and produces more than 1,000 kilograms of hazardous waste each month. Commonly generated hazardous wastes may include used waste paint, solvents, fuel filters, and explosive ordnance destruction wastes. In general, these wastes are generated from aircraft, vehicle, and ground support equipment maintenance, infrastructure maintenance, and training exercises. Table 3.11-1 contains details of waste generated at WSMR in 2007.

> A **Large Quantity Generator** is a producer or over 1,000 kilograms (300 gallons) of waste in a calendar month or over one kilogram of acutely hazardous waste in a calendar month.

WSMR has developed systems to ensure that regulations are followed, including a hazardous waste minimization center to track regulated chemicals brought onto the installation. WSMR maintains a system to collect, package and dispose of hazardous waste utilizing satellite accumulation point stations and 90-day treatment and disposal sites. Waste capacity of a satellite accumulation point is approximately 50 gallons. Waste must be moved to the 90-day site within three days of reaching the satellite accumulation point capacity. From the 90-day site, wastes are either transferred to an off-site licensed facility or to the WSMR Hazardous Waste Storage Facility prior to final disposal (Ref# 145). WSMR has developed an Environmental Disaster Plan as part of the WSMR Disaster Control Plan to prevent and/or control (i.e., minimize the impact) accidental discharges of oil and hazardous substances and includes all actions taken before, during, and after the spill event to reduce the probability of damage, minimize its effects and initiate recovery.

> A **Satellite Accumulation Point** is a location where Hazardous Waste is temporarily stored before it is sent to a 90 Day Site or to a permitted HWSF or treatment/disposal site. It is located at or near the point of waste generation and must be under the control of the operator.

3.11.5.1 Resource Conservation and Recovery Act Permitted and Regulated Units

Table 3.11-2 describes the RCRA permitted and regulated units at WSMR.

Table 3.11-1. Hazardous Waste Generated at WSMR in 2007

Waste Description	EPA Hazard Code	Quantity (pounds)
Aqueous Brake Solution	D039	913
Monethanolamine Waste from Parts Cleaning/Degreasing	D006, D018, D027, D039, D008, D040	190
Spent Solvent from Equipment Cleaning/Degreasing Operations: Contains Naphtha	D039	18,324
Waste Dicholormethane	D010, F002	15
Waste Hypochlorite Solution	D002	529
Ultrasonic Cleaner Contaminated with Metals	D001, D008	97
Expired Materials	D001, D002, D003, D005, D007, D011, D018, D022, F005	1112
Waste Tetrachloroethylene	D039, F001	42
Thermal Batteries with Chromium	D007	1229
Waste Sodium Hydroxide Solution	D002	171
Solvent and Metal Contaminated Liquid from Various Operations	D001, D002, D010, D022, D035, D039, F002, F003, F005	1810
Chemical Lab Wastes	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D018, D040, F003, F005	1848
Ignitable Isopropanol Waste	D001	6
Used Antifreeze	D008	1508
Used Oil/Gasoline with Xylene/Toluene	D001, D006, D018, F005	410
Absorbent Material and Debris From Spill Cleanup	D006, F001	1305
Solvent and Metal Contaminated Waste Solids	D005, D006, D008, D039, F001, F002, F003	3180
Solvent and Metal Contaminated Waste Paint Related Material From Various Painting Operations	D001, D007, D018, D022, D035, D039, D040, F003, F005	3339
Solvent and Metal Contaminated Waste Solids From Various Painting Operations	D001, D006, D007, D008, D039, D040, F001, F003, F005	4370

Source: Ref# 146

3.11.5.2 Corrective Action Sites

The RCRA Corrective Action Program covers cleanup of releases of hazardous waste and hazardous constituents from Solid Waste Management Units (SWMUs) or Areas of Concern (AOC). Under this program, any facility applying for a RCRA Part B permit will be subject to an RCRA Facility Assessment. A RCRA Facility Assessment is used to identify SWMUs, collect existing contaminant release information, and identify known or suspected releases at SWMUs requiring further information.

Area of Concern (AOC) means any area having a known or suspected release of hazardous waste or hazardous constituents that is not from a SWMU and that NMED has determined may pose a current or potential threat to human health or the environment. An AOC may include buildings, structures, and other locations at which releases of hazardous waste or constituents have not been remediated, including releases resulting from one time and accidental events.

Currently there are 116 SMUs and 19 AOCs at WSMR which require corrective action. Types of these units include landfills, oil/water separators, drains/pipes and sumps, fire fighting training areas, tanks, surface impoundments, septic systems, storage sheds, missile impact sites, petroleum releases, and sewage treatment plant components (Ref# 146).

3.11.5.3 Recovery of Testing Debris

The Military Munitions Rule is the identification of circumstances under which military munitions are, and are not, considered a waste for regulatory purposes. A military munition is not a solid waste when used for its intended purpose. Therefore, military munitions that have been used for their intended purpose including; training; research, development, testing and evaluation; and on-range clearance activities are not solid wastes. A material that is not a solid waste cannot be a hazardous waste. Used for intended purposes "does not include the on-range disposal or burial of unexploded ordnance and contaminants when the burial is not the result of product use" [40 CFR 266.202(a)]. Used or fired military munitions become solid waste when they are transported off of the range to be stored, reclaimed, treated, or if they are disposed of by burial or landfilling either on or off range.

Unused military munitions become waste when any of four conditions apply:

- The unused munition is abandoned by being disposed of, burned, incinerated, or otherwise treated prior to disposal.
- The unused munition is removed from storage for purposes of disposal or treatment prior to disposal.
- The unused munition is deteriorated, leaking, or damaged to the point that it can no longer be returned to serviceable condition, and cannot be reasonably recycled or used for other purposes.
- The munition has been determined by an authorized military official to be a solid waste.

Missiles can potentially contain hazardous materials such as lithium and silver-zinc batteries, which can eventually end up on the ground surface. These types of batteries and other hazardous waste generated from missile activities are currently cleaned up and disposed of in accordance with the WSMR Waste Management Plan (Ref# 147). Hazardous material and test items that require additional analysis following testing are recovered immediately, while nonessential material is recovered as part of a continuous effort to keep the installation clear of debris (Ref# 149).

Table 3.11-2. Resource Conservation and Recovery Act Permitted and Regulated Units at WSMR

Facility Name	Description
Hazardous Waste Storage Facility	The Hazardous Waste Storage Facility has a fenced area of approximately 151,700 square feet and is located approximately eight miles east of the Main Post. The most significant contributors of waste are the Main Post and the HELSTF.
Hazardous Test Area - Open Burning/Open Detonation	The Open Burning/Open Detonation is situated on the westernmost edge of the Hazardous Test Area, located 10 miles north of the Main Post on the eastern slopes of the San Andres Mountains. Consisting of two open detonation pits and an open burn pan, the Open Burning/Open Detonation was used for demolition of primary explosives, secondary explosives, propellants, explosives ingredients in propellants, propellant compositions, powders, and smokes. The detonation pits and the burn pan opened in 1972 and were certified closed in 2003.
Tula Peak Munitions Burial Site and Incinerator	The Tula Peak burial sites are located near the eastern boundary of WSMR. There are four burial pits within 75 feet of each other. Cluster bomb units and other small ordnance were placed in the incinerator and then the debris was buried as part of the ordnance disposal procedure.

Table 3.11-2. Resource Conservation and Recovery Act Permitted and Regulated Units at WSMR (continued)

Facility Name	Description
Red Rio Bombing Range Landfills	The Red Rio Bombing Range encompasses 29,500 acres near the northeast boundary of WSMR. Two areas were reportedly used for munitions burial from 1963 to 1987, receiving dummy projectiles dropped during practice at the Red Rio Range. Projectiles were placed in an open pit, detonated and burned. The residue was buried with fill and a new pit was excavated. At least five pits were created and filled.
Oscura Bombing Range Disposal Pits	The Oscura Bombing Range encompasses approximately 26,400 acres. Explosives were placed in the pits, where they were detonated and burned. After burning, the debris was covered with fill. The disposal operation was conducted until the pit was filled. At least five pits were utilized for burial.
Rhodes Canyon Landfill	Closure activities are complete. Post closure activities are being conducted under an approved Corrective Measures Implementation Work plan.
HELSTF Landfills (SWMUs 38 and 39)[1]	These landfills are located east of the HELSTF in the southern section of WSMR. Both Landfills were in operation from the early 1960's to 1989. The landfills are two unlined trenches that reportedly received non-hazardous construction wastes.
Former Main Post Landfill No. 3 at Scrap Yard	Former Main Post Landfill No. 3 at Scrap Yard is located in the southern portion of the Main Post. The site reportedly operated from 1965 to 1982. The northern portion of the landfill was fenced and used as the WSMR scrap metal accumulation point until 2000.
Former Oscura Range Center Landfill (SWMU 158)	This landfill is located 0.5 miles south of Oscura Range Center. Waste was removed in 1998. Closure activities are complete.
Nuclear Effects Reactor Facility Ponds No. 1 and No. 2 (SWMUs 160 and 161)	The Nuclear Effects Reactor Facility is located three miles south of the Main Post. Pond No. 1 was known to receive waste water from floor drains, sinks, and toilets in Building 21225. The waste water stream reportedly included human waste and laboratory waste. Pond No. 2 received waste water from Building 21235. Both ponds have been closed.
Former Acid Neutralization Unit at HWSF (SWMU 89)	The former acid tank is located eight miles east of the Main Post area at the Hazardous Waste Storage Facility. The tank consisted of an open-topped reinforced concrete tank that was used to evaporate liquid chemical wastes generated at photographic laboratories. The unit was occasionally used to store damaged transformers containing PCBs.
Former STP Percolations Ditches (SWMU 82)	This SWMU consists of two excavated soil ditches located immediately east of the WSMR Sewage Treatment Plant and approximately two miles east of the Main Post. The ditches were used from 1958 to 1986 as discharge trenches for Sewage Treatment Plant effluent.
HELSTF Cleaning Facility Sump (SWMU 142)	The sump is located at the HELSTF, Building 26131. The unit is located in the Pre-Clean Room of this facility and has been active since 1983.
Liquid Propellant Evaporation/Neutralization Pits (SWMUs 92 and 100)	This site consists of 10 earthen pits located two miles east of the Main Post area in the Liquid Propellant Storage Area. The pits were constructed in 1953 and intended to provide secondary containment for the storage area. The pits are unlined and used for containment of Inhibited Red Fuming Nitric Acid, liquid propellants, monomethyl hydrazine, unsymmetrical dimethyl hydrazine, and petroleum/oils/lubricants.
Surface Impoundment at the Temperature Test Facility (SWMU 104)	The Temperature Test Facility is located 2.5 miles east of the Main Post. The surface impoundment was used to evaporate process waste water generated as a by-product for freezing rain tests performed in the test building.

1. Solid waste management unit (SWMU) means any discernable unit or area at the facility at which solid waste has been placed at any time, and from which the NMED has determined that there may be a risk of a release of hazardous waste or constituents, irrespective of whether the unit was intended for the management of solid waste.

Source: Ref# 148

Recovery is normally performed by the recovery contractor managed by the Directorate of Installation Support, Maintenance and Supply Division. It can also be done, depending on the circumstances, by various organizations as detailed in WSMR Regulation 70-8.

Missile debris is disposed of in accordance with RCRA, WSMR Hazardous Waste Management Plan, and AR 200-1. Inadvertent missile or target impacts outside WSMR boundaries, including White Sands National Monument and San Andres National Wildlife Reserve, will be addressed under provisions of RCRA and WSMR Environmental Compliance Handbook which also contains WSMR Regulations 200-1 (Ref# 147).

3.11.6 RELATED MANAGEMENT PROGRAMS

3.11.6.1 Pollution Prevention Plan

The Army Pollution Prevention Program is based on the Federal Pollution Prevention hierarchy:

- Eliminate or reduce the pollution sources;
- Recycle or reuse what is not eliminated;
- Treat what is not recyclable or reusable; and
- Properly dispose of remaining waste (42 USC Chapter 133).

Under E.O 13148, Greening the Government through Leadership in Environmental Management, White Sands developed a Pollution Prevention Plan to implement programs aimed at attaining pollution prevention goals. This plan contains the necessary concepts and practices for reducing hazardous material use and waste generation at WSMR.

Pollution prevention deals with contamination of air, water, and land concurrently by reducing waste at the source and addressing the problem prior to the creation of pollution. Activities such as substituting non-toxic or less toxic substances for toxic chemicals, improving housekeeping, staff education, and adopting BMPs, as well as recovery, reuse, and recycling are all effective at reducing pollution. Achieving a reduction in hazardous waste quantities can be accomplished through material inventory control, efficient waste management, and using less hazardous materials (Ref# 114).

3.11.6.2 Environmental Assistance Program

The Environmental Assistance Program was developed to assist WSMR in complying with State and Federal environmental laws and regulations. Program implementation began in 2002 with recurring inspections of WSMR facilities, sites, and operations.

Current field inspections generally include storm water sites, hazardous materials, and hazardous waste accumulation sites. Hazardous waste accumulation sites and storm water sites are inspected according to risk-based criteria (Ref# 114).

3.11.6.3 Environmental Management System

In January 2007, President Bush signed E.O. 13423, "*Strengthening Federal Environmental, Energy, and Transportation Management*", directing all Federal Agencies to implement an Environmental Management System at appropriate organizational levels. In July 2001, the Deputy Assistant Secretary of the Army issued a policy memorandum directing Army Installations to:

- Comply with E.O. 13148 requirements; and
- Adopt the internationally recognized Environmental Management System standard International Organization for Standardization 14001.

International Organization for Standardization 14001 is an organized, formal approach to managing an organization's environmental risks. Installations clearly identify, prioritize, manage, and check progress toward meeting environmental requirements; minimize environmental, community, and mission risks; and identify areas for continuous improvement. Its standard approach addresses the installation's organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources as they relate to the environment (Ref# 150).

3.11.6.4 Installation Restoration Program

The Installation Restoration Program is a DoD program designed to identify, characterize, and remediate the environmental contamination on military installations. The program was implemented in response to CERCLA requirements to remediate sites posing a health threat (Ref# 114).

The Installation Restoration Program provides management for the identification, investigation, and cleanup of areas contaminated during past (pre-1984) activities at WSMR. The program began in August 1988 with a RCRA Facility Assessment of WSMR, which identified 138 SWMUs and 26 AOCs. Since then WSMR continued to investigate and cleanup sites warranting further action, including numerous voluntary clean up actions and groundwater monitoring and soil borings to document the presence or absence of contaminants. Remedial work plans have been developed outlining the best procedures for clean up at remaining sites, and WSMR petitioned New Mexico Environmental Department for No Further Action rulings on sites at which clean up actions have been performed.

Restoration activities are completed according to a site's relative risk. The higher the relative risk, the sooner a site's restoration activities must be completed. Current goals for installations, such as WSMR, are as follow:

Restoration activities will clean up to a lower relative risk category, or have remedial systems in place for:

- 50 percent of identified high relative risk sites by the end of FY2002;
- 100 percent of identified high relative risk sites by the end of FY2007;
- 100 percent of identified medium relative risk sites by the end of FY2011; and
- 100 percent of identified low relative risk sites by the end of FY2014.

WSMR's Installation Restoration Program is meeting these goals (Ref# 151).

3.11.6.5 Radon Reduction Program

The Radon Reduction Program is a mandatory program within the Army. All housing units and all operational facilities on WSMR with basements or subsurface structures have been surveyed. No regulatory levels were exceeded and no remediation was required. The Environment and Safety Installation Safety Office is responsible for this program (Ref# 114).

3.11.6.6 Spill Planning and Response Program

WSMR has a comprehensive Installation Spill Contingency Response Plan. This plan is Annex G to the WSMR Disaster Plan. While a Spill Prevention Plan is a good management practice, due to the absence of navigable waters on WSMR, a spill plan is not currently required by Federal regulations. Nevertheless, WSMR has a Spill Prevention Plan in place (Ref# 114).

3.11.6.7 Hazardous Material Emergency Response

The Fire Protection and Emergency Response Division provides emergency response and containment of hazardous materials and incidents/spills and could perform limited cleanup of such materials if necessary (Ref# 114).

3.12 Facilities and Infrastructure

3.12.1 INTRODUCTION AND DESCRIPTION

The primary military mission of WSMR is to provide quality testing, evaluation, research, and other technical services to the Army and DoD. WSMR serves as a multi-service test range by supporting research, development, and testing programs for missiles and instrumentation. Thus, WSMR's infrastructure and facilities are continually evolving, constantly being improved and expanded to accommodate the military test and evaluation mission, and is under the operational control of the DTC. Electricity, water, sewage, and natural gas are necessary to support various missions, as well as maintain the residences of WSMR personnel. An extensive system supplies these resources to personnel stationed throughout the installation, with the highest concentration of infrastructure in the southern portion of the installation, especially at the Main Post. AR 420-49, *Utility Services*, establishes the policies and responsibilities for the operation, maintenance, repair, and construction of facilities and systems for the efficient, economical, and environmentally sound management of utility services at all Army installations.

Utility systems discussed in this section include potable water supply, wastewater collection and treatment, stormwater management, and communication systems. Solid waste collection and landfills are discussed in Section 3.11, transportation-related infrastructure is discussed in Section 3.13, housing and other community service-related infrastructure on WSMR are discussed in Section 3.14, and the use and demand of energy systems and the infrastructure supporting these systems (i.e., gas and electric utilities) are discussed in Section 3.16.

3.12.1.1 Main Post

The Main Post is the urbanized portion of WSMR, which occupies approximately 1,530 acres along the eastern slope of the Organ Mountains in the southwest corner of WSMR and serves as the center of operations for most organizations and tenants (Ref# 074). The Main Post administrative and technical complex includes WSMR Headquarters, operations control center, administrative offices, technical laboratories and work areas, warehouses, and service centers. The Main Post also serves as a self-contained community with military and Family housing, shopping facilities, medical clinics, emergency and fire services, educational and recreational facilities, and churches.

3.12.1.2 Test Facilities and Range Centers

WSMR's infrastructure includes systems that service over 2,000 test facilities and sites which support the military weapons test and evaluation mission (Ref# 074). The main range is used for tests and evaluations of tri-service missile systems, high-energy laser and directed-energy systems, air-defense fire distribution systems, space systems, and surface-to-surface missile systems. Common test infrastructure include missile launch sites, missile impact areas, instrumentation sites, communication sites, and radar and laser test facilities. Four distinct range camps (Stallion, Oscura, North Oscura, and Rhodes) are strategically located in the central and northern portions of the installation to provide administrative, technical, and service support to areas too remote to serve from the Main Post. Each range center, as well as the Main Post, serves as a nerve center, planning area, or offers logistical support for ongoing range operations up to and including telemetry, instrumentation, radar, data, communications, supplies, and other mission related support.

3.12.2 POTABLE WATER SUPPLY

Water use at WSMR remains a crucial issue for land planning purposes. Viable surface water resources for water consumption are essentially non-existent, and groundwater resources sometimes require treatment before use due to high salinity. All potable water supplies at WSMR are supplied through groundwater wells and are monitored under the SDWA. AR 420-46, *Water Supply and Wastewater*, outlines criteria, procedures, and standards for the operation, maintenance, and repair of water systems and associated appurtenances at Army installations. This section describes current conditions of the potable water system in terms of the supply and distribution systems, water consumption rates, and types of water treatment. For more information on the characteristics of regional aquifers, including water quality and available yield, see Section 3.8, Water Resources.

3.12.2.1 Main Post

The majority of water pumped on WSMR is supplied by Main Post water wells. The water supply for the Main Post area is obtained from 13 active wells – 11 production wells in the Main Post aquifer and two production wells in the Soledad aquifer (Ref# 152). Two additional supplementary wells that could provide extra capacity to WSMR are also located in the Soledad aquifer, but are currently inactive pending needs from WSMR and approval by the State of New Mexico (Ref# 013). A draft report on the water supply was completed in April 2009 (Ref# 251). The study indicated that the equipment capacity for all Main Post supply wells is currently 8,930 gpm, but that the combined well capacity by year 2050 is estimated to decrease to 4,440 gpm. For the four Soledad wells, it was estimated that current equipment capacity is 3,430 gpm, but by 2050, this is estimated to decrease to 1,850 gpm. Thus, the combined supply wells are currently equipped to yield a total of 12,360 gpm or 17.8 million gallons per day (mgd). This instantaneous yield is expected to decrease over time due to aquifer drawdown and, by 2050, it is estimated to be 6,290 gpm or 9.06 mgd from all existing supply wells.

The Main Post water treatment and distribution system currently comprises the 13 active wells, a central treatment plant, storage tanks, a central booster station, and approximately 130 miles of water lines (Ref# 074, 152). Water from the Main Post wells is treated using sedimentation, disinfection, and fluorination processes. The supply wells pump the water through two sedimentation tanks prior to entering two ground storage tanks. The central booster station delivers the treated potable water to the distribution network, which consists of a low- and high-pressure distribution system. The low-pressure system provides potable water to operational facilities (e.g., warehouses and motor pools). The high-pressure system supplies potable water to housing, schools, and administrative buildings through pipe mains constructed of primarily PVC and asbestos cement, and ranging in sizes from six to 16 inches in diameter. Additionally, a 10-inch asbestos cement pipe delivers potable water to "down range" facilities located east of the Main Post area (Ref# 152).

The 1986 analysis evaluated the water storage capacity, fire flow, and hydraulic conditions of the distribution system. The analysis concluded that the potable water production and storage capacity at WSMR could support an effective population of 10,182 or an actual population of about 13,000 persons. Residual capacity exists for the fire flow; however, the system as a whole was marginal due to the age of the central portions of the system. A potential problem with surge suppression was identified that had resulted in ruptured pipes and will need to be addressed with further analysis. Capacity of the system under fire-fighting tests was shown to be marginal in 1986 and parts of the system were recently upgraded. In certain areas, hydrants were also identified as marginal in the 1986 study. Thus, it needs to be ascertained if issues of capacity under fire-fighting conditions have been addressed and corrected. Currently, the water treatment plant system control and data acquisition system (SCADA) that controls the flow of water through the distribution system via the booster pumps is not operating properly. A new

SCADA needs to be installed at the water treatment plant to provide optimal operation of the distribution system.

According to an infrastructure capacity study conducted in 2007, the average daily consumption rate per capita is currently lower than those in 1986, when the last potable water system analysis was conducted prior to the 2007 study. This decrease was due to the reduction of on-site residences and dependents. The Main Post potable water system is currently serving a population of approximately 7,600 (including military and civilian population and their dependents) at a consumption rate of 100.5 gallons/day (Ref# 013). The 2007 annual water production was 424.4 million gallons, or an average monthly production of 35.4 million gallons. The monthly water production for FY2007 ranged from a maximum of 58.5 million gallons in August to a low of 12 million gallons in January. The most significant water users on the Main Post are irrigation systems, including the golf course and baseball field irrigation systems, which used approximately 71 million gallons and 500,000 gallons, respectively, in FY2007. Based on a draft potable water system analyses report conducted in April 2009, the Main Post potable water system has been experiencing an average daily domestic usage rate of approximately 0.9 mgd usage in more recent years (Ref# 252). During a peak water usage day (summer months), the existing water system supplies approximately 3.31 mgd. The study also indicated that water demand for golf course/irrigation and the LC 38 Missile Range/Orogrande have historically averaged 556,071 gpd and 102,416 gpd, respectively.

The following is a summary of the existing Main Post potable water system (Ref# 152):

- Production Capacity: 4.5 mgd
- Historical Demand: 1.2 mgd (26.7 percent of existing production capacity)
- Current Demand: 0.9 mgd (or 20 percent of existing production capacity)
- Storage Capacity: 3.1 million gallons

Planned improvements (FY 2009 through FY 2013) for the Main Post water supply facilities include, but are not limited to: replacement of chlorination systems, replacement of waterlines, and rehabilitation of wells (Ref# 153).

3.12.2.2 Water Systems Outside the Main Post Area

HELSTF and SMR obtain water from mountain-front wells. All other facilities on WSMR receive hauled water from the Main Post or the Stallion Range Center (Ref# 074). At the Stallion Range system, the primary source is brackish groundwater pumped from two wells and, as of 2008, these wells have a maximum combined daily production of 0.05 mgd (Ref# 153). Water from the Stallion Range system must be treated at the desalinization plant before storage and distribution. The plant consists of three 50,000 gpd electro-dialysis reverse systems and a 100,000-gallon tank for treated water (Ref# 001, 074). Historically, the average daily consumption level at the Stallion Range Center is 0.096 mgd (Ref# 001) and the annual groundwater production averages about 9.3 million gallons a year (Ref# 074).

HELSTF and SMR water systems obtain water from freshwater aquifers located along the eastern piedmonts of the San Augustin and southern San Andres Mountains. The five wells supplying these systems had a combined annual production of 17.2 million gallons of water in 1999 (Ref# 074). As of 2008, the maximum combined daily production of the wells is approximately 0.7 mgd (based on four operational wells) (Ref# 153).

3.12.3 WASTEWATER

WSMR has two main wastewater treatment plants – one on the Main Post, located just east of the WSMR landfill, and one in the northern range, just south of the Stallion Range Center. All sewage discharges at WSMR are monitored under permits issued by the NMED.

3.12.3.1 Main Post

Sanitary wastewater and minor commercial discharges generated at the Main Post are routed through a collection system and gravity fed to the WSMR sewage treatment facility located 1.5 miles southeast of the Main Post. Initially constructed in 1958, this facility is a trickling-filter plant with secondary wastewater treatment capabilities. The sewage collection system consists of 100,000 linear feet of vitrified clay and concrete pipe, ranging from 4- to 21-inch diameter pipes. All branch lines collect into a central 15-inch diameter main which progressively increases to a 21-inch diameter main upon entry into the wastewater treatment plant (Ref# 152). Because the entire wastewater collection system for the Main Post area is designed for gravity flow, no force mains are required (i.e., no pumping or pressurized lines).

Wastewater at the Main Post facility is treated in a primary and secondary clarifier coupled with a trickling filter, followed by chlorine disinfection. Treatment facility effluent is routed about three miles east-southeast to an area known as West Dry Lake, and is discharged into an unlined free water surface wetland (i.e., a modified earthen tank known as Davies Tank). There, the water is evaporated and recharges the aquifer. Portions of this playa are now permanently inundated as a result of the discharged effluent (Ref# 074). The associated sludge management system at the Main Post sewage facility contains primary and secondary digesters and sludge drying beds. Sludge is removed from the primary and secondary clarifiers and treated in two anaerobic sludge digesters. Digested sludge is discharged to three concrete-lined sludge drying beds located at the sewage plant. Dewatered sludge is characterized, transported, and disposed of at an off-range commercial landfill permitted under the RCRA (Ref# 074).

The Main Post sewage plant has a design capacity of 1.0 mgd, with a peak hourly flow of 2.5 mgd, and is permitted by the State of New Mexico to discharge a maximum of 0.63 mgd of treated effluent (Ref# 152,153). Recent average effluent flow ranges from 0.15 to 0.20 mgd and peak flow ranges from 0.38 to 0.50 mgd (Ref# 253). The 2007 report stated that the current overall wastewater flows at the Main Post are less than those in the 1986 analysis, but that because wastewater treatment capacity is based on the original 1958 design capacity, it could not be confirmed whether the existing facility, as is, would still be able to meet the 1.0 mgd design capacity or future demand. Additionally, the 2006 Installation Status Report gave poor ratings to the wastewater collection system, indicating that major deficiencies in the system could pose significant obstacles on WSMR's missions (Ref# 152).

Since the 1986 evaluation, the only significant upgrades to the Main Post wastewater system included inspection and lining of major sewer lines and installation of the UV disinfection system at the wastewater treatment plant. In 2005, a UV disinfection system was added to the wastewater treatment process following the secondary clarifiers. However, this system is undersized and currently not operating to the required performance specifications as defined by WSMR's discharge permit (Ref# 152). A project has been initiated to install flow control and filtration capabilities to provide acceptable loading conditions to the UV system. The following is a summary of the Main Post wastewater treatment system:

- Design Capacity (Daily / Peak Hourly Flow): 1.0 mgd / 2.5 mgd
- Current Load (Daily / Peak Hourly Flow): 0.2 mgd (20 percent of existing design capacity) / 0.50 mgd (50 percent of existing design capacity)

3.12.3.2 Wastewater Outside the Main Post Area

The Stallion Range Center area is served by a central wastewater collection system connecting nearly all of the habitable buildings, which contain sanitary waste disposal facilities (Ref# 001). Several of the facilities have dry wells, which intercept and dispose of non-sanitary wastewater. The wastewater collection system conveys sewage to a septic tank facility. This tank consists of four compartments and is constructed to allow parallel operation of two two-compartment units. The present wastewater system was constructed in 1961. At that time, the existing septic tank discharged to one of two oxidation ponds located downstream from the tank. Since that time, the two oxidation ponds have been separated by earth berms to form four ponds, with a total volume of approximately 1.3 million gallons. Due to the relatively low influent flows, the level of these pond cells is negligible, and the full capacity of the oxidation pond cells has not been used. Any overflow from these ponds would be directed southeast into nearby natural drainages. The Stallion Range Center treatment system has a maximum treatment capacity of 0.15 mgd via a septic tank/evaporative lagoon system (Ref# 153). Up to 30,000–40,000 gallons of wastewater per day is treated at the Stallion Range Center, about 25 percent of its treatment capacity (Ref# 074).

HELSTF is located on Range Road 264, 2.2 miles north of US 70. Most HELSTF-generated wastewater is collected by means of sewage collection lines and transferred to four lined sewage lagoons, which function by evaporation. The four lagoons hold approximately three million gallons and are generally 85 to 95 percent full (Ref# 154). HELSTF has six septic systems; new sewage lagoons have been proposed that would be designed to replace the existing lagoons (Ref# 049).

Additional wastewater processing occurs at the NASA White Sands Test Facility (WSTF) in the southwest corner of WSMR, which uses lagoons for processing and evaporation (Ref# 001).

3.12.4 STORMWATER

Most of WSMR lies within the Tularosa Basin, which is a relatively low landscape area bounded on the west by the San Andres, Organ, and Oscura Mountains and on the east by the Sacramento Mountains. These regional landscape features affect stormwater flows and drainage. Average annual rainfall in the Tularosa Basin is just over 10 inches per year; however, stormwater drainage in the basin is influenced by the average annual precipitation of about 17 inches in the higher elevations of approximately 8,000 feet (Ref# 013).

The conveyance of runoff during a precipitation event is mainly a concern for the Main Post area as it contains large areas of impervious surface, serving as the center of operations for most of WSMR's organizations and tenants. A levee along the western edge of the Main Post was built in 1968 to divert storm water drainage from the Organ Mountains to the north and south of the Main Post area. However, in 1978 there was significant flood damage to the Main Post area. The Main Post area is located on the eastern alluvial outwash of the Organ Mountains near the focus of a semicircular-shaped drainage area. Runoff from the mountain drainage area is transmitted into two major arroyos, a northern and southern arroyo, located north of El Paso Gate and south of Martin Luther King Boulevard, respectively. The northern arroyo flows northeast and eventually passes beneath Owens Road approximately 1.2 mile north of the Las Cruces Gate via three concrete box culverts. The southern arroyo flows east from the south end of the golf course levee and eventually combines with the runoff from the unlined ditches draining the Main Post's southern area before passing beneath Headquarters Avenue approximately 0.3 miles south of Martin Luther King Boulevard via three concrete box culverts. Both arroyos drain through concrete box culverts which greatly restrict flows during major storm events. Storm pipes, inlets and culverts provide drainage in a few discrete sections of the northern housing area and the administrative area between Headquarters Avenue and Dyer Street. A majority of stormwater drainage from the southern portion of the Main Post area flows through the location of the proposed Future Development

Area (potential HBCT complex). Currently, there are three major drainage outfalls along the east side of Hughes Road south of Watertown Avenue, which then flow southeast through arroyos located in the proposed EN BN project site.

A draft stormwater drainage report was completed in April 2009, which included a hydrological and hydraulic analysis of the drainage system in and around the main cantonment area (Ref# 254). With respect to the existing channel-levee system and the two major drainage arroyos surrounding the Main Post, results of the study identified various hydraulic capacity deficiencies in the channel-levee system, the conveyance capacity of the south arroyo, and the hydraulic restrictions of the existing culvert road crossings at both the north and south access points. Modeling results indicated that the existing channel-levee system and the south arroyo is only adequate to carry the 25-year storm discharge in certain sections and is generally inadequate for discharges resulting from larger storms. Results from the study also show that the culvert crossings at Owen Road and Headquarters Drive are inadequate to convey discharges from events greater than a two-year storm without overtopping these roads, assuming the culverts are not clogged by debris and sediment deposits. Additionally, the study indicated that the proposed EN BN and Future Development Area are subject to flooding from a 100-year storm event.

With respect to the interior drainage within the main cantonment area, modeling was performed to assess the existing storm system's effectiveness to properly handle the flows generated for different storm events. For each storm event that was modeled, pipes and ditches that exceeded their capacity was identified. Results showed that the number of surcharged pipes ranged from 15 for a one-year storm to 111 for a 25-year storm. Results for the number of overflowing ditches ranged from six for a one-year storm to 55 for a 25-year storm. The analysis also indicated that the current system is not capable to fully handle the flows generated by a 10-year storm.

Stormwater runoff control measures are covered under the Environmental Protection section of the general specifications for contracts supporting military construction projects assigned to USACE at WSMR (Ref# 155).

3.12.5 COMMUNICATIONS

In order to maintain communication to all areas throughout the installation, WSMR has a complex communications system in place. This includes standard telephone lines, coaxial communication lines, microwave equipment, radio frequency, and other forms of transmission. As with other infrastructure, communication networks are more heavily concentrated in the southern portion of the installation. The Information Operation Directorate is responsible for communication support to WSMR, including distribution, maintenance, and scheduling.

The on-range telephone system is distributed via the WSMR–Test Support Network. WSMR–Test Support Network consists of 475 miles of underground and aboveground main trunk fiber-optic cable which interconnects major test facilities for voice, data, and video communications (Ref# 074). Off-range and Main Post residential telephone service is provided by Qwest Communications via a major underground fiber optic system. Over 20 microwave sites used for telephone and public communications are located within or near (i.e., less than 50 miles) WSMR (Ref# 074).

WSMR is also served by a trunked, multi-agency/site ground radio system, which is operated and maintained by the Information Operations Directorate (Ref# 074). The system allows ground radio communication over all parts of WSMR as well as inter-site voice communication between WSMR, NASA White Sands Test Facility, Fort Bliss, Holloman AFB, Sandia Laboratories, Kirtland AFB, Fort Wingate, and the Electronic Proving Ground (Fort Huachuca, Arizona).

3.13 Transportation

3.13.1 INTRODUCTION AND DESCRIPTION

This section discusses the network of roads, highways and railroads which serve southern New Mexico and the WSMR region. This section also briefly discusses the occurrences of roadblocks as a result of WSMR activities.

3.13.2 REGIONAL TRANSPORTATION

Interstate highways 10 (I-10), 25 (I-25), and to a lesser extent, 40 (I-40), are the primary interstates which link the WSMR area to the rest of the interstate highway system (see Figure 3.13-1). I-10 generally traverses in an east-west direction and passes approximately 50 miles south of the Main Post with exits to WSMR at El Paso, Texas, and Las Cruces, New Mexico. I-25 provides a north–south interstate connection to WSMR, with local exits at San Antonio (17 miles from the Stallion Gate), and Las Cruces (22 miles from the Las Cruces Gate). I-40 traverses the northern half of New Mexico in an east-west direction and intersects I-25 in Albuquerque, 99 miles north of WSMR.

Other major highways serving WSMR include US 380, US 70, and US 54. US 70 crosses the southern portion of WSMR between Las Cruces and Alamogordo and connects the City of Las Cruces to the Main Post, with an exit located five miles north of the Main Post on Range Road 1. US 54 runs a parallel course along the entire eastern boundary of WSMR between Carrizozo and El Paso. US 380 travels along the northern boundary of WSMR between San Antonio and Carrizozo and connects with I-25 in San Antonio. No major access points exist along the western boundary of WSMR.

The Main Post, where most of the installation's personnel work and about 12 percent of the civilian workforce reside, is located in the southwest corner just south of US 70. Las Cruces is the second largest city in New Mexico and, together with other outlying Doña Ana County communities, has a travel time of approximately 30 minutes to the installation and provides residence to 56 percent of the civilian workforce at WSMR. Alamogordo is located approximately 50 miles northeast of WSMR along US 70 with travel times to the installation estimated at one hour. This area is home to approximately nine percent of the civilian employees at WSMR. El Paso is the sixth-largest city in Texas and the El Paso Airport is the closest major airport to WSMR that provides regularly scheduled passenger flights. At 71 miles south of the Main Post, travel time to the airport is approximately 72 minutes. Approximately 17 percent of WSMR's civilian workforce resides in El Paso (Ref# 152).

The immediate roadways into WSMR include US 70, with four lanes, and US 54, which is predominantly two lanes. These highways, at 45-plus miles per hour speed limits, have a capacity of 1,003 vehicles per hour (Ref# 013). According to the New Mexico DOT's 2004 annual average daily traffic, US 70 experienced 16,070 vehicles per day just east of the Las Cruces city limits and 7,658 vehicles per day just west of Alamogordo (Ref# 156). US 54 experienced 6,880 vehicles per day near the Town of Orogrande, 7,592 vehicles per day just south of Alamogordo, and 4,433 vehicles per day near Carrizozo. US 380 experienced 1,915 vehicles per day and 1,404 vehicles per day east and west of Carrizozo, respectively. US 54 is also a significant roadway serving the Fort Bliss area and has been analyzed for its capacity in the *Fort Bliss, Texas and New Mexico, Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement*. According to the SEIS, US 54 is generally operating at a sufficient level and no major traffic issues were identified (Ref# 037). Additionally, the Supplemental Environmental Impact Statement (SEIS) identified a few transportation projects that would improve roadways in the region, including the addition of lanes in each direction on US 54 near the Fort Bliss entrance.

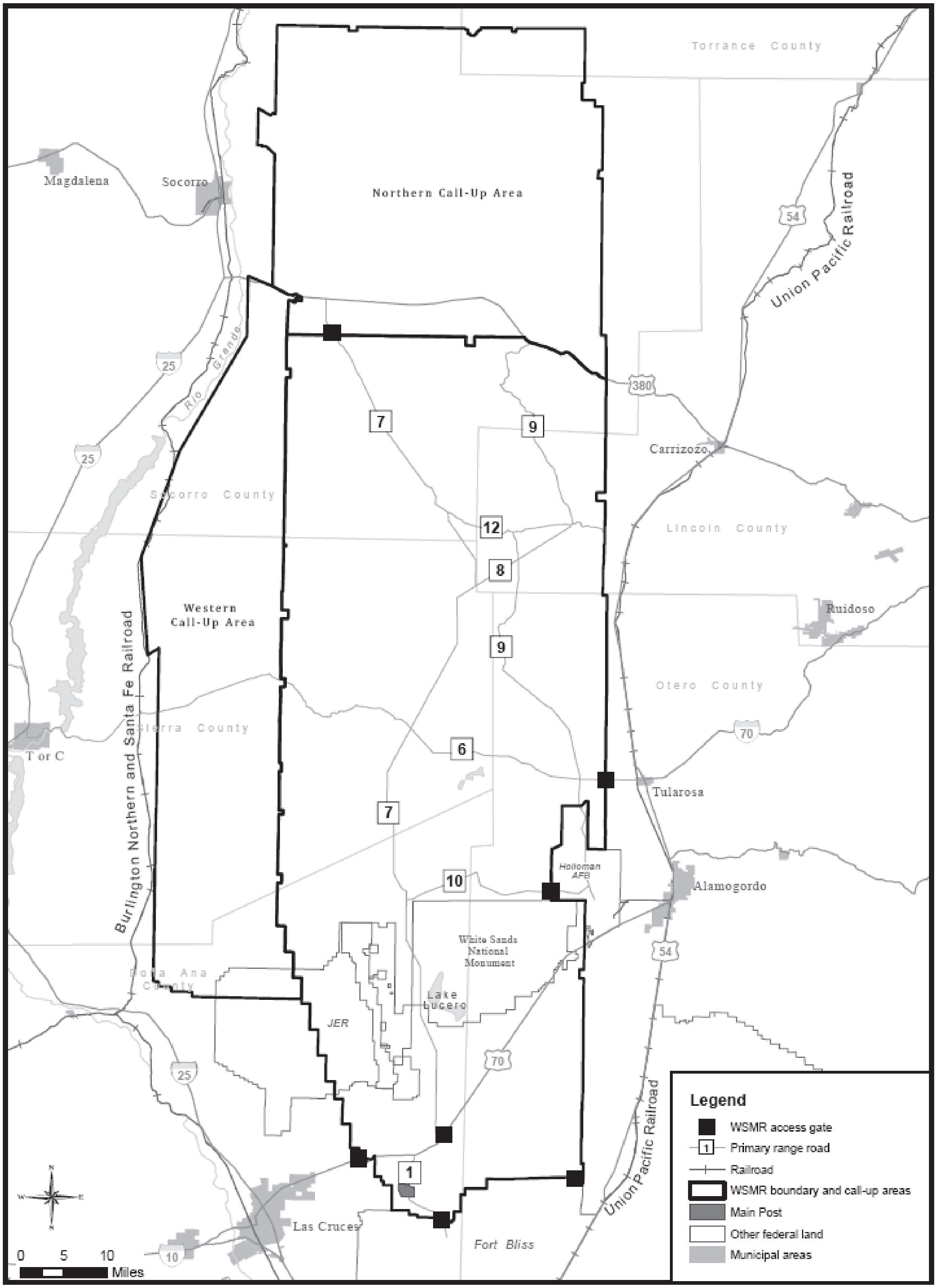


Figure 3.13-1. Roadway Network Surrounding WSMR

In 2003, Governor Bill Richardson signed into law the Governor Richardson's Investment Partnership - a $1.6 billion statewide transportation expansion and infrastructure improvement project that is supported by nearly 100 cities, counties, business groups and chambers of commerce across New Mexico (Ref# 157). Governor Richardson's Investment Partnership includes 42 expansion and critical infrastructure improvement projects with over 100 construction contracts across New Mexico. The following lists Governor Richardson's Investment Partnership projects that are relevant to the WSMR region (Ref# 157):

- Reconstruction and expansion of I-10 between Las Cruces and the Texas state line – this corridor is considered a major east coast to west coast route for transport of goods and services. This project comprises the reconstruction of existing lanes and expansion from a four-lane to a six-lane highway to accommodate high commuter and commercial traffic from El Paso. Estimated time of completion for this project is May 2011.
- Improvements to US 54 between Tularosa and Vaughn - this corridor is currently a two-lane facility with no shoulders, no passing zones and various deficient areas. The US 54 corridor is part of the Southwest Passage Initiative for Regional and Interstate Transportation Corridor extending from El Paso to Kansas City and is utilized by traffic generated by the North American Free Trade Agreement. Traffic largely comprises heavy commercial truck traffic and passenger cars with attached second vehicles in tow headed into Mexico. The proposed improvements include an enhanced two-lane (i.e., a two-lane road with periodic passing opportunities). Estimated time of completion for this project is May 2011.
- Reconstruction and improvements on Route 26 - this corridor is a major link between I-10 and I-25 and a vital link for economic development in New Mexico. Proposed improvements include replacement of existing pavement structure, construction of eight-foot widened shoulders, guardrail, and drainage structures. Estimated time of completion for this project is June 2010.

New Mexico's DOT Park and Ride service, which began in May 2003, is the fourth largest public transit operation in New Mexico, based on ridership numbers (Ref# 158). In June 2008, the average daily ridership increased by 40.8 percent to 1,880 passengers per day since its inception. Starting January 2006, New Mexico DOT began its Silver Route, which travels primarily on US 70 between New Mexico State University, Las Cruces, and WSMR. The service operates on weekdays, except for several holidays, with pick-up hours starting around 6 a.m. at Las Cruces and departure times from WSMR at 4:45 p.m. Monday through Thursday and at 3:45 p.m. on Friday (Ref# 159). Bus stops for the Park and Ride occur at several locations on WSMR, including the Las Cruces Gate and Headquarters.

3.13.3 WSMR ACCESS AND INTERIOR ROADS

3.13.3.1 WSMR Access and Entry Gates

Generally, access to WSMR from surrounding communities is direct and convenient on well-maintained highways. Between WSMR and Alamogordo (east of WSMR), US 70 is a straight and level road, where traffic is light and travel time to the Main Post is approximately one hour. The road was expanded to four lanes in 1959. Safety roadblocks, discussed later in this section, can cause delays of up to one hour on US 70 during missile testing. Between WSMR and Las Cruces (directly west of the Main Post), US 70 travels over the San Augustin Pass with speed limits averaging 60 miles per hour and travel time to the Main Post about 25 minutes. US 54 between WSMR and El Paso (south of WSMR) is accessible through the El Paso Gate with a connection to War Road. This route directs vehicles through the Fort Bliss range on a straight and well-maintained roadway.

There are seven primary access points onto WSMR: US 70 at the Las Cruces and Small Missile Range Gates; Range Road 1 at the El Paso Gate; US 380 at the Stallion Gate; US 54 at the Tularosa and Oro

Grande Gates; and Range Road 10 at the Holloman Gate. The Las Cruces and El Paso gates are the only two primary access control points providing ingress and egress to the Main Post area. The remaining gates are used for limited access with varying levels of security ranging from gates secured by lock and key to controlled access between WSMR and Holloman AFB (Ref# 152).

The Las Cruces and El Paso gates both serve the Main Post area, but are located on opposite ends of the area and serve traffic for different locations. The Las Cruces gate is the main access point to the Main Post and has traffic from US 70 that comes from Alamogordo and Las Cruces. US 70 also has roadways that feed from US 54, I-10 and I-25. This gate and the WSMR Visitor Control Center are located approximately three miles to the south from Owen Road. This entrance provides access onto Headquarters Avenue, which can be considered the main "signature boulevard" running north-south through the Main Post area. Up to 4,000 vehicles daily were reported entering the Las Cruces Gate (Ref# 013). The El Paso gate provides access to the Main Post from the south and can be accessed for traffic from El Paso, US 54, and I-10. This gate also allows access to personnel requiring access to Fort Bliss for training and/or mobilization. This gate is located off of Martin Luther King Boulevard, approximately 34 miles north from US 54.

Peak hours for the Las Cruces and El Paso gates are generally between 6 a.m. to 8 a.m. and 3:30 p.m. to 5 p.m., Monday through Friday (Ref# 160). Use in each direction during these peak hours is approximately 1,450 vehicles per hour at the Las Cruces gate and 900 vehicles per hour at the El Paso gate (Ref# 160). During the peak traffic hours, the current gate configurations are at or near capacity. The 2008 infrastructure study noted that the average traffic distribution was one percent motorbikes, one percent commercial trucks, and 98 percent Private Owned Vehicles (POVs). Also, it was observed that, in general, Soldiers stay on-post and, therefore, are not adding to peak period gate traffic (Ref# 013).

3.13.3.2 WSMR Installation-Wide Roadways and Tank Trails

WSMR maintains access to much of the range via a widespread network of primary and secondary range roads. Most areas within WSMR are connected via an extensive road network, with the exception of less accessible areas in the San Andres and Oscura Mountains. A road system within WSMR is of limited-access and is maintained, as funding permits, by WSMR (Ref# 001). The roadway system within the installation comprises 1,338 miles of major range roads, 596 miles of secondary roads, 1,490 miles of bladed trails, and an undetermined length of remote two-track four-wheeled-vehicle trails. The size, surface, and condition of these roads vary. Major range roads are two-lane roads with either paved or graded surfaces; all secondary roads are unpaved (Ref# 074). A network of tank trails is located south of the US 70. WSMR currently has 15,840 s.y. of tank trails, none of which are paved, except for minimal concrete tank crossings over asphalt roads (Ref# 152). Traffic levels on internal roads (excluding the Main Post area) vary between five and 50 vehicles per day (Ref# 074).

The major internal roads at WSMR are Range Road 1, Range Road 2, Range Road 6, and Range Road 7. Range Road 1, which extends in a north-south direction for approximately six miles, provides access to the Main Post area from the Las Cruces gate (via US 70) and from the El Paso gate. Range Road 2 traverses in an east-west direction from the Orogrande Range Camp to the Main Post area for about 20 miles. Range Road 6 extends in an east-west direction for 24 miles. Range Road 7 extends in a north-south direction from Stallion Range Center to the Small Missile Range for approximately 115 miles.

Tactical vehicle routes (tank trails) provide alternative access for armored vehicles and other vehicles and equipment utilized in combat readiness training. The tactical routes provide one-lane access for vehicles between motor pools and maneuvering areas. However, there are limitations on tank trail use as there are very few suitably constructed road crossings currently on WSMR.

3.13.3.3 Main Post Roadways and Parking

Primary roads at WSMR comprise all installation roads, including major range roads, and streets that serve as main distributing arteries for all traffic originating from within or outside of the installation. These roads carry the greatest traffic volumes. Primary roads typically have four lanes to permit the highest travel speed, and are intended to be continuous, through-traffic alignments that are relatively straight to best support moderate to heavy traffic. The primary four-lane roadway in the Main Post area is Headquarters Avenue. Equipped with a turning lane and a center lane dedicated to left-turn movement, this roadway runs north to south from the Las Cruces gate to the El Paso gate serving as the installation's main road. The only other primary road at the Main Post is Aberdeen Avenue, which supports east-west traffic flow, with four lanes at Hughes Road at the east side of the Main Post and reduced to two lanes before the physical fitness area in the west. Currently, there are no defined rush hours or traffic congestion on WSMR, except for congestion that occurs during the a.m. peak periods at the Main Post access control points (La Cruces and El Paso Gates). The primary access roads to the locations of the EN BN complex and proposed Future Development Area (proposed HBCT complex) are Watertown Avenue, Martin Luther King Avenue, and Hughes Street.

Secondary roadways generally provide traffic movement between primary and tertiary roads and typically connect primary roads to adjacent land use zones. The smaller volumes of traffic carried by these roads (compared to primary roads) permit slower design speeds to accommodate stop-and-go traffic. Examples of secondary roads at the Main Post include Ripley Street, Martin Luther King Boulevard, Picatinny Avenue and Rock Island Avenue. Tertiary roadways or residential roadways handle lower volumes of more localized traffic and on-street parking. These roadways mainly provide vehicular access to housing, individual facilities, parking areas, and service areas. Street lighting, walkway and bicycle lanes, signage and landscape planting are typically incorporated in the design. Lower speed limits are usually posted in these areas to the higher concentration of pedestrian traffic. Currently, most of the residential roadway network at the Main Post is closed to the public due to ongoing family housing construction (Ref# 152).

In April 2009 a draft traffic study was completed, which assessed the existing roadway system of the main cantonment area (Ref# 255). The study indicated that traffic flows on-post are essentially governed by the limitations of traffic flow through the two access control points. These access points effectively meter flow both into and out of the cantonment area. The study also analyzed existing levels of service (LOSs) at key unsignalized intersections for the peak hours (6:30 a.m. – 7:30 a.m. and 3:30 p.m. – 4:30 p.m.). The LOS scale ranges from A to F, where A represents the best operating conditions (free-flow conditions) and F is the worst (stop-and-go conditions). LOS A, B, and C are typically considered good operating conditions, while LOS D represents high density, but stable flow, and LOS E and F are considered unacceptable. The traffic analysis indicated that all study intersections are currently operating at acceptable LOSs during both peak hours (i.e., C or above).

Although quantity does not currently seem to be an issue, parking facilities at WSMR are generally considered to be in poor condition. Parking areas are generally run down, over-tarred, and cracked (Ref# 152). In addition, many parking areas have been eliminated due to the placement of temporary and permanent barriers to meet AT/FP standards. The main concern with these blocked-off parking areas would be a lack of maintenance within these abandoned parking areas. Inevitable cracking and general deterioration of the asphalt will have a negative impact to pedestrian circulation and building access.

3.13.4 HIGHWAY CLOSURES

Since 1946, WSMR has been setting safety roadblocks on US 70 and other local roads to protect motorists from debris during a test mission. A MOA with the State of New Mexico grants WSMR the authority to establish roadblocks on public roadways US 70, US 54, and US 380 as a safety precaution during missile tests (Ref# 161). Under the agreement, roadblocks on US 54 and US 70 may last approximately 60 minutes and, in cases of emergency, no longer than 80 minutes. On US 380 roadblocks may last approximately two hours. Per requirements stated in the agreement, WSMR must notify the State Highway Engineer at the New Mexico State Highway Department 48 hours prior to implementation of any such public roadblocks. The US 70 roadblocks are set at various points between White Sands National Monument and San Augustin Pass. The US 380 roadblocks are set east of the Rio Grande and west of Carrizozo. The US 54 roadblocks are set south of Orogrande and north of the New Mexico and Texas state line. During FY 2007, 32 highway closures occurred (22 for US 70 and 10 for US 380) (see Section 2.2.1.2.2). WSMR also establishes an average of five internal roadblocks per day. These roadblocks can occur anywhere on the main range and are from 2.5 to three hours in length (Ref# 001).

3.13.5 RAIL ACCESS

Two commercial railroad carriers service the project region – the Union Pacific/South Pacific and the Burlington Northern and Santa Fe provide service to El Paso. The Union Pacific/South Pacific provides direct service from El Paso to Fort Bliss and acts as a common carrier for the installation (Ref# 037). The Union Pacific/South Pacific has three lines in the El Paso area: the northeast track parallels US 54 and the west and southeast tracks parallel I-10. The Union Pacific/South Pacific operates and maintains 11 rail yards in the El Paso area.

The closest railhead to WSMR at Orogrande Range Camp on Fort Bliss has not been operational for many years (Ref# 152). The rail yards that are of particular importance to Fort Bliss are the Davis, Alfalfa and Stanton rail yards. All of these rail yards have storage and handling facilities to service hundreds of railcars. Fort Bliss provides a rail network that consists of approximately 15 miles of track and is primarily used for shipping and receiving tactical vehicles, ammunition, and other material. These tracks connect to the rail facilities at the western and southeastern post boundaries at Fort Bliss. To support the installation's activities, the Strategic Rail Corridor Network– a DoD-designated rail line system for the movement of essential military equipment to ports located around the country – is accessed through the main Union Pacific/South Pacific track running west to Tucson, Arizona and northeast along the western border of McGregor Range Camp to Alamogordo, New Mexico. Access from Fort Bliss to these Strategic Rail Corridor Network lines is coordinated through Union Pacific/South Pacific.

3.14 Socioeconomic Resources

Socioeconomic resources addressed in this section include population, economic development, housing, schools, community services, and quality of life. The ROI is defined as the geographical region within which most of the socioeconomic effects of actions at WSMR are likely to occur. These include the local jurisdictions where most consequences are expected.

The WSMR statistics for 2004 stated that 68 percent of the employees lived in Las Cruces or on the Main Post of WSMR (Doña Ana County), 17 percent lived in the El Paso area (El Paso County, Texas), nine percent lived in the Alamogordo area (Otero County); and six percent lived in other areas (Ref# 162). Where active duty personnel do not live on post they generally live within a reasonable commuting distance from the installation. Therefore, it is likely that increases in the number of active duty military will largely have an offsite impact to the nearby areas of Doña Ana County, most specifically in the Las Cruces area.

Consequently, the ROI for each of the resource areas addressed in this section is defined as:

- The three-county region of Doña Ana and Otero counties, New Mexico, and El Paso County, Texas for population and economic development;
- Portions of Doña Ana County within reasonable driving range for housing military personnel and their dependents, and the three-county region for housing civilian personnel and their dependents;
- Las Cruces Public School District for schools;
- Doña Ana County for law enforcement, fire protection, and medical services; and
- Doña Ana County for quality of life.

3.14.1 POPULATION

3.14.1.1 Region of Influence Population

From 1990 to 2007, the population in the three-county ROI increased by 217,541 persons or 27.9 percent, and had an average annual growth rate of 1.46 percent (Ref# 163). The annual growth rate has slowed in the ROI since 2000, with the exception of Las Cruces, which has increased its annual rate of growth over the previous decade. Populations in Doña Ana County and Las Cruces are growing faster than the overall rate of growth in New Mexico. In El Paso County, the population is growing less rapidly than the overall rate of growth in Texas. Populations in the ROI are shown in Table 3.14-1 (Ref# 022, 164).

The population in the three-county ROI in 2007 was approximately 997,000 persons, with 74 percent residing in El Paso County, 20 percent in Doña Ana County, and six percent in Otero County. The largest city in the ROI is El Paso, Texas. In El Paso County, 83 percent of the populace resided in the City of El Paso, with only three percent living in rural areas (Ref# 037). Las Cruces, which is in Doña Ana County, adjoins WSMR and had a population of approximately 90,000 persons in 2007, which is 45 percent of the county total, with another 20 percent living in rural areas (Ref# 037). Chaparral, an unincorporated area north of the City of El Paso and straddling the Doña Ana – Otero County border, had a 2006 population of approximately 6,100. Rural residents of Otero County account for 29 percent of the populace, with the City of Alamogordo being home to 57 percent of the county residents (Ref# 037).

Table 3.14-1. Region of Influence Population, 1990 – 2007

Area	Population		
	1990[1]	**2000[2]**	**2007[2]**
New Mexico	1,515,069	1,819,046	1,969,915
Doña Ana County	135,510	174,682	198,791
Las Cruces	62,126	74,267	89,722
Otero County	51,928	62,298	63,129
Texas	16,986,510	20,851,820	23,904,380
El Paso County	591,610	679,622	734,669
ROI	**779,048**	**916,602**	**996,589**

1. Ref# 164.
2. Ref# 163.

3.14.1.2 WSMR Related Population

WSMR's population includes civilian and military employees and their dependents, as well as contractors. During the period of 1990 – 1998, total employment at WSMR decreased by 38 percent to 6,020. Since 1998, employment has begun to rise slightly, increasing to 6,237 at an annual average rate of 0.6 percent from 1999 to 2004 (Ref# 162).

Total WSMR population includes both civilian and military dependents. According to Census 2000 data, the average household size in Doña Ana County was 2.85 persons (Ref# 022). Thus, this analysis assumes that for every government civilian/contractor there will be 1.4 dependents. The number of government civilian, contractor, and civilian/contractor dependents are estimated through 2008 using an annual growth rate equal to the annual rate for the years 1999 to 2004. These are also presented in Table 3.14-2.

Table 3.14-2. WSMR Employment and Population

	1999	**2002**	**2004**	**2006**	**2007**	**Change 1999 to 2007**
Civilian Employees	2,650	2,550	2,550	3,010	3,010	12%
Contractor Employees	3,010	3,150	3,220	2,500	2,500	-17%
Military Employees	370	510	460	420	440	2%
Civilian Dependents	7,920	7,980	9,090	7,710	7,710	-7%
Military Dependents	540	740	670	560	580	1%
Total Population Associated with WSMR	**14,490**	**14,930**	**15,990**	**14,200**	**14,240**	**-8%**

Sources: Employment figures 1999-2004 from Ref# 162; Employment estimates for 2006-2007 from Table 2.2-9.
Civilian dependents based on 1.4 dependents per employee; includes dependents of contractors (Ref# 037).
Military dependents = number of accompanied Soldiers + number of children = (0.58 * number of military) + (number of military * 0.48 *1.6). See Table 2.2-9.
Military transients, such as students, are not included in the Socioeconomic analysis. They are at White Sands Missile Range for a short period of time living on post, are unaccompanied, and spend almost all of their time in training, contributing little to the regional economy.

3.14.1.3 Population Projections

Population projections for New Mexico and its counties, including Doña Ana and Otero, are made by the Bureau of Business and Economic Research at the University of New Mexico in Albuquerque.

Population projections for Texas and its counties, including El Paso County, are made by the Office of the State Demographer, Institute for Demographic and Socioeconomic Research, at the University of Texas at San Antonio.

The State's projections from 2010 to 2030 are shown in Table 3.14-3. Doña Ana County is expected to grow faster than the State of New Mexico; and growth rates in El Paso County are expected to exceed those of the State of Texas.

Table 3.14-3. Population Projections, 2010 – 2030

Place	2010	2015	2020	2025	2030	Change 2010 to 2030
State of New Mexico	2,112,986	2,251,319	2,383,116	2,507,548	2,626,553	20%
Doña Ana County	218,523	238,044	255,057	270,761	286,741	24%
City of Las Cruces	91,621	99,806	106,939	113,524	120,224	24%
Otero County	67,018	68,896	70,508	71,981	73,348	9%
State of Texas	24,330,612	26,156,715	28,005,788	29,897,443	31,830,589	24%
City of El Paso	804,655	869,427	930,007	987,926	1,045,267	23%
ROI	**1,090,196**	**1,176,367**	**1,255,572**	**1,330,668**	**1,405,356**	**22%**

Source: Ref# 165, 166.

Table 3.14-4 presents population projections in the ROI for 2007 through 2013.

Table 3.14-4. Baseline Population Projections, 2007 – 2013

County	2007	2008	2009	2010	2011	2012	2013	Change 2007 to 2013
Doña Ana County	198,791	205,162	211,737	218,523	222,295	226,132	230,035	14%
El Paso County	734,669	757,294	780,615	804,655	817,211	829,964	842,915	13%
Otero County	63,129	64,400	65,696	67,018	67,389	67,763	68,139	7%
ROI	**996,589**	**1,026,856**	**1,058,048**	**1,090,196**	**1,106,895**	**1,123,859**	**1,141,089**	**13%**

1. Population projections for 2008 and 2009 use compound annual growth rate between 2007 (Table 3.14-1) and 2010 (Table 3.14-3).
2. Projections for 2011-2013 use compound annual growth rate between 2010 and 2015 (Table 3.14-3).
3. Compound annual growth rate - ⟦(Population in last year ÷ Population in first year)⟧^((1/number of years))-1

Source: Ref# 163, 165, 166.

3.14.2 ECONOMIC DEVELOPMENT

The three-county ROI is economically dominated by El Paso County. As shown in Tables 3.14-5 and 3.14-6, in 2006, 75 percent of employment and 75 percent of personal income in the ROI are attributed to El Paso County. The remaining personal income distribution in the ROI falls at 19 percent in Doña Ana County and six percent in Otero County. Table 3.14-5 shows baseline employment through 2006 and projections through 2013.

Table 3.14-5. Baseline Employment and Projections: 1990 – 2013 in the Region of Influence

Employment by Year	Doña Ana County	Otero County	City of El Paso	ROI	State of Texas	State of New Mexico
1990	58,156	25,322	269,744	353,222	9,304,146	767,139
2000	75,557	27,278	326,272	429,107	12,244,699	972,954
2006	89,681	29,106	358,334	477,121	13,514,130	1,099,401
2007	92,455	29,440	365,489	487,284	13,820,364	1,126,481
2008	95,314	29,777	372,788	497,663	14,133,538	1,154,228
2009	98,262	30,119	380,232	508,264	14,453,809	1,182,659
2010	101,301	30,464	387,825	519,090	14,781,337	1,211,790
2011	104,434	30,814	395,569	530,147	15,116,286	1,241,638
2012	107,664	31,167	403,468	541,439	15,458,826	1,272,222
2013	110,994	31,525	411,525	552,972	15,809,128	1,303,559
Compound Annual Growth Rate	**3.09**	**1.15**	**2.00**	**2.13**	**2.27**	**2.46**

1. Employment projections for 2007-2013 assume rates of growth for each area, are constant at the 2003 – 2006 compound average. See note for Table 3.14-4 for formula.

Source: Ref# 167, 168, 169, 170, 171.

Table 3.14-6. Total Personal Income

Year	Income (current dollars – millions)				Income (2008 dollars – millions)			
	Doña Ana County	Otero County	City of El Paso	ROI	Doña Ana County	Otero County	City of El Paso	ROI
1990	1,723	700	7,313	9,736	2,884	1,173	12,243	16,300
2000	3,120	1,054	12,650	16,824	3,965	1,339	16,074	21,378
2006	4,712	1,431	18,123	24,266	5,115	1,553	19,670	26,338

Source: Ref# 167, 168, 169, 170, 171.

Employment and personal income in the ROI has steadily increased since 1990, led by Doña Ana and El Paso counties. Employment gains in Otero County have been more sporadic. Total employment is up 15 percent from 1990 to 2006, with a less than 21 percent population gain during that period. Employment grew faster than the population in Doña Ana County, with a 54 percent gain in employment and a population gain of 43 percent. Likewise, employment gains outpaced population in El Paso County, 33 percent to 25 percent, respectively, over the 1990 to 2006 period. Employment projections to 2013 are made through assumption of a constant rate of growth equal to the average rate of change for each county and region during the period 2003-2006, as measured by the Bureau of Economic Analysis (Ref# 167, 168, 169, 170, 171).

Table 3.14-7 shows 2006 employment by key sector and the percentage of total employment for each sector by county and totals for the ROI. Government and government enterprises are the largest employment sector in the ROI, comprising 23 percent of total employment. State and local governments make up 68 percent of government employment. Other important sectors in the ROI and in each of the counties include retail trade, health care and social assistance, and accommodations and food services. These sectors account for 11.5, 10.6, and 7.1 percent of the employment in the ROI, respectively.

Table 3.14-7. Region of Influence Employment by Key Sectors in 2006

Employment by Key Sectors - 2006	Doña Ana County		Otero County		City of El Paso		ROI	
	Employment	Percent	Employment	Percent	Employment	Percent	Employment	Percent
Private non-farm employment	65,302	72.8	17,822	61.2	282,128	78.7	365,252	76.6
Government and government enterprises	21,520	24.0	10,655	36.6	75,308	21.0	107,483	22.5
Federal - civilian and military	4,191	4.7	5,725	19.7	24,378	6.8	34,294	7.2
State and local	17,329	19.3	4,930	16.9	50,930	14.2	73,189	15.3
Construction	6,786	7.6	2,070	7.1	20,391	5.7	29,247	6.1
Manufacturing	3,589	4.0	323	1.1	23,750	6.6	27,662	5.8
Wholesale trade	1,494	1.7	310	1.1	12,762	3.6	14,566	3.1
Retail trade	8,919	9.9	2,998	10.3	43,131	12.0	55,048	11.5
Transportation and warehousing	2,270	2.5	847	2.9	17,954	5.0	21,071	4.4
Administrative and waste services	3,354	3.7	1,434	4.9	27,119	7.6	31,907	6.7
Health care and social assistance	12,351	13.8	2,670	9.2	35,366	9.9	50,387	10.6
Accommodation and food services	6,211	6.9	1,810	6.2	26,008	7.3	34,029	7.1
Other services	9,775	10.9	2,753	9.5	39,148	10.9	51,676	10.8
Other non-farm employment	10,553	11.8	2,607	9.0	36,499	10.2	49,659	10.4

Percentages are of total employment for each county and the ROI. Table 3.14-5.
Source: Ref# 167, 168, 169

In 2002, the Institute for Policy and Economic Development of the University of Texas at El Paso prepared a report on the economic impact of the WSMR on the regional economy (Ref# 172). The region examined in that report was similar to the ROI examined for this EIS, differing only in that the Institute report included Socorro County, New Mexico. Excluding Socorro County from the EIS impact analysis does not change the applicability of the Institute report to the EIS socioeconomic ROI because the report found that only three percent of the WSMR economic impacts affected Socorro County "and other areas".

The Institute for Policy and Economic Development (IPED) reported that total annual personal income as a result of WSMR activities in the ROI was approximately $551 million, in 2002 dollars. This would be $670.2 million in 2008 dollars. The military portion of that total is calculated by multiplying the number of active duty military (508) by the difference between active military average Family income ($45,176 in 2002 dollars) and average allotments of pay sent out of the area ($10,175 – 2002 dollars). Total personal income of military personnel in the ROI in 2002, was $21.6 million in 2008 dollars. Civilian average Family income is $66,743 (2002 dollars) and total personal income for all WSMR civilian families was $414.3 million in 2008 dollars. Total Family personal income for WSMR personnel was $435.9 million in 2008 dollars, or about two percent of the total personal income in the ROI (see Table 3.14-6).

Local bank deposits in checking and savings accounts are a source of capital for loans and regional development. In 2002, these totaled $90,951,841 for WSMR personnel. These included $2,975,275 for active duty military (Ref# 172), an average of just under $5,900 per military member, which is approximately $7,100 in 2008 dollars.

Sales taxes collected by local governments as a result of WSMR-related employee purchases totaled $1,984, 376, as reported by IPED (2002). Of these, $103,489 were paid by military and their Families (Ref# 172), an average of $248 (2008 dollars). Civilian employees and their families paid the balance, an average of approximately $445 per family.

Finally, IPED estimated that in 2002, 65 percent of the region's economic impacts were allocated to Doña Ana County; 20 percent to El Paso County; 12 percent to Otero County; and as noted earlier, three percent to Socorro County and other areas (Ref# 172). IPED did not provide a breakdown of economic impacts associated with active military as opposed to civilian employees.

3.14.3 HOUSING

For this EIS, the ROI for housing of Soldiers and their Families is assumed to be those portions of Doña Ana County within a reasonable driving distance of WSMR. This assumption is based on a recent housing market analysis by Robert D. Niehaus, Inc., which was commissioned by the U.S. Army. The study included only "communities within a 45-minute commute of the installation's principal work areas" (Ref# 173). El Paso and Otero counties are too far away from WSMR principal work areas to be impacted by increases in the numbers of Soldiers and their Families. The ROI for Soldiers includes portions of Doña Ana County to the west and south of the Main Post, from Las Cruces to Chaparral.

The housing region restriction identified for military personnel does not apply to housing demands of civilians. Because the alternatives will increase populations in Otero and El Paso counties, the analysis will also examine the effects of changes in population of civilians in the three-county region of Doña Ana, Otero, and El Paso counties. This will be consistent with the fact that in 2004, 17 percent of persons affiliated with WSMR lived in the El Paso area and nine percent lived in Otero County in the Alamogordo area (Ref# 162).

The U.S. Census Bureau collects information on housing units, including type of housing, whether it is occupied by the owner or a renter, and how many units would be contained in a multi-unit structure.

From 1990 to 2000, the number of housing units in Doña Ana County increased from 49,148 to 65,210, an average annual increase of 2.9 percent. Owner occupied housing rose from 59 percent to 62 percent during that same period. In Otero County, the number of housing units increased from 23,177 to 29,272, an average annual increase of 2.4 percent. Owner occupied housing rose from 49 percent to 53 percent during that same period. In El Paso County, the number of housing units increased from 187,473 to 224,447, an average annual increase of 1.8 percent. Owner occupied housing rose from 56 percent to 60 percent during that same period (Ref# 037). In 2006, the total number of housing units was 355,000 (Ref# 022).

In 2006, the number of housing units in Doña Ana County was 74,654, an increase from 65,210 in 2000, an average annual increase of 2.3 percent. In 2006, the number of housing units in Otero and El Paso counties was 30,612 and 249,266, respectively (Ref# 022). These are increases from 2000 totals of 29,272 units in Otero County and 224,447 units in El Paso County. These increases are an average annual increase of 0.75 percent in Otero County and 1.76 percent in El Paso County. By 2013, applying these rates of growth to each county, the number of housing units is projected to total 401,317, an increase of 46,785 housing units in the ROI. Increases from 2006 to 2013 would be 12,761 in Doña Ana County; 32,379 in El Paso County; and 1,644 in Otero County.

A housing market analysis was completed in July 2008 by Robert D. Niehaus, Inc., for the U.S. Army, Office of the Assistant Chief of Staff for Installation Management. The analysis identified the following criteria to determine the "capacity of the area housing market to provide military personnel with housing meeting Army and DoD criteria for acceptability" (Ref# 173). There were four criteria:

- Location - Potential houses must be within a 45-minute drive;
- Affordability – Costs must be affordable based on pay grade and accompaniment status;
- Quality – Housing must meet or exceed standards for "decent, safe, and sanitary housing" and does not include mobile homes (Ref# 173); and
- Number of bedrooms – Proper number of bedrooms based on pay grade, number of dependents, and accompaniment status.

Within the market area, the off-post population in 2000 was 112,753, and grew to 131,217 in 2008 (Ref# 173), an annual average increase of 1.9 percent. Niehaus (Ref# 173) estimated that currently there are 54,597 housing units in the ROI, 50,050 of which are occupied; 64 percent (32,109) of the occupied units are occupied by the owner. The Niehaus Analysis estimated a total vacancy rate of 8.3 percent.

The relationship between military housing demand and availability of acceptable housing which meets DoD criteria for acceptability is discussed in the Niehaus report (Ref# 173). Currently, there are 447 total military (permanent-party) personnel at WSMR. Of these, 291 are military Families, 126 are unaccompanied personnel, 11 are military couples, and 19 are accounted as voluntary separations. Of the accompanied personnel, 133 currently reside in on-post family housing and 158 reside in off-post housing. Of the unaccompanied personnel, 93 are E5 (Sergeant) pay grade and below and are housed in on-post unaccompanied quarters. There are also 33 unaccompanied personnel living off-post. Niehaus identified a community housing shortage of seven acceptable units for unaccompanied personnel.

Based on the analysis of the availability of acceptable housing in the ROI, and based on the Army's position that housing should first be obtained on the local market, Niehaus states that there is a current market shortfall of 19 acceptable houses, off-post, in the market area. This off-post shortfall, when added to the 133 military personnel currently occupying on-post family housing, identifies an initial on-post housing requirement of 152 Family units. Because the current inventory of on-post family housing is 551 units, there is a current surplus of 399 on-post family housing units.

3.14.4 SCHOOLS

The ROI for schools is the Las Cruces Public School District, which includes the City of Las Cruces and the schools located on WSMR, White Sands Elementary and White Sands Middle School, combined into one school for grades 1 through 8, on the Main Post. The Las Cruces Public School District is designated as the ROI because it is the district which would gain most of the additional students which would be expected when the military presence at WSMR is increased under the Grow the Army and Transformation initiatives. Enrollment in the Las Cruces Public School District in 2007 was approximately 24,400 students. The District has 24 elementary schools, seven middle schools, three high schools, three charter schools, and one alternative high school (Ref# 174).

The Las Cruces Public School District is one of three school districts in Doña Ana County. Of the others, The Hatch School District had approximately 1,400 students in 2007. Hatch is to the northwest of Las Cruces and is outside the housing ROI, where most new families are expected to live. The Gadsden Independent School District had approximately 14,000 students in 2007. The Gadsden Independent School District overlaps with the housing ROI, although most of the Gadsden District is to the south and west of the housing ROI (Ref# 174).

The current enrollment on-post is approximately 300; 200 elementary and 100 middle school students. The capacity of the school, based on past usage, is approximately 700 students. High school enrollment is approximately 80 to 100. These students attend school off the Main Post (Ref# 175).

According to the Las Cruces Public School District, the District high schools are currently over-capacity. The current crowding and expected increases in enrollment, irrespective of any growth at WSMR, have spurred expansion plans for the School District. This expansion will include an elementary school in 2009, a middle school in 2010; and a new high school in 2011 (Ref# 176).

Federal impact aid is not sent directly to the School District. Instead, impact aid is sent to the state, which maintains approximately 90 percent for general funds. Only 10 percent of the impact aid is distributed from the state to schools (Ref# 175).

3.14.5 COMMUNITY SERVICES

The ROI for community services for this EIS is Doña Ana County. As discussed in the housing section, this is the area where newly transferred military personnel and their dependents are assumed to reside. Therefore, their impacts will be concentrated in Doña Ana County, primarily in the areas nearest WSMR. Except as otherwise noted, information in this section comes from the Vision 2040 Plan, Chapter 8, being developed by the City of Las Cruces and Doña Ana County (Ref# 174).

3.14.5.1 Law Enforcement

Within Doña Ana County, law enforcement services are provided by the county and by the four municipalities of Hatch, Las Cruces, Mesilla, and Sunland Park. In addition, Doña Ana County is part of District Four of the New Mexico State Police, which also provides law enforcement services. District Four includes Doña Ana County and parts of Sierra, Otero, and Grant counties.

The Doña Ana County Sheriff's Department's jurisdiction covers 3,800 square miles. In 2007, the department had 211 employees. Of these 143 were sworn officers, one was a temporary sworn officer, and 67 were civilians. The City of Las Cruces Police Department had a total of 252 employees in 2007, with 164 being sworn officers. The Hatch Police Department had seven police officers and a Police Chief. The Mesilla Police Department employed 12 persons, including nine sworn officers.

These governmental units have a total of 483 employees, including 323 sworn officers and civilians. This would present a ratio of 2.5 employees for every 1,000 inhabitants in Doña Ana County, including a ratio of 1.7 sworn officers per 1,000 residents. For Las Cruces, this would present a ratio of 2.9 employees for every 1,000 inhabitants. The Doña Ana Sheriff's Department has a target of two sworn officers per 1,000 county residents. The current ratio is only 0.73 sworn officers per 1,000 county residents, so the Sheriff's Department is understaffed according to its defined criteria. To be fully staffed, the Sheriff's Department would need to have a total of 388 sworn officers.

The New Mexico State Police District Four had 38 employees in 2007. Of those, 25 were sworn officers. In addition, there is an investigation Bureau which has three lieutenants, three sergeants, and 15 investigators.

On WSMR, the Directorate of Emergency Services is responsible for providing law enforcement and fire protection services. It is responsible for enforcing military and civilian laws, regulations and mandated directives. The WSMR police are DoD civilians.

The WSMR Police Department staffing levels are commensurate with base population and mission requirements. Mutual aid agreements are in place with other law enforcement agencies in the region.

3.14.5.2 Fire Protection

Like law enforcement, fire protection services are provided by the county and by the four municipalities of Hatch, Las Cruces, Mesilla, and Sunland Park. The services are provided by a mix of paid firefighters and volunteer firefighters.

Doña Ana County has six paid firefighters and 320 volunteer firefighters. The County Fire and Emergency Services has 26 paid employees. The County has mutual aid agreements with the City of Las Cruces, the municipalities of Mesilla and Sunland Park, and the NASA WSTF and WSMR.

The City of Las Cruces Fire Department operates seven fire stations. In 2008, there were 123 sworn personnel and five civilian support staff. Hatch has a volunteer fire department with between eight and 15 firefighters. Mesilla has 16 part-time, paid firefighters and two volunteer firefighters, and Sunland Park has 11 paid firefighters and 12 volunteer firefighters.

On a scale of 1 to 10 under its Public Protection Classification Program, with 1 being the highest rating, the Insurance Service Organization rates the 16 fire districts in Doña Ana County from Class 4 to Class 7. The City of Las Cruces has an Insurance Service Organization rating of 4, although the West Mesa/Airport area has a rating of 9. The Hatch, Mesilla, and Sunland Park Fire Departments have 2008 Public Protection Classification Program ratings of 8, 6, and 7, respectively (on a scale of 1 to 10 with 1 representing a program requiring the highest degree of fire protection equipment).

As stated above, the Directorate of Emergency Services is responsible for providing fire protection services on WSMR. The WSMR Fire Department has 74 DoD employees, organized into five companies; The Fire Chief is the fire protection official (Ref# 178, 179). Two companies are located at the Central Station on the Main Post. The others are individually assigned to the outstations at the Launch Complex, Laser Test Facility, and the Stallion Range. The Fire Department has a certified Hazardous Materials Team, a DoD certified mine rescue team, and a Wildland Fire Attack Team (Ref# 179).

The WSMR has mutual aid agreements with Doña Ana and Otero counties, the BLM, Fish and Wildlife Services, and NASA. It also has Inter-Service Support Agreements with Holloman Air Force Base and Fort Bliss (Ref# 179).

3.14.5.3 Medical Services

Medical services are provided by ambulance services, hospitals, and medical centers in the Doña Ana ROI.

3.14.5.3.1 Ambulance Services

A private ambulance company, American Medical Response (AMR), provides ambulance services within Doña Ana County and its municipalities. On WSMR, ambulance services at the Basic Life Support Services level are provided by the McAfee Health Clinic. By 2011, ambulance services will be provided by the Fire Department and will be upgraded to Advanced Life Support services (Ref# 179).

3.14.5.3.2 Hospitals and Medical Centers

The Memorial Medical Center Hospital is a privately run hospital in Las Cruces. With 280 beds, the hospital is run by Life Point Hospital, Inc., under a 40-year lease agreement with Doña Ana County and the City of Las Cruces. Memorial Medical Center is a full service, acute care facility with associated facilities located in Las Cruces.

A second private Las Cruces hospital, the Mountain View Regional Medical, has 168 beds and provides full service care. It is located next to the Mountain View Outpatient Surgery Center and the Medical Plaza. Both hospitals provide 24-hour emergency services.

In addition to the hospitals and their associated facilities, Doña Ana County has the following health clinics, all located in Las Cruces:

- Ben Archer Health Center;
- First Step Center for pediatrics;
- La Clínica de Familia Community Health Center; and
- St. Luke’s Health Clinic.

Doña Ana County is “designated as a Medically Underserved Area,” with the northern and southern areas “designated as Health Professional Shortage Areas (Ref# 174).

On WSMR, medical services are centered at the McAfee Health Clinic. The Clinic provides preventive medicine, health education and testing, with active duty military and resident Family members receiving priority for services. Emergency services for acute illnesses and accidents are provided with an emphasis on stabilization and transportation to full service hospitals (Ref# 180).

3.14.6 QUALITY OF LIFE

Quality of life is measured by more than having a job, access to medical care and putting food on the table. Communities strive to provide access to facilities which enable their citizens a place to recreate and relax and to pursue continuing education to enhance and improve their lives. This section discusses recreation and the availability of public parks, provision of public libraries, and institutions which provide an opportunity for higher education. The ROI for quality of life for this EIS is Doña Ana County. As discussed in the housing section, this is the area where newly transferred military personnel and their dependents are assumed to reside. Therefore, their impacts will be concentrated in Doña Ana County, primarily in the areas nearest WSMR. Unless otherwise stated, all information in this section comes from the Vision 2040 Plan, Chapters 3 and 8, being developed by the City of Las Cruces and Doña Ana County (Ref# 174, 181).

3.14.6.1 Recreation On-Post

The public is not permitted to access WSMR except by special permission due to the hazardous and potentially sensitive nature of many of the testing and training operations there. Recreational activities offered to the public include: hunting, public tours, and athletic events.

3.14.6.1.1 Hunting

WSMR and the NMDGF have conducted public big game hunts on the installation cooperatively since the late-1950s (Ref# 102). Big game species hunted include oryx and pronghorn antelope. Mule deer were hunted on WSMR historically, but have not been hunted in recent years due to dramatic population declines which began in the mid-1990s. Recreational hunting is authorized on WSMR only so long as it does not interfere with WSMR mission-related activities. To avoid conflict with military testing and training events, big game hunts are typically conducted on weekends and scheduled well in advance (Ref# 102), although small game hunting is allowed during non-mission days in accordance with New Mexico laws.

Big game hunt licenses are awarded using a lottery draw system and consist of the following types: once-in-a-lifetime, veteran, youth, oryx hunts, "security-badged" oryx hunts, and pronghorn hunts. Oryx hunts take place in several established hunt areas throughout the range. These hunts occur on non-duty days and are monitored by NMDGF and WSMR law enforcement patrols.

Once-in-a-lifetime oryx hunts may be granted to any applicant who is a US citizen while veteran-only hunts are limited to veterans of the ongoing wars in Iraq and Afghanistan. Oryx population reduction hunts and security-badged oryx hunts are escorted hunts with the express purpose of oryx population reduction. Security-badged oryx population reduction hunts are scheduled hunts which are primarily conducted in mountainous areas on and around the perimeter of hazardous areas. Security-badged oryx population reduction hunts are limited to individuals with long-term range security access and their qualified guests. These hunts may take place on any no-duty day during several designated months and occur in several specially designated areas and throughout the San Andres and Oscura Mountains. The pronghorn hunt is conducted annually in the Stallion area of the range. Small game hunts and cougar hunting are permitted on the range within the NMDGF designated hunting season and subject to NMDGF harvest quotas. Small game hunts are conducted in 11 areas which collectively cover the majority of WSMR.

Hunting is not considered to be incompatible with existing military operations on WSMR so long as the two activities are deconflicted through scheduling (Ref# 104). Vehicles travel along established roads and paths and hunters dismount to hunt. Off road travel is allowed for retrieval of the harvested game.

3.14.6.1.2 Public Tours

Public tours of the Trinity Site are offered biannually. The Trinity Site, which was the site of the first atomic bomb detonation in 1945, is a National Historic Landmark. In addition, White Sands National Monument provides guided tours of Lake Lucero approximately once per month.

3.14.6.1.3 Athletic Events

Athletic events held on WSMR include biking, running, and swimming races and the Bataan Memorial Death March. Several races are run per year and include duathlons and triathlons. The annual Bataan

Memorial Death March, first held in 1989, consists of a 26.2 mile trek through rugged terrain within WSMR. Participants number in the thousands and march to honor Bataan Death March survivors and for the athletic challenge.

3.14.6.1.4 Other Recreation

WSMR provides a variety of on-post recreational activities. The Community Center offers bingo and billiards, video rentals, and services including discounted theater tickets and travel arrangements. Adjacent to the Community Center is the Aquatic Center with an 82-foot pool and a children's pool. Bell Gym is open daily, offering fitness classes and equipment and recreational leagues in basketball, flag football, and golf. The Roadrunner Bowling Center is open Monday through Saturday. Outdoor recreational opportunities include the White Sands Golf Course, rated as "one of the best nine-hole courses in the Sun Country Section." The Outdoor Recreation Center rents camping and outdoor recreation equipment for a nominal fee and maintains the Volunteer Park Travel Camp Site (Ref# 182). The White Sands Missile Range Museum provides a historical look at the origins of America's space and missile programs and the beginnings of the atomic age. The adjoining missile park displays a number of missiles and rockets tested at White Sands. Recreational activities are also discussed in Sections 3.2.3.2 and 3.2.4.

3.14.6.2 Recreation and Parks Off-Post

The City of Las Cruces and Doña Ana County each have developed and maintained parks, recreational facilities, and trails for its citizens. The Facilities Department of the City of Las Cruces manages its parks, athletic fields, open spaces (including medians), and trails. The Doña Ana Facilities and Parks Department, part of the Public Works Department, manages the county's parks and facilities. In addition, there are parks and recreational facilities in Doña Ana County which have been developed and are maintained by the State of New Mexico and by Federal government agencies.

In December 2007, Las Cruces had 79 recreational facilities owned and operated by the City. These facilities covered 856 acres, and included athletic fields, parks, trails, and medians. Doña Ana County parks totaled 334 acres in 2007.

Chapter 3 of the Vision 2040 Plan compares the city-recommended acreage against the 2007 actual acreage to identify the surplus or deficiency of each type of recreational land use. Both the City of Las Cruces and Doña Ana County fall short of the recommended acreages of their parks (Ref# 181).

The State of New Mexico operates two state parks and one state monument within Doña Ana County. The Fort Selden State Monument (30 acres) and the Leasburg Dam State Park (293 acres) are both located a few miles north of Las Cruces. Both need additional staffing and additional protection for historic and cultural resources found in each site (Ref# 181). The Mesilla Valley Bosque State Park (307 acres) recently opened and is located along the west side of the Rio Grande River, just to the southwest of Las Cruces. Additional open spaces managed by the State of New Mexico include the Picacho Bosque Wildlife Management Area, Broad Canyon, and the Chihuahuan Desert Rangeland Research Center, comprising 47, 147, and 53 acres, respectively.

BLM-administered public lands adjacent to WSMR are open yearlong to a variety of uses including hunting, camping, hiking, bird watching, rock hounding, off-highway vehicle use, and mountain biking.

3.14.6.2.1 Libraries

Doña Ana County offers four public libraries. Three are currently operational: Thomas Branigan Public Library, Hatch Public Library, and Sunland Park Community Library. The Valley Public Library is expected to re-open in late 2008 (Ref# 174).

3.14.6.2.2 Higher Education

In addition to the public schools discussed earlier, higher education is offered in Doña Ana County through NMSU and Doña Ana Community College. Located in Las Cruces, NMSU had a 2006 enrollment of nearly 20,000 students, of whom approximately 3,200 are graduate students. The Doña Ana Community College has two campuses in Las Cruces and two Centers located in Anthony and Sunland Park, in the southern areas of the county (Ref# 174).

3.15 Environmental Justice

E.O. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that the Army make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. For this EIS, census data presented in the *Fort Bliss, Texas and New Mexico, Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement* (Ref# 037) were used to estimate the number of persons in minority populations and low-income populations living in areas that could potentially be affected by the Proposed Action and other alternatives. Unless otherwise noted, data in this section are from the Fort Bliss SEIS.

The ROI for Environmental Justice in this EIS is the three-county area comprised of Doña Ana and Otero counties in New Mexico, and El Paso County in Texas. Consistent with the Fort Bliss SEIS (Ref# 037), this EIS defines minority populations and low-income persons and populations as:

- Minority populations are those found in census areas containing all persons of Hispanic origin plus Blacks; American Indians, Eskimos, and Aleuts; and Asian or Pacific Islanders (without double-counting persons of Hispanic origin who are also contained in the latter groups), such that the number of minority persons equals or exceeds 50 percent.
- Low-income populations are those found in census areas where the percentage of persons determined by the U.S. Census Bureau to have incomes below the poverty level exceeds the regional average for persons so characterized. The 2000 Census determined that in 1999 a family of four with an income of $18,104 or less was in poverty. Different income levels were established for different family sizes and structures.

3.15.1 LOW-INCOME POPULATION

The number of persons determined to be low-income in the ROI in 1999 was 213,513, which was 23.8 percent of the total population of 897,128 persons for whom poverty status was determined by the U.S Census Bureau. In Doña Ana County, the percentage of low-income persons was 25.4 percent, or 43,054 persons of a population of 169,559 for whom poverty status was determined. In Otero County, the percentage of low-income persons was 19.3 percent, or 11,737 persons of a population of 158,722 for whom poverty status was determined. El Paso County had a percentage of low-income persons of 23.8 percent, or 158,722 persons of a County population of 666,676 for whom poverty status was determined (Ref# 183).

The Mescalero Apache Reservation is located in northeastern Otero County, with small, unpopulated portions also located in Lincoln County, New Mexico. A population of 3,156 persons lived on the reservation in 2000 and 35.7 percent of the reservation population was determined to have incomes below the poverty level (Ref# 037).

Within the ROI, there are 171 census tracts, of which 81 have a percentage of low-income persons greater than the ROI average of 23.8 percent. Of the 32 census tracts in Doña Ana County, 17 are identified as low-income populations. In Otero County, three of 13 census tracts are low-income populations, and in El Paso County, 61 of the 126 census tracts are low-income populations (Ref# 037).

3.15.2 MINORITY POPULATION

The number of minority persons in the ROI in 2000 was 709,651, which was 77.4 percent of the total population of 916,602 persons (Ref# 037).

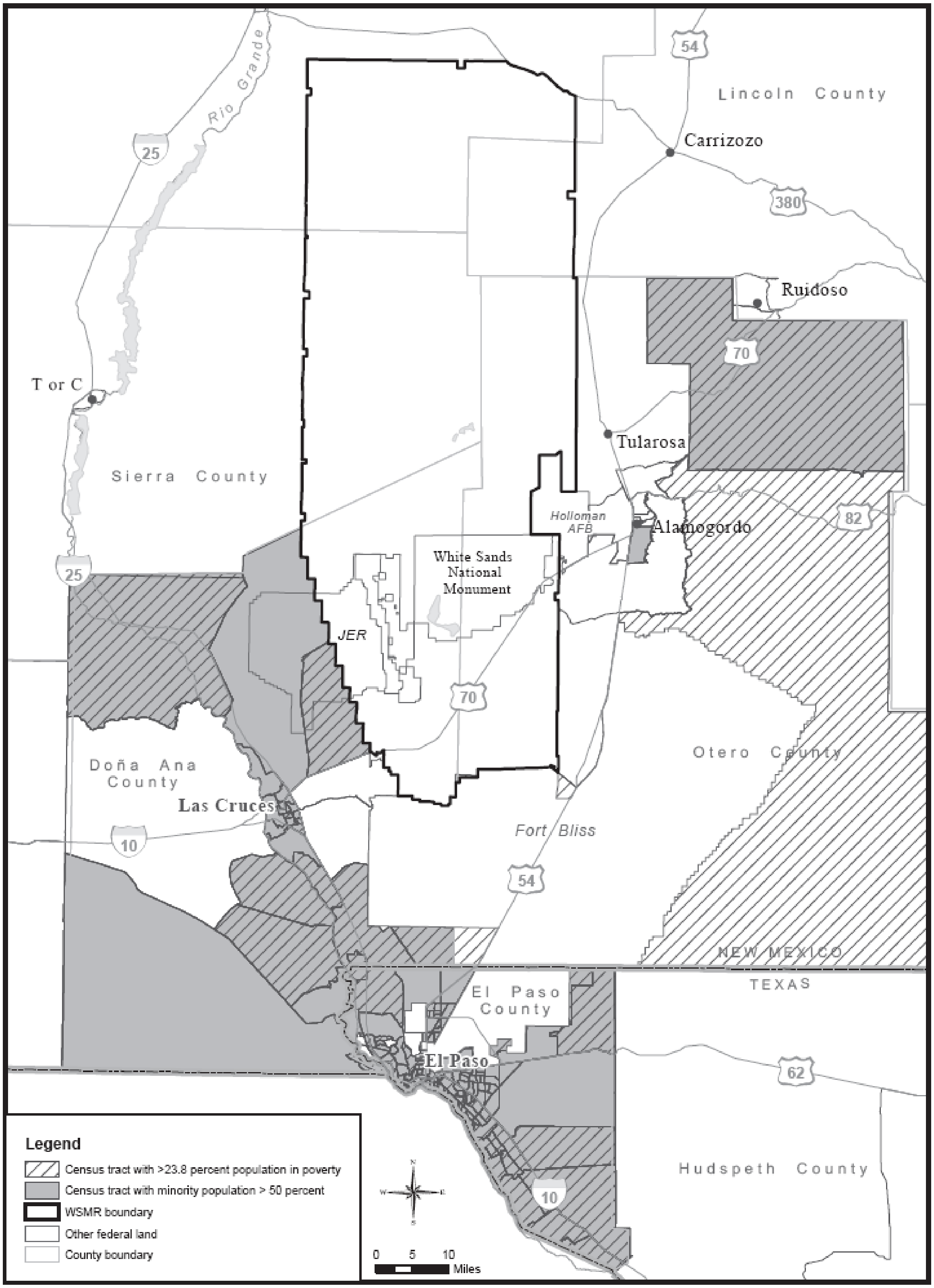
In Doña Ana County, the minority population was 117,994, which is 67.5 percent of the County population of 174,682 persons. Those who identified themselves as Hispanic or Latino totaled 110,665 persons, which is 63.4 percent of the County population. Black or African American persons were 2,723 persons, or 1.6 percent. American Indian and Alaskan Native persons totaled 2,580 persons, or 1.5 percent. Asians totaled 1,330 persons, or 0.8 percent. Native Hawaiian and Other Pacific Islanders were comprised of 117 persons, or 0.1 percent. A population of 43,209, or 24.7 percent of the population, identified themselves as some other race, and 6,245 persons, or 3.6 percent, identified themselves as being of two or more races. Many of the persons listed as Hispanic of Latino are also counted in the later categories. For the number and percentages of minority persons in this and the other counties and geographic areas, double counting is eliminated and persons are counted only once when computing the percentages and total number of minority persons in each geographic area (Ref# 037).

In Otero County, the minority population was 34,728, which is 44.3 percent of the County population of 62,298 persons. Those who identified themselves as Hispanic or Latino totaled 20,033 persons, which is 32.2 percent of the County population. Black or African American persons were 2,440 persons, or 3.9 percent. American Indian and Alaskan Native persons totaled 3,614 persons, or 5.8 percent. Asians totaled 728 persons, or 1.2 percent. Native Hawaiian and Other Pacific Islanders were comprised of 82 persons, or 0.1 percent. A population of 7,272 persons, or 11.7 percent, identified themselves as some other race, and 2,242 persons, or 3.6 percent, identified themselves as being of two or more races (Ref# 037).

On the Mescalero Apache Reservation in Otero County, 96.7 percent of the 2000 population of 3,156 persons was minorities (Ref# 037).

In El Paso County, the minority population was 564,087, which is 83.0 percent of the County population of 679,622 persons. Those who identified themselves as Hispanic or Latino totaled 531,654 persons, which is 78.2 percent of the County population. Black or African American persons were 20,809 persons, or 3.1 percent. American Indian and Alaskan Native persons totaled 5,559 persons, or 0.8 percent. Asians totaled 6,633 persons, or 1.0 percent. Native Hawaiian and Other Pacific Islanders were comprised of 669 persons, or 0.1 percent. A population of 121,721, or 17.9 percent of the population, identified themselves as some other race, and 21,652 persons, or 3.2 percent, identified themselves as being of two or more races (Ref# 037).

Figure 3.15-1 shows minority and low-income census tracts within the ROI. This graphic identifies census tracts where the percentage of minorities is greater than 50 percent (minority populations) and those tracts where the percentage of persons determined to be below the poverty level exceeds 23.8 percent (low income populations).



Source: Ref# 037

Figure 3.15-1. Minority and Low-Income Census Tracts within the Region of Influence

3.16 Energy

3.16.1 INTRODUCTION AND DESCRIPTION

Electricity and natural gas utilities are necessary to the mission at WSMR, and provide energy sources for operational and support facilities and residences within the installation. An extensive utility network supplies electricity and natural gas (see Section 3.12, Facilities and Infrastructure) to facilities situated throughout WSMR, with the highest concentration located within the Main Post.

3.16.2 ELECTRICITY

Electricity at WSMR is generated off-range and is supplied by local commercial utilities with several locations linked directly to distribution lines on the local power grid. El Paso Electric Company (EPEC) supplies approximately 93 percent of the electricity used at WSMR with additional supply provided by Otero Electric and Socorro Electric Cooperative (Ref# 184). Primary electrical service is provided by EPEC in the southern and central parts of WSMR and by Socorro Electric Cooperative to the northern part of WSMR and the Stallion Range Center.

Electricity is distributed onto WSMR by the following substations:

The LC-38 Substation (formerly called Army Launch Area Five) is owned by WSMR and is supplied by EPEC through a 115 kilovolt (kV) transmission line. This substation consists of two 5,000 kilovolt amperes (kVA) 115 to 12.47 kV power transformers and eight distribution circuit breakers. Distribution feeders two, three, six, seven, and eight serve various facilities in the lower range area from the ALA-5 Substation (Ref# 185).

The Main Substation (also referred to as the Las Cruces Substation) is a 115 to 34.5 kV substation owned and operated by EPEC (Ref# 152). It has two incoming 115 kV wood pole transmission lines, one owned by EPEC and the other by WSMR (which provides alternate power service from the Plains Electric Cooperative). WSMR owns and operates the low-side portion of the Main Substation. Seven distribution feeders exit the WSMR portion of the Main Substation and provide power service to the Main Post as well as other service areas (Ref# 185).

The SMR Substation is owned by WSMR and is a 12.47 to 24.16 kV transformation. SMR distributes up-range to midway of the range.

The Otero Electric Cooperative operates through the Alamogordo Substation.

The Sierra Electric Cooperative operates through the Cuchillo Substation near Truth or Consequences.

The Anti Missile Radar Army Defense Substation is owned and supplied by EPEC and receives 115 kV incoming voltage and transforms it to 12.47 kV. This substation feeds various facilities in the east and middle portions of the Missile Range Area (Ref# 185).

The Multifunction Array Radar Substation is owned and supplied by EPEC and receives 115 kV incoming voltage and transforms it to 4.16 kV. This substation feeds various facilities in the east and middle portions of the Missile Range Area (Ref# 185).

The Socorro Electric Cooperative operates through the Socorro Substation.

Maintenance and repair of the electrical distribution system is provided by the White Sands Directorate of Installation Support, Operations Division and a private contractor (Ref# 005, 185).

Electricity is distributed across WSMR by approximately four circuit miles of 115 kV overhead transmission lines, 153 circuit miles of overhead power distribution lines, 11 circuit miles of underground power distribution lines, and 12 circuit miles of overhead/underground street lighting circuits (Ref# 185). Mobile and remote operations use portable generators for power supply where no ground-based source is accessible. WSMR currently has over 300 portable diesel generators with outputs ranging from 10 to 700 kVA to remote sites (Ref# 005).

In 2007, the total quantity of electricity purchased by WSMR was 109,000 megawatt-hours (MWh) (Ref# 184). Off-range military dependents consume considerably less than this amount (Ref# 005). In the past four years, the highest peak power demand at WSMR has been 15.2 MVA (Ref# 152).

WSMR has the ability to purchase power from a number of suppliers. EPEC, which currently supplies about 93 percent of WSMR's power, has a total capacity of approximately 1,500 megawatts (MW) generated by six electrical generating facilities that it owns wholly or partially. In addition, EPEC has agreements in place to purchase power from other companies as required (Ref# 186). Assuming a load factor of 0.9568, WSMR's maximum peak load of 15.2 MVA would equate to 14.5 MW (Ref# 013). At peak consumption, WSMR consumes approximately 1.0 percent of EPEC's total power supply capacity.

Pursuant to the New Mexico Renewable Energy Act and NMAC 17.9.572, investor-owned utilities and rural electric cooperatives in New Mexico must demonstrate that a certain minimum percentage of their total annual energy sold was generated from renewable energy sources. Renewable energy sources allowable under these regulations include wind, solar, distributed generation, and other technologies. Investor-owned utilities, such as the El Paso Electric Company, are is required to supply six percent of its New Mexico energy sales from renewable sources through 2010, increasing to 10 percent by 2011, 15 percent by 2015, and 20 percent by 2020. Rural electrical cooperatives, such as the Otero, Socorro, and Sierra Electrical Cooperatives, must acquire no less than five percent of retail sales by 2015 and this minimum percentage will increase by one percent per year until 2020, when it will be 10 percent (Ref# 187).

As per the Energy Policy Act of 2005, Federal facilities must acquire or generate three percent or more of their total consumed energy from renewable sources in FY 2007-2009. This minimum percentage will increase to five percent between FY 2010 and 2012 and to 7.5 percent in FY 2013.

Construction of alternative energy generation facilities on WSMR and WSTF is currently under consideration. If alternative energy facilities were to be constructed, a larger percentage of WSMR's total power used could be expected to come from renewable sources.

3.16.3 NATURAL GAS

Natural gas is supplied to the Main Post for heating and other industrial and residential uses. Most of the facilities are heated by natural gas; however, facilities located away from the Main Post are supplied by tank-fed propane gas (Ref# 005). The Public Service Company of New Mexico supplies WSMR with natural gas through two high-pressure pipelines at 380 pounds per square inch gauge (Ref# 152). Delivery points include the Main Post, Northeast Line, Nike (Nike Avenue), and compressed natural gas stations (Ref# 188). The distribution line to WSMR enters the Main Post at Building 1794, where it is metered, reduced in pressure, and distributed. WSMR facilities outside of the Main Post use tank-fed propane gas for heating and other purposes. The highest maximum peak demand for natural gas within the past four years occurred in FY 2006 at 0.041 million cubic feet per hour (MCFH). The maximum gas supply capacity from the Public Services Company of New Mexico is currently 0.645 MCFH (Ref# 152).

3.17 Frequencies

3.17.1 INTRODUCTION AND DESCRIPTION

This section describes existing conditions related to frequency management, encroachment and interference issues affecting radio, radar, telemetry and other uses of the electromagnetic spectrum.

In order to maintain communication to all portions of the Range, WSMR has a complex communications system in place, which includes radio, standard telephone lines, coaxial communication lines, microwave equipment, and other forms of transmission. Nearly all test and training missions on WSMR require radio communication for safety and coordination purposes and therefore require mission-specific frequency allocation and deconfliction.

Section 3.17.2 describes the DoD, Army, and WSMR policies and procedures governing the use of radio frequencies (RF) in support of mission activities. Section 3.17.3 describes the current potential for interference with or conflicts between WSMR and other users of RF bands, and measures that WSMR utilizes to avoid RF encroachment and interference issues. Note that potential health effects of RF and other forms of radiation are discussed in Sections 3.9 and 4.9 of this EIS.

Radio Frequency encroachment refers to competing demands (i.e., between military and commercial or other civilian users) for radio frequency use within specific frequency spectrum and transmission areas.

3.17.2 DEPARTMENT OF DEFENSE AND ARMY FREQUENCY MANAGEMENT

The use of the electromagnetic frequency spectrum for military communication purposes is tightly controlled from the DoD level down to individual ranges and installations. Regulations outlining DoD and Army policy for RF communications management include, but are not limited to:

- DoD Directive 4650.1. Management and Use of the Radio Frequency Spectrum;
- DoD Directive 3222.3. Department of Defense Electromagnetic Compatibility Program;
- Army Regulation 5-12. Army Management of the Electromagnetic Spectrum;
- Range Commanders Council Publication 700-1. Frequency Management Guidelines for National and Service Test and Training Ranges;
- National Telecommunications and Information Administration - Manual of Regulations and Procedures for Federal Radio Frequency Management; and
- Combined Communications-Electronics Board Allied Communications Publications 190(C). Guide to Spectrum Management in Military Operations (applicable to joint operations among deployed member nations).

The DoD has established the Area Frequency Coordinator (AFC) system for National and Service-level Test and Training Ranges to ensure the successful operation of communication-electronics assets, provide rapid frequency coordination to minimize harmful interference, and maximize efficient radio spectrum frequency use by all military services. AFCs are responsible for establishing frequency coordination systems and processes at and between National and Service-level Test and Training Ranges.

Below the AFC level, a Range Frequency Manager (RFM) coordinates and grants access to electromagnetic spectrum resources at individual Ranges. RFM responsibilities include:

- Assigning specific frequency allocations, guidance and restrictions to range users;
- Ensuring all current and future range activities comply with Federal, civil, DoD, and local regulations on use of the electromagnetic spectrum and acquisition of spectrum-dependant equipment;
- Ensuring that range activities do not cause harmful interference to Federal Aviation Administration, civil public safety department, and other crucial civil communication systems;
- Maintaining liaison with and obtaining approvals from other local, regional, and national civilian frequency management offices for range activities.

Because spectrum availability for test and training is limited in many areas, most military ranges require frequency scheduling on a priority basis. This often requires coordination between the local range scheduling office, the RFM, and the local and adjacent AFCs (Ref# 189).

At WSMR, the Cox Range Control Center is the designated scheduling agency for test and training missions on a range-wide basis. This office has responsibility for reviewing all uses to ensure non-interference between range instrumentation radars and responders and test operations. All WSMR range users are required to obtain Radio Frequency Authorizations for all radiation producing equipment and activities, and to coordinate with Range Scheduling (Ref# 005).

It is important to note that frequency spectrum management at the national level ultimately falls under the control of the Department of Commerce, and the DoD is one of more than 20 other Federal agencies seeking frequency access. Thus, the DoD and its military services do not have ultimate authority over any part of the electromagnetic spectrum, and in certain cases can be denied access for technical or legal reasons (Ref# 189).

3.17.3 FREQUENCY SPECTRUM, ENCROACHMENT AND INTERFERENCE

As described in Section 3.17.2 above, WSMR is subject to a series of regulations governing the use of the electromagnetic spectrum. WSMR is committed to complying with all applicable regulations, thereby ensuring adequate communication ability during test and training activities, and preventing interference with other military and civilian communication networks.

WSMR provides communication service and infrastructure to range users including air-to-ground communications, ground communications, secure communications, data-timing systems, and frequency control and analysis (Ref# 040).

Air-to-ground communications at WSMR consist of radio guidance and control for command and destruct missions, which is limited to the 406- to 550-megahertz (MHz) frequency band, and aircraft communications using discrete frequencies within both the very high frequency and ultra-high frequency bands, specifically the 225- to 399.9- MHz range. Ground communications at WSMR consist of intercom units (using 115-Volts-Alternating-Current), temporary ground communications using portable radios issued on a mission-by-mission basis, and permanent ground communications involving extended and exclusive use of a frequency channel (Ref# 001).

WSMR performs frequency surveillance, evaluation, and radiation analysis and controls the use of all radio frequencies on WSMR. All frequencies used in connection with range missions are constantly monitored and frequency scheduling is performed daily. Transmitter, receiver, and antenna frequency spectrum usage and electromagnetic propagation are analyzed to develop interference tolerances, interference reduction and prevention programs, and to identify radiation hazard distances from emitters. WSMR provides frequency surveillance (both fixed and mobile) in a 150-mile radius of WSMR, as well as in portions of Colorado and Utah (Ref# 126). There are seven fixed radio surveillance sites with four on-range locations (Sacramento Peak, Holloman AFB, south range launch sites, and north range Small Missile Range) and three off-range locations (McGregor Range, Fort Bliss, and Kirtland AFB). WSMR has had a historic presence at Kirtland AFB in support of the fixed radio surveillance program, but due to funding priorities WSMR may no longer support the Kirtland program. WSMR also has a mobile team that can provide surveillance support in geographic areas not adequately covered by fixed sites (Ref# 001).

WSMR also conducts a number of test and training activities which emit electromagnetic signals with the potential to disrupt RF communications or cause harmful interference to electronic equipment on and off the installation if not properly managed. For example, the 746th Test Squadron from Holloman AFB conducts an array of GPS Interference Programs at WSMR, which range from jamming to validation of both military and civilian navigation systems, as well as testing of other electronic warfare equipment.

> **Electromagnetic interference** refers to any electromagnetic disturbance that interrupts, obstructs, or otherwise limits the performance of electronics or electronic equipment. **Harmful interference** is interference that endangers the functioning of radio navigation services or other safety devices, or regularly interrupts authorized radio communication services.

It is WSMR policy to comply with all applicable regulations regarding electromagnetic interference, and to limit interference with adjacent land uses where and when at all feasible. For activities such as GPS and RF jamming with a potential for harmful interference (or public safety hazards), WSMR will strive to confine the activity to restricted airspace and operate within existing agreements. WSMR will attempt to modify activity elements such as the signal frequency, strength, and/or transmission angle to restrict the potential for harmful interference with the WSMR boundaries. In the event that an activity can result in harmful interference off-range which cannot otherwise be mitigated, WSMR will undertake additional protective measures such as highway closures to ensure that civil organizations and the public are not endangered. WSMR analyzes the potential for electromagnetic interference on a project-specific and ongoing basis. Despite these preventive efforts, it is still possible for WSMR activities to occasionally interfere with certain civilian activities. For example, the National Radio Astronomy Observatory noted in a 2007 study that WSMR aeronautical telemetry transmissions (frequencies between 1435 and 1530 MHz) do occasionally interfere with Observation activities (Ref# 190).

WSMR test and training activities generally do not pose an interference threat to civilian air traffic control (ATC) radar systems. ATC radars generally operate in the 2,000 – 5,000 MHz range, not within the frequencies affected by most WSMR emissions, including those from restricted radar use. WSMR restricts emissions to narrow frequency bands that do not affect ATC radar, in accordance with distance and frequency requirements specified in WSMR SOPs, the National Telecommunications and Information Administration "Manual of Regulations and Procedures for Federal Radio Frequency Management", and MOA with the Federal Aviation Administration (Ref# 191).

3.18 Wildland Fire

This section addresses wildland fire conditions, prevention, and control within WSMR. The ROI for wildland fire includes ignitable sources and wildfire fuels located within WSMR's boundaries.

Fire is a natural part of most Chihuahuan desert ecosystems, and most native species and habitats have adapted to fire (Ref# 192, 193, 194). Fire can have beneficial impacts including maintaining and improving wildlife habitat, and improving and maintaining ecosystem health and function. However, negative effects from wildland fire can occur. Effects of fires on biological, physical, and human resources will depend on the fire severity and the extent of the fire. Primary effects on biological resources from fires may include loss of vegetative cover and resulting increase in erosion and soil instability, mortality of vegetation, and temporary or permanent loss of wildlife habitat and forage (Ref# 192, 193). Effects on humans may include loss of life and property, financial costs of suppression efforts, health and safety issues with regard to smoke, and temporary inconvenience to travel, daily activities, or interference with mission activities.

3.18.1 FIRE MANAGEMENT

Wildland fire management on WSMR is the responsibility of the Environmental Division, Fire and Emergency Services Division. The WSMR Fire Chief has control over all fire fighting activities, including deployment of equipment and resources. In the event that outside assistance is needed, the Fire Chief can request assistance from the BLM, USFWS, United States Forest Service, or local fire departments.

In addition, WSMR has a formal MOA with SANWR to provide fire suppression and prescribed burning support when needed (Ref# 195). WSMR also has a mutual agreements with NASA (Ref# 196), BLM (Ref# 197), the City of Socorro (Ref# 198), and JER to provide fire protection or suppression services (Ref# 193).

WSMR has four fire stations on the installation located on Main Post, Stallion Range, HELSTF, and Nike Road (Ref# 199). WSMR Fire Department has specific procedures for notifying the White Sands Communication Center and the Range Directorate in the event of a fire in order to respond safely and to prevent further impact to mission activities (Ref# 193). The WSMR Fire Department provides mission standbys for potentially fire starting missions in order to provide quick and efficient response to any wildland fires that do start. The Fire Chief also has authority to restrict potentially fire starting missions on high fire danger days, if deemed necessary and appropriate.

Guidance for the WSMR wildland fire program is provided by a variety of Federal and DoD policies and guidelines, the most notable of which are listed in Appendix B. Further direction for wildland fire management at WSMR is outlined in the Integrated Wildland Fire Management Plan (Ref# 193) and the Strategic Wildland Fire Planning Guide (Ref# 200). The Integrated Wildland Fire Management Plan lays out the objectives for the program, presents background information on wildland fire specific to WSMR and the region, and provides approaches for implementing these objectives. Primary goals for the wildland fire program at WSMR include reducing the risk of catastrophic wildfires and providing for the safety of firefighters and the public, protecting the military mission from delay or loss of capacity, improving and maintaining ecosystem function, and improving wildlife habitat (Ref# 193). The Strategic Wildland Fire Planning Guide provides short and long-term operational direction on how to implement the Integrated Wildland Fire Management Plan.

The plan delineates fire management units on WSMR based on three scales, which have similar vegetative communities, share management and logistical constraints, and/or are bounded by natural or artificial boundaries such as roads and drainages. The broadest scale is the Fire Management Areas (FMAs), with Fire Management Zones (FMZs) within these, and lastly, Burn Units have been created as a planning tool for prescribed burns (Ref# 193).

WSMR utilizes a variety of tools for managing wildland fire on the installation. In the past, fire management strictly adhered to direct fire suppression tactics. WSMR has now adopted a "let burn" policy in situations where fires pose no threat to public safety or the mission, and are not harming any resources. WSMR has also used prescribed burning and mechanical fuel treatments in order to restore ecosystem integrity and reduce the risk of catastrophic wildfires (Ref# 193).

3.18.2 WILDLAND FIRE ENVIRONMENT

Historically, fire has been a natural part of the Chihuahuan Desert ecosystems, but fire regimes have been altered in the past decades due to fire suppression and changes in land uses such as grazing. Fire suppression, in addition to drought and grazing, in semi-desert grasslands in particular, has contributed to shrubland invasion and degradation. An increase in fuel loading in higher elevation ecosystems such as ponderosa pine and juniper woodlands has also resulted from fire suppression (Ref# 192, 193).

Wildland fire conditions are affected by many variable factors, including weather, topography, and fuel conditions. Details of the regional climate are discussed in Section 3.4 (Air Quality), topography is described further in Section 3.6 (Earth Sciences), and primary vegetation types are discussed in Section 3.7.3 (Vegetation). The Integrated Wildland Fire Management Plan and other documents outline in more detail the fuel characteristics and the wildland fire environment specific to WSMR (Ref# 192, 193). In general, the majority of fires in southern New Mexico occur from May to July due to higher temperatures and lower relative humidity. Years of high fire occurrences in the southwest have historically corresponded with La Niña years. Prevailing winds throughout the year are generally from the west, with the exception of July and August when winds come from a southerly direction, contributing to the formation of summer monsoons.

The terrain on WSMR is varied and includes steep slopes, footslopes, rolling hills, and flats. Fuels are also diverse and range from continuous fine fuels in the grasslands, to patchy shrublands, to heavier fuels in the woodland areas. One area in particular on WSMR that has a high fuel loading and high potential for a catastrophic wildfire is pinyon juniper woodland, approximately 34,000 acres in size, in the Oscura Mountains (Ref# 192, 193).

3.18.3 FIRE HISTORY ON WSMR

Little data is available on wildland fires on WSMR prior to 1992; however, post-1992 data indicates, that the majority of documented wildland fires were mission caused, with the month of June seeing the highest incidence of wildland fires. From 1999 to 2005, WSMR has averaged 13 wildland fires per year, with 70 percent of those being mission related, 22 percent caused by roadside or unknown ignitions, and the remaining eight percent caused by lightning (Ref# 192, 201). To date, no fires have caused any damage to infrastructure, and no fires have gone off the installation (Ref# 202).

WSMR and the SANWR (within WSMR boundaries), have conducted prescribed burns for the purpose of decreasing wildland fire risk, improving ecosystem function, and improving wildlife habitat (Ref# 193). WSMR has conducted fewer than 10 burns in the last 12 years (Ref# 193). SANWR conducts at least one prescribed burn a year from 1,500 to 44,000 acres, some of which cross the refuge boundary and burns within the installation (Ref# 203).

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4.0 ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

4.1 Introduction

This chapter presents the direct and indirect effects or impacts of implementing each of the three alternatives described in Chapter 2: the No Action Alternative, Alternative 1, and Alternative 2. The findings are organized by the resource topics presented in Chapter 3. Each section in this chapter is organized in the same manner, beginning with a description of the methodology used to assess potential impacts for that resource. The region of influence, technical approach, and the factors used to determine the significance of impacts are also discussed.

The environmental impacts have been determined using the criteria in the Army NEPA Guidance Manual 2007 (Ref# 007).

Direct impacts are caused by the action taken and occur at the same time and place. Examples include habitat destruction, soil disturbance, air emissions, and water use.

Indirect impacts are caused by the action taken and occur later in time or are farther removed in distance from the action. Examples include surface-water quality changes resulting from soil erosion, and reductions in productivity resulting from changes in soil temperature.

4.1.1 CHARACTERIZATION OF POTENTIAL IMPACTS

Where possible, potential impacts associated with each of the alternatives have been quantified. In a number of cases (such as the analysis of impacts to aesthetic resources), it is not possible to quantify impacts and a qualitative assessment of potential impacts is presented. The following descriptors are used qualitatively to characterize impacts where quantification of impacts is not practical:

- ***Beneficial*** – Impacts would benefit the resource/issue.
- ***None*** – No measurable impacts are expected to occur.
- ***Minor*** – Short term but measurable adverse impacts are expected. The action may have slight impact on the resource.
- ***Moderate*** – Noticeable adverse impacts that would have a measurable effect on a resource and are not short term are expected to occur.
- ***Significant impact mitigable to less than significant*** – Obvious adverse impacts, both short term and long term would occur, and would have serious consequences on a resource. These impacts would be considered significant. When mitigation measures are applied; however, the impact would be reduced to moderate, minor, or none.
- ***Significant impact*** – Clearly noticeable environmental effects would occur and would be sufficient in magnitude to destabilize important attributes of the resource. Mitigation to less than significant impacts would not be possible.

Context and intensity are taken into consideration in determining a potential impact's significance, as defined in 40 CFR Part 1508.27. The context of an impact takes into account the ROI, the affected interests, and the locality. The intensity of a potential impact refers to the impact's severity and duration and includes consideration of: beneficial and adverse impacts; the level of controversy associated with a project's impacts on human health; whether the action establishes a precedent for future actions with significant effects; the level of uncertainty about project impacts; or whether the action threatens to violate Federal, State, or local law requirements imposed for protection of the environment.

4.1.2 APPROACH FOR ANALYZING IMPACTS

Each resource topic examines the potential impacts of the following: changes in range capabilities (e.g., changes in land use and activities, additional range infrastructure, and specialized areas); the implementation of HBCT (or comparable unit) stationing; and the potential use of the Southeast Multi-Use Area for off-road maneuver training.

As discussed in Chapter 2, WSMR has a mature environmental program and review process for new customer requirements. A list of WSMR's mandatory coordination/review processes and management practices are provided in Section 2.5. These processes include, but are not limited to, siting approval; NEPA documentation (tiered as appropriate); Archaeological review (or survey); UXO review (or survey); development of test plans and SOPs; safety reviews; airspace scheduling; frequency coordination; and personnel evacuation/road closure requirements. These basic management practices allow WSMR to avoid or minimize impacts to human health and the environment at the outset of a project or program. Each resource section may also describe additional resource-specific management practices WSMR would reasonably undertake as part of the Proposed Action to avoid or minimize adverse impacts.

Impacts of activities are discussed under three general headings (or Activity Classes):

- Ground Operations (e.g., On-Road Vehicle Use, Off-Road Vehicle Use, Dismounted Operations, and Field Operations)
- Hazardous Operations (e.g., Surface Weapons Firing, Airborne Weapons/Munitions Release [with or without evacuation], Directed Energy Systems, Weapons Impact, SDZ, and Airspace Danger Zone)
- Air Operations (e.g., Air Vehicle Operations)

The levels of use for these activities, as described in Chapter 2, provide a bounding case in terms of duration and intensity, although the specific locations for these activities have not been determined. Therefore, the impacts are provided in a programmatic fashion. Furthermore, the proposed expansion of range centers, development of range infrastructure and creation of new Specialized Areas are analyzed programmatically as their locations have not yet been determined. These elements would be further analyzed in future project-specific NEPA documents (at an appropriate level of analysis) once their proposed locations and details are further developed. Therefore, this EIS provides information on the general types of impacts that could occur that would aid in the tiering process (see Section 1.7).

The proposed location of the Future Development Area (potential HBCT complex), depicted in Figure 2.3-2, provides the basis for analysis in this EIS, although specific locations of buildings within the area have not been developed. WSMR would determine if further environmental review would be warranted in the future once these specific building locations become clearer.

4.1.3 MEASURES FOR REDUCING IMPACTS

Each resource section describes strategies for reducing resource-specific impacts associated with Alternative 1 and 2. First, a list of potential management practices is provided that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Secondly, a description of recommended management actions are provided that would aid WSMR in administering the mitigation measures described in the EIS or streamline its environmental management of future activities. These actions themselves are not mitigation measures, but would strengthen the process for implementing these types of measures. They include but are not limited to:

- Updating existing environmental and safety plans to reflect the outcome and land use changes proposed in this EIS;
- Developing or revising coordination processes or SOPs;
- Developing or enhancing environmental awareness programs; and
- Requesting additional resources (funding or manpower) to implement environmental strategies.

Lastly, descriptions of potential mitigation measures are provided that avoid or minimize adverse impacts under each action alternative. Based on these, WSMR would identify the mitigation measures it would commit to in the ROD of this EIS.

4.2 Land Use and Aesthetics

This section evaluates the impacts to Land Use and Visual Resources by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.2.1 IMPACT METHODOLOGY

Impacts to land use were assessed by comparing the compatibility of proposed land uses with existing land uses. Compatibility is defined here as the ability for two land uses to co-exist without significant conflict. For example, residential neighborhoods are considered incompatible with high aircraft noise levels. Smoke, dust, and safety considerations are also factors in assessing the compatibility of a proposed land use with existing co-located or adjacent land uses. Frequently, compatibility between two land uses exists in varying degrees based on frequency, duration, and intensity of the action.

Impacts to visual resources were assessed by determining the relative amount of viewshed alterations that would result from the implementation of the alternatives to defined Areas of Aesthetic Concern and Public Roads and Highways (as described in Section 3.2.5).

4.2.1.1 Region of Influence

The ROI for Land Use and Visual Resources includes WSMR, WSMR call-up areas, areas beneath WSMR Restricted Area airspace, remote sites operated by WSMR, and areas located on and off WSMR that may be viewed by the public. The cities of Las Cruces and Alamogordo are considered part of the land use ROI, because land use patterns in these cities may be affected by proposed personnel increases. In order to facilitate the analysis of visual resources within WSMR, the ROI has been divided into two major public view categories: Areas of Aesthetic Concern and Public Roads and Highways.

4.2.1.2 Technical Approach

Data was obtained from a variety of reference documents to determine potential impacts to Land Use and Visual Resources under each alternative.

Potential compatibility issues exist between current land uses and components of Alternative 1, Alternative 2, and the No Action Alternative. Changes in land use are quantified based on the amount of area affected. Compatibility issues considered include exclusionary factors, such as safety buffers, and nuisance factors, such as noise, dust, and smoke generated by the proposed activity. Exclusionary factors associated with a proposed land use are those factors that fully exclude certain other land uses. Nuisance factors have the potential to cause annoyance or reduced efficiency for adjacent land users. The compatibility of a particular land use with surrounding land uses is determined based on its impacts to several resource areas. Factors with a high degree of relevance to land use are discussed in detail in Section 4.6, Earth Sciences (dust and excessive erosion as nuisance factors), Section 4.9, Safety (SDZs and UXO impacts on land use), and Section 4.10, Noise (a nuisance factor). Impacts to these resource areas are discussed briefly in this section.

WSMR follows established planning and coordination procedures when making land use decisions (see Section 3.2.2). All siting of facilities and activities on WSMR must be made in compliance with AR 210-20, AR 350-19, and other applicable regulations. The internal review and coordination process identifies environmental, safety-related, and other constraints and those issues are resolved prior to activity initiation. Because this internal planning and coordination process is in place, compatibility of individual WSMR missions with one another are not analyzed to a high degree of detail.

In order to identify potential impacts of the alternatives on visual resources, Areas of Aesthetic Concern and public roads and highways were identified as potential areas where the public may be able to view portions of WSMR and where the aesthetic value of the landscape is important. Potential land use and activities changes proposed under the alternatives were evaluated to determine if they could adversely affect the visual environment in these locations.

4.2.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to land include:

- The severity of the land use conflict. For example, as per AR 385-63, non-participants are absolutely prohibited from entering SDZs. Less severe compatibility issues include nuisance factors such as noise, dust, and smoke;
- The frequency of the land use conflict; and
- The capacity to avoid land use conflicts through scheduling.

The criteria to evaluate the significance of potential impacts to visual resources include:

- Introduce physical features that are substantially out of character with adjacent developed areas; and
- Alter a site so that a sensitive viewing point or vista is obstructed or adversely affected, or if the scale or degree of change appears as a substantial, obvious, or disharmonious modification of the overall view.

4.2.2 NO ACTION ALTERNATIVE

4.2.2.1 Range Capabilities and Use

Under the No Action Alternative, ongoing test and training operations would continue and several new, previously analyzed actions would be initiated, as described in Section 2.2.

4.2.2.2 Main Post and Population Effects

The *Final Environmental Assessment for 2nd Engineering Battalion Transition* concluded that this action, with the development of a 70-acre complex adjacent to the Main Post would have no significant impacts on land use (Ref# 004). Several other projects on the Main Post and new facilities and activities throughout the installation have recently been reviewed and approved and would be undertaken over the next couple of years. These actions have been previously analyzed and found to have no significant impacts on land use.

The planned construction of facilities for the EN BN and other supporting development on the Main Post would be in the far viewing distance from the Aguirre Springs Campground and the Organ Mountains and Organ Needles Wilderness Study Areas (overlooking the Tularosa Basin), and would not diminish the visual quality of the overall landscape. Additional construction for infrastructure throughout WSMR may be visible from public highways and distant viewing locations, but would not change the overall visual context as it would be similar in nature to existing infrastructure. This context is a wide-open landscape punctuated with discrete pockets of facilities (such as launch sites and test beds), which have developed over time, to support the overall mission and purpose of WSMR.

Within WSMR, two National Historic Landmarks, the Trinity Site and LC-33 and other eligible historic properties and landscapes are sensitive to visual change as a function of historic context. The integrity of these historic values, including the visual context, is managed under WSMR's current ICRMP. Portions of WSMR may be viewable from the White Sands National Monument; however, the main visitor locations, such as the Alkali Flat Trail and the Nature Center, are at least two miles from the WSMR boundary. Minor changes in facilities on WSMR would have little effect on White Sands National Monument visitors.

4.2.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.2.3.1 Range Capabilities and Use

4.2.3.1.1 Range Land Use

There are several changes in land use classification proposed under Alternative 1. The majority of the area currently designated as Primary Test Zone would be converted to Augmented Test Zone, Range Centers and Built-Up Areas, and Impact Areas.

4.2.3.1.1.1 Conversion of Land from Primary Test Zone to Augmented Test Zone

Approximately 1.6 million acres of area currently designated as Primary Test Zone would be re-classified as Augmented Test Zone (see Figure 2.3-1). Only 8,000 acres of land would remain as Primary Test Zone, while Augmented Test Zone would increase in size to 1.8 million acres. Heavy wheeled and tracked vehicles are permitted to operate off-road in the Augmented Test Zone. Vehicular and other types of off-road maneuvers in this zone would lead to loss of vegetation and erosion, resulting in a reduction in testing/training realism. The WSMR ITAM Program is designed to prevent loss of training realism on Army ranges through range use management, operator education, range rehabilitation, and several other methods (more detail on these programs is provided in Section 3.6, Earth Sciences). Off-road operation of vehicles could also result in degradation of cultural resources located in the affected areas. Existing and proposed procedures for the avoidance of cultural resources impacts are discussed in Section 4.5, Cultural Resources. Activities in the proposed Augmented Test Zone would be de-conflicted with currently ongoing activities through scheduling and would be compatible. Additional environmental review may be performed in the future for currently undetermined off-road ground disturbing activities.

Alternative 1 proposes an adaptive management process so that off-road test activities would undergo several review processes. This would include vetting through the Range Master Planning office, Flight Safety Office, Environmental Division, Radiation Protection and range scheduling office to ensure compatibility with existing operations, infrastructure, and facilities. This review process would identify specific sites that must be avoided (either for safety, or for resource management purposes). Approved areas would either avoid these or create avoidance zones within the area in order to achieve compatibility with existing land use (Ref# 005). Overall, land use flexibility on WSMR would increase with the conversion of 1.6 million acres to Augmented Test Zone. Proposed ground maneuver for test purposes has flexibility to adapt to spatial constraints and meet mission requirements given the extent and variety of land on WSMR.

Additional noise and dust may result from off-road operations and construction in built-up areas in the Augmented Test Zone. Noise and dust impacts are discussed in Section 4.6 and Section 4.10, respectively. While noise and dust from WSMR ground maneuvers in the Augmented Test Zone may be noticeable occasionally to people off-installation, they would not displace or permanently affect off-installation land uses.

The use of heavier, tracked vehicles may cause an increase in dust generation during maneuvers, which may be viewable from nearby public roads and highways. It is anticipated that the dust would cause a temporary impact to visual resources; however, there would be no permanent impacts to the aesthetic values of WSMR. Vehicle tracks would leave visible scars on the land, which may cause minor impacts to the visual environment if noticeable from public viewing locations. The vehicles themselves, as objects that can be seen, would not cause impacts to the visual environment considering they are commonly painted camouflage tones, although they may be noticeable and of interest to viewers along public roads and highways.

4.2.3.1.1.2 Conversion of Land from Primary Test Zone to Range Centers and Built-Up Areas

Under Alternative 1, approximately 7,000 acres would convert from Primary Test Zone to Built-Up Areas (see Figure 2.3-1). Siting of facilities in Range Centers and Built-Up Areas would undergo an integrated review and approval process and additional environmental review may be performed for developments within these areas. By defining Built-Up Areas, both around the Main Post and Range Centers, WSMR can consolidate mission support and community functions (and infrastructure). Allocating land for this purpose also provides separation between built-up uses (with higher population) and test and training operations. The potential for incompatible encroachment would lessen. The proposed development areas are exposed to ongoing military noise sources, including subsonic and supersonic aircraft, missile, rocket overflights, and munitions firing and detonation (see Section 4.10, Noise). Noise exposure from these sources could require construction techniques to reduce interior noise levels as recommended by Army noise guidelines.

The expansion of the Main Post may over time, become more visible from distant viewing locations overlooking the Tularosa Valley; however, dispersed military development is part of the existing context and impacts to aesthetic values would be minor to moderate. The expansion of the two Range Centers would have no impacts because they are not located in areas viewable by the public.

Additional light emitted from new facilities could have a minor localized impact on the dark night sky. Illumination should not interfere with astronomical observations at regional observatories due to distance and attenuation of light. These impacts could be minimized with the implementation of appropriate BMPs requiring down-lighting of outdoor lights at new facilities (Section 4.2.5).

4.2.3.1.1.3 Conversion of Land from Primary Test Zone to Impact Area

The total amount of land on WSMR used as Impact Area would increase by up to 2,000 acres under Alternative 1 (see Figure 2.3-1) to support new live-fire testing and training. Designation of new Impact Areas requires extensive coordination so that the new land use is compatible with natural and built constraints. The creation of permanent dudded impact areas would be subject to the joint approval of the Assistant Chief of Staff for Installation Management, Deputy Chief of Staff for Army Training and Doctrine Command, and the Director of Army Safety, as per AR 350-19.

Direct constraints on land use would be imposed by SDZs associated with the impact areas. SDZs are not permitted to extend outside of DoD-controlled lands and, no impacts to off-installation land use would occur as a result of SDZs. On WSMR, SDZ constraints are in effect only while weapons use is underway, but operational planning is clearly made more complicated in areas affected by frequently activated SDZs. Location of several Impact Areas in the same general area such that SDZs overlap would minimize the overall area on WSMR constrained by land use restrictions. Locations for new impact areas well inside the WSMR boundary are more suitable in order to contain safety buffers and noise, and for security purposes.

The expansion of the Impact Areas could adversely affect aesthetic values; however, it is likely that WSMR would locate these areas on remote areas of the range (due to safety reasons) that would not be viewable from public vantage points.

4.2.3.1.2 Range Activities and Levels of Use

Changes in range activities are related to anticipated increases in levels of use for specific activities as well as the introduction of activities that would be new to WSMR. Potential impacts associated with these changes are discussed below organized by Activity Class.

4.2.3.1.2.1 Ground Operations

Future test events may use large areas (up to 61,800 acres) throughout the range for off-road uses involving up to 600 troops, as well as manned and unmanned heavy wheeled and tracked vehicles at dispersed locations. These areas would be subjected to increased erosion, vegetation loss, and increased risk of fire, all of which could indirectly impact land use, if they were to cause the area to cease to be a viable operating location. Monitoring and adaptive management would allow land resources to recover and retain ecological conditions (defined by the WSMR Environmental Division with ITAM support) to sustain testing over the long term. There would be increased potential for Soldiers maneuvering in large combat vehicles or on foot during large test events to inadvertently cross boundaries into White Sands National Monument or SANWR, performing activities outside those approved in existing co-use agreements. WSMR would indicate off-limits areas to range users through signs, stakes and electronic global positioning system coordinates to minimize these occurrences. Incidental events would have little direct impact on resource values, but could indicate a need to take additional measures to contain military operations on WSMR land.

4.2.3.1.2.2 Hazardous Operations

WSMR would continue to manage and deconflict hazardous activities with other uses through scheduling and safety review. The planned integration of ground and airspace scheduling, safety review, and radio frequency approvals of WSMR, Fort Bliss and Holloman AFB would improve safety, and minimize incompatible uses both on and off the installation.

Hazardous operations could have the following impacts based on their Activity Category:

- Safety-related restrictions on land use (SDZs) are generated based on specific weapons types and delivery parameters.
- High-intensity noise as well as dust, smoke, and other nuisance factors are associated with Surface Weapons Firing.
- Lands in SDZ may not be occupied by non-participants while the SDZ is active (e.g., during hazardous activities).
- Safety issues are associated with Airborne Weapons /Munitions Releases (with evacuation).
- Increased numbers of evacuations would slightly reduce the availability of WSMR land and call-up areas for hunting.
- Improper location of Airspace Danger Zones could affect safety at civilian airports.

- Potentially degrade the visual environment if viewable from Areas of Aesthetic Concern and Public Roads and Highways.
- Increase in countermeasures types of operations could produce smoke or dust that may negatively impact viewscapes in and around WSMR.

4.2.3.1.2.3 Air Operations

Aircraft noise has the potential to drive land use compatibility issues on underlying lands. The level of aircraft sorties supporting test events is only a minor portion of the aircraft operations using WSMR's airspace, and would be concentrated in restricted airspace over WSMR land. The potential for increased noise levels from a 25 percent increase in test activity to cause compatibility issues with underlying land use is extremely low. Noise levels in the ROI would be dominated by F-22A combat training sorties previously analyzed in the EA for Transforming the 49th Fighter Wing's combat capability (Ref# 136). Facilities constructed under the PA would be compatible with subsonic time-average noise levels expected to occur once F-22A beddown is completed. Areas beneath WSMR airspace would be exposed to an average of 25 sonic booms per month from F-22A flight activity (which is considered a baseline condition under the No Action Alternative in this EIS) (Ref# 136). As with adjacent non-military receptors, WSMR personnel and facilities may also experience occasional annoyance from these sonic booms. WSMR's proposed increased air operations, such as UAS flights, under Alternative 1 would not pose high noise levels in themselves, nor would they occur in areas of dense population. Therefore, aircraft operations under Alternative 1 would pose negligible to minor impacts to land use or aesthetics.

4.2.3.1.3 Range Infrastructure

Land use impacts could result from construction of permanent Mission Support Facilities and Specialized Areas. Mission Support Facilities are often manned and are, therefore, subject to restrictions based on safety and other considerations. Specialized Areas are often associated with large safety buffers, which temporarily or permanently exclude non-participating personnel. Noise, dust, and other nuisance factors related to operation of certain Specialized Areas could lead to compatibility issues on adjacent DoD or non-DoD lands.

Additional infrastructure that would be constructed under Alternative 1 would include additional communications (fiber optic connections), instrumentation, up to 20 miles of connector tank trails between the Main Post and Fort Bliss, and up to 150 miles of new North-South tank trail corridors to support test and training capability. New Mission Support Facilities would include expanded Range Centers.

The proposed 150 miles of North-South tank trail would improve connectivity between the primary mission facilities in the south part of the installation with the north, and open up the mid- and north range to a wider spectrum of activities. Due to the narrowing of the WSMR land area between White Sands National Monument and the SANWR, the alignment of the new travel corridor may be required to make use of a small strip of land owned by either the monument or the SANWR. If land not owned by WSMR were to be required for the tank trail, WSMR would enter into negotiations with the current landowner regarding acquisition of the land in question. The tank trail would be designed such that additional erosion and the likelihood of "washouts" would be minimized to the extent practicable. Nuisance effects (such as dust, additional erosive debris, noise, and higher levels of activity in a natural area) could result. Potential land use impacts could be minimized through early coordination between WSMR and the applicable land management agency on a mutually acceptable alignment for this corridor, and possible changes to the existing agreements that govern their respective activities. If mutually acceptable provisions can be reached for the location, construction practices, maintenance and operation of the tank trail, land use impacts could be mitigated to less than significant.

Placement of new instrumentation and communications, infrastructure, and facilities can limit flexibility for other future activities on WSMR.

Additional infrastructure development of new/reconstructed tank trails and expanded Range Centers would not be viewable from Areas of Aesthetic Concern or Public Roads and Highways; thus, no impacts to aesthetic values would be anticipated. The installation of additional utilities and communication lines may have a minor impact during construction from dust generation and the presence of equipment if viewable from Areas of Aesthetic Concern or Public Roads and Highways; however, no impacts would be expected following construction. Increased concentrated facilities, particularly around the Main Post could change the visual context from distant viewing locations (such as Aguirre Springs Campground), and may generate more night light that could affect the dark night skies. This could be a negative impact to camping experiences. Existing facilities pose no problem to regional observatories, and therefore, future ones, using appropriate BMPs (such as down-lighting and prescribed maximum illumination) can manage potential impacts.

Future siting of facilities and activities within the viewshed of historic sites could change the visual context and affect their historic values; however, the Trinity Site is managed by WSMR in agreement with the SHPO to preserve the area's visual integrity and no permanent structures are allowed. Aesthetic values of Areas of Aesthetic Concern and public roads and highways could be diminished from the generation of dust during the construction of facilities and infrastructure as well as ground operations. These minor impacts would be short term and localized.

Increase in countermeasures types of operations could produce smoke or dust that may negatively affect viewscapes or obscure visibility for other activities in and around WSMR. Limiting these activities, based on their location relative to highways, residential areas, and other mission activities, and other factors such as wind direction and wind speed, can reduce potential impacts to inconsequential.

4.2.3.1.4 Specialized Areas

The six proposed Specialized Areas would involve changes from open land to built-up areas. This section describes specific impacts to land use and visual resources associated with creation of each of the Proposed Specialized Areas.

4.2.3.1.4.1 Environmental Laboratory Complex

The proposed Specialized Area for the Environmental Laboratory Complex would require approximately 1,600 acres along Nike Road in the southern portion of WSMR. The proposed Specialized Area contains requisite safety buffers within its boundaries, and would exclude other operations. Any activities requiring expanded safety areas on an occasional basis would be coordinated through scheduling and safety review. Inversely, a number of hazardous operations (such as missile firings) may require occasional evacuation of facilities. The proposed site is close to the Main Post and other built-up areas. This is consistent with strategies to avoid siting of permanent facilities in WSMR's core areas (at the center of WSMR furthest from boundaries) in order to maintain maximum flexibility and use of core areas for hazardous activities such as missile and directed energy operation that generate large safety areas. Due to the large land area required for this complex, it is likely that land use would be a key consideration for the siting or NEPA evaluation of this specialized area.

4.2.3.1.4.2 Joint Land Attack Cruise Missile Defense Extended Netted Sensor

JLENS would require one site utilizing up to 4 acres for facilities and parking. JLENS would use radars, emit radar radiation, and include aerostats (balloons) tethered to the surface. Modern communication and radar transmitters can produce highly electromagnetic environments that are potentially hazardous to ordnance. Consequently, the siting of JLENS would need to consider proximity to ordnance storage and

UXO areas under the Hazards of Electromagnetic Radiation to Ordnance program. The restricted airspace unit selected for JLENS to accommodate its tethered aerostats would guide the general location of JLENS facilities. Due to the potential for conflicts with other range users in terms of airspace and radio frequency use, land use would be a key consideration during siting and environmental reviews for this Specialized Area.

4.2.3.1.4.3 Joint Urban Research, Development, Testing and Evaluation Environment

The Specialized Area for the Joint Urban RDT&E Environment would require approximately 1,300 acres for a mock urban environment composted of single and multi-story buildings. With safety buffers, the entire complex would require up to 2,720 acres. Although a location for the complex has not been determined, its utility requirements (power and water) would guide it towards areas where these connections would be the least expensive, such as closer to the Main Post. The location would also be influenced by the radio frequencies it would emit (radar, microwave phone, and television and broadband generators) and the ability to de-conflict frequency use (see Section 4.17, Frequencies). Due to the relatively large area required, land use would be a key consideration during the siting and environmental review for the Specialized Area for the Joint Urban RDT&E Environment.

4.2.3.1.4.4 Electro-Optical .50 Caliber Range

The proposed Electro-Optical .50 Caliber Range would utilize up to 120 acres and include firing lanes, office space, instrumentation facilities, weapons storage, and restrooms. The range would be designed to allow for easy evacuation of SDZ while firing is underway (i.e., SDZ would not include buildings, roads, and other populated areas). Berms would be used to minimize area affected by direct fire and ricochet danger. The proximity of work centers and housing should also be considered during range siting to avoid noise-related impacts. Land use would be a key consideration during the siting and environmental review for the Specialized Area for the Electro-Optical .50 Caliber Range.

4.2.3.1.4.5 Individual Combat Skills Course

The location for the Specialized Area for the Individual Combat Skills Course has not been determined but would most likely be located near the Main Post to reduce travel time for Soldiers. The course would require a relatively flat area, up to 60 acres. While there would be no particularly hazardous aspects of the course to adjacent land users, the obstacle course could become an attractive nuisance for resident children. Therefore, the property should be fenced and it would be ideally located away from on-post housing areas. In this respect, land use would be a key consideration during the siting and environmental review for the Specialized Area for the Individual Combat Skills Course.

4.2.3.1.4.6 Local Training Area

The proposed Local Training Area would likely be constructed in the southern portion of WSMR, near the Main Post, although the exact location has not yet been determined. The Local Training Area would include a land area of approximately four miles by five miles (12,800 acres) and would ideally include arroyos and other terrain features that could be used for bridge-gapping training. Depending on its exact location, personnel within the Local Training Area may need to be evacuated during hazardous operations (such as missile firings). Off-road vehicle use and dismounted operations associated with the Local Training Area have the potential for adverse impacts to the landscape through erosion and vegetation loss. These impacts would be moderate to significant but may be mitigable to a degree depending on their location, extent and duration. Training activities within the Local Training Area could result in noise and dust to adjacent areas. WSMR would need to consider these factors during the siting of this training area. The Local Training Area would likely be located within the viewshed of Areas of Aesthetic Concern or Public Roads and Highways (e.g., US 70). Depending on the preferred location for the Local Training

Area, land use would be a key consideration during the siting and environmental review for this specialized area.

4.2.3.2 Main Post and Population Effects

Land use patterns within the Main Post would not change under Alternative 1, as no construction would occur within the Main Post beyond that which was described under the No Action Alternative. However, some new specialized areas may be located within a mile of the Main Post and result in minor land use changes as discussed in Section 4.2.3.1.4. Minor increases in personnel that would occur under Alternative 1 would not be expected to affect land use in any way.

4.2.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.2.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.2.4.1.1 Construction

The proposed Future Development Area (potential HBCT complex) at WSMR would result in the conversion of approximately 300 acres of vacant land to built-up area (expansion of the Main Post). Land use types in the new Future Development Area would include: Administrative, Troop Housing, Supply/Storage, and Service/Industrial. A HBCT (or comparable unit) would bring with it approximately 3,800 personnel and 6,100 Family members. These Soldiers and their Family members would require approximately 2.8 million s.f. of family housing and 560,000 s.f. of troop housing. In total, the arrival of a HBCT (or comparable unit) would require approximately 1.3 million s.f. of new facilities. Infrastructure associated with a HBCT would also include expanded utilities infrastructure capacity. Conversion of 300 acres to built-up area would remove this area from potential test and training activities, although this area has not historically been used for test or training activities (currently or in the past). Therefore, there would be no land use conflicts from the construction within the Future Development Area.

WSMR developed an Area Development Guide for the potential HBCT complex. A HBCT complex or similar future use would also conform to the Installation Design Guide. An Area Development Guide addresses architectural themes, landscape planning, circulation, and sustainable building design. While the elements of the final design of the Future Development Area have not been finalized, it is assumed that major elements, such as architectural themes, would be implemented that would result in none to minor aesthetic impacts.

4.2.4.1.2 Main Post and Population Effects

As shown in Table 2.3-7, substantial increases in the number of assigned military, military dependants, government civilians, and contract civilians would occur at WSMR under Alternative 2. A percentage of the newly assigned military personnel and all newly posted civilians would require housing off-installation. The housing market area, as defined based on a 45-minute commute from the WSMR Main Post area, includes the City of Las Cruces and surrounding portions of Doña Ana County (Ref# 048). Housing shortfalls in this area can be expected to be met through new construction or conversion of existing structures. New population in the market area would drive additional secondary growth, as jobs are created to provide services to new residents. Existing comprehensive plans and zoning documents prepared for the City of Las Cruces, the City of Las Cruces Extra-Territorial Zoning Jurisdiction, and Doña Ana County make accommodations for accelerated growth (Ref# 024, 025, 026, 027, 028, 029, 031). In addition, The City of Las Cruces and Doña Ana County are collaborating on a regional planning document intended to prepare for growth expected to occur between present date and the year 2040 (Ref# 204). While the City of Alamogordo is not within the housing market area as defined by the military Housing Market Analysis, a portion of the new WSMR personnel may choose to live there and associated growth could occur. Along with the accelerated growth expected to occur in areas adjacent to WSMR, would come increased potential for incompatibility between civilian development and the military mission. Noise-generating facilities on WSMR (e.g. the proposed mortar range) would be sited with consideration of noise-sensitive land uses (e.g. residences).

4.2.4.2 Training within the Southeast Multi-Use Area

The Southeast Multi-Use Area would occupy approximately 120,000 acres on WSMR south of US 70 (see Figure 2.4-1) and would be a Specialized Area within the Augmented Test Zone land use classification. This area would be considered specialized because it is expected to contain more intensive off-road use than the rest of the installation. This area would be used by a HBCT (or comparable unit) and other users for off-road vehicle maneuvers with tracked and wheeled vehicles, IED route clearance training, and dismounted operations. Up to 100 miles of additional tank trails would be developed within and approaching the Southeast Multi-Use Area. Locations for non-vehicle related ground disturbing activities (e.g., digging and new construction) would be reviewed and approved by the WSMR Environmental Division prior to activities commencing. Areas along existing roads and areas that have been previously disturbed would be favored during training area site selection.

Under Alternative 1, off-road vehicle use for testing would be permitted south of US 70, although HBCT-type off-road training would only be allowed under Alternative 2, within the proposed Southeast Multi-Use Area. HBCT training would be more frequent and more intense than test activities that would occur in this area under Alternative 1 or the No Action Alternative. Rigorous oversight by the WSMR Environmental Division, potentially with ITAM support, would be required to ensure that training activities in this area are sustainable. Within the Southeast Multi-Use Area, training activities would be limited by areas designated as off-limits due to safety hazards, environmental management activity, or resource value. Operational activities could be de-conflicted with oryx and other hunting through scheduling. Mission activities would continue to have scheduling priority over hunting activities.

Noise, dust, and other nuisance factors resulting from training operations in the Southeast Multi-Use Area may affect adjacent non-DoD lands lying immediately to the east. These lands are owned almost entirely by the Federal government (managed by BLM) and the State of New Mexico. Land uses in this area include agriculture (mostly livestock), recreation, and resource extraction. While land users may notice the training activities, land use compatibility issues would not occur.

Portions of the Southeast Multi-Use Area may be viewable from US 70. The use of this area for HBCT training purposes with tracked and wheeled vehicles may cause an increase in dust generation during maneuvers. These vehicles are typically painted camouflage tones, and would not generally be discernable from US 70 in themselves. The dust generated by the vehicles would be the most noticeable feature of off-road training. In addition, vehicle tracks would leave visible scars on the land. Therefore, minor to moderate impacts may occur during maneuvers from dust generation and vehicle tracks. There is potential for the finer particles of airborne dust to remain suspended for longer timeframes that would contribute to long-term visibility degradation (e.g., haze). The repeated disturbance of soils would also make them more susceptible to becoming airborne during high-wind events. There are no models that can accurately correlate off-road vehicle generated dust or loose soils with the development of long-term haze, as haze is usually attributable to man-made sources of fine particulate matter from automobile exhaust and power plants which have been the focus of such studies. Consequently, it is uncertain to what extent, if any, off-road vehicle generated dust would degrade the long-term visual qualities of the area. The potential for long-term adverse visibility impacts could therefore range from moderate to significant. As discussed in Section 4.4.5.3, WSMR would request funding for and develop a protocol for continuing studies of airborne dust from off-road vehicle use to assess long-term impacts to air quality and the potential for haze issues. From these studies, WSMR would use adaptive management to develop strategies to minimize impacts to air quality.

4.2.5 MEASURES FOR REDUCING IMPACTS

4.2.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Infrastructure

- Undergo review and approval based on both the current requirement and long-term management of land resources on WSMR for all proposed new facilities in Built-Up Areas and throughout the installation. Follow AR 210-20 for master planning.
- Evaluate and provide adequate separation from sensitive areas and land uses for siting of facilities and activities (including ground maneuver) that generate effects such as noise, dust, and other nuisance factors.
- Only allow temporary facilities and ephemeral activities within historic landmark areas.
- Develop siting strategies and criteria for future facilities and activities with a further refinement of mission priorities for WSMR Operational Units.
- Avoid areas with a high degree of hazardous uses (requiring evacuation) during siting of permanent facilities and daily activities.
- Separate community areas from active mission areas (using appropriate buffers or designed features).
- Avoid sensitive habitats and ecological areas while siting permanent facilities and ground disturbing activities.
- Develop Area Development Guides for new complexes of buildings (as was done for the HBCT complex) to reduce aesthetic impacts. Area Development Guides address architectural themes, landscape planning, circulation, and sustainable building design.
- Design new facilities to incorporate indigenous colors of the desert and southwestern architectural forms, to make them blend into the natural landscape to preserve aesthetic values of Areas of Aesthetic Concern and public roads and highways.
- Utilize incandescent lights of less than 150 watts or shielded lights on overhead light fixtures (shielded such that light rays are projected below a horizontal plane running through the lowest point to the fixture) (Ref# 205) to minimize disturbance to individuals conducting night time astronomical observations, which would be in compliance with the New Mexico Night Sky Protection Act.

Ground Operations

- Avoid areas with existing hazards, such as UXO, during siting of ground maneuver areas. Precede any approved use with surveying and clearing of selected areas to achieve acceptable risk levels.
- Survey for UXO in areas proposed for off-road vehicle use. Avoid areas known to contain UXO until cleared of hazards. Limit access to sensitive areas (e.g. wetlands, cultural resources) for vehicle maneuvers until location-specific environmental analysis has been completed.
- Coordinate with USDA prior to dismounted operations in the JER.
- Apply dust suppressants in paved and unpaved areas where vehicle use is concentrated, to the extent practicable.

Hazardous Operations

- Locate firing points for Surface Weapons Firing away from sensitive land uses to avoid associated impacts of noise, dust, and other nuisance factors. For example, a mortar range should not be located near housing areas.
- Perform noise modeling for selected site and level of operations for the proposed Electro-Optical .50 Caliber Range. Use Army noise level recommendations and noise contours as a tool for compatible siting.
- Ensure that SDZs do not extend beyond the boundaries of WSMR or its call-up areas (as required per AR 385-63) through the WSMR mission planning and environmental review processes. Remove all persons from non-DoD lands affected by SDZs during call-up area evacuations. Evacuate non-participants from areas on WSMR that would be affected by SDZs.

Air Operations

- Do not encroach on airfield clear zones with proposed facilities and operations.

4.2.5.2 Recommended Management Actions

Infrastructure

- WSMR is in the process of setting priorities for various portions of the installation in terms of future mission emphasis. The most recent Range Training Lands Assessment describes initial goals and objectives for future uses. Continuing this process is critical to the success of future siting and planning decisions at WSMR.
- Proposed Mission Support Facilities and Specialized Areas should be subjected to standard review processes on a case-by-case basis to determine the best configuration for avoidance of land use conflicts. If the proposed facility would be located on non-DoD lands, a landowner agreement may be required.
- Implementation of an integrated siting process for new facilities and activities on the range would minimize restrictions on current and future land uses.
- To protect visual resources avoid land use changes within the viewshed of the White Sands National Monument and national historic landmarks.

Ground Operations

- WSMR should ensure that the boundary with White Sands National Monument is clearly identified to prevent inadvertent incursions during testing and training. Additional signs may be required.

Hazardous Operations

- Adaptive Management should be used to optimize range utilization, given the restrictions imposed by SDZs and other constraints.

Air Operations

- No additional management actions would be needed for land use with regard to Air Operations.

4.2.5.3 Mitigation Measures

4.2.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

WSMR would coordinate with the applicable land management agency(s) to develop mutually acceptable provisions for the location, construction practices, maintenance and operation of the North-South tank trail where it traverses non-WSMR land.

4.2.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

Mitigation measures would not be warranted for land use and aesthetics. Mitigation measures for airborne dust that may affect visibility are provided in Section 4.4.5.3.

4.3 Airspace

This section evaluates the impacts to Airspace by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.3.1 IMPACT METHODOLOGY

The methodology used to determine the impact of the Proposed Action and alternatives on the airspace utilization is based upon applying the FAA significance criteria discussed in Section 4.3.1.3.

4.3.1.1 Region of Influence

The ROI analyzed includes the airspace boundaries controlled by Cox Range Control Center used for WSMR activities. Section 3.3 provides a description of WSMR airspaces.

4.3.1.2 Technical Approach

Historic and planned airspace utilization data was obtained from WSMR staff, Cox Range Control personnel, the WSMR Airspace Manager and the Airspace Manager at Holloman AFB to determine the potential impacts to airspace management under each alternative. FY 2008 operational data obtained from WSMR was analyzed to determine a baseline utilization rate for the WSMR airspace. These data; however, did not include a fully operational F-22A beddown at Holloman AFB. Therefore, airspace utilization rates projected in the *Environmental Assessment Transforming the 49th Fighter Wing's Combat Capability* (Ref# 136) were added to the FY 2008 WSMR data. Where air operations were delineated by altitude for the F-22A within WSMR airspace in that EA, those percentages within the specific altitude bands were also analyzed.

4.3.1.3 Factors Considered for Determining Significance of Impacts

The significance of potential impacts on airspace management or air traffic control depends on the degree to which the action would affect the airspace environment. Significant impacts could occur if the results were to impose major restrictions on commercial air traffic, significantly limit airspace access to a large number of users, or require modifications to air traffic control systems. Also included are considerations of such factors as the interaction of the Proposed Action within specific airspace with adjacent controlled, uncontrolled, or other military training airspace, possible impacts on other nonparticipating civil and military aircraft operations, and possible impacts on civil airports which underlie or are within close proximity to the airspace involved in the Proposed Action or alternatives. In order to evaluate those impacts, FAA Order 7400.2E, "Procedures for Handling Airspace Matters" (Ref# 206), outlines the factors used to determine if a proposed airspace action is considered significant. Among those factors are:

- Reducing the amount of navigable airspace.
- Creating an obstruction to air navigation.
- Creating new special use airspace (including prohibited areas, Restricted Areas, warning areas, and military operations areas) or require the modification of existing special use airspace.
- Changing an existing or planned military training route (or other routes).

- Changing an existing or planned Instrument Flight Route minimum flight altitude, a published or special instrument procedure, an Instrument Flight Route departure procedure or require a Visual Flight Rule operation to change from a regular flight course or altitude.
- Restricting access to or affect the use of public use airports or airfields.
- Changing commercial or private airport or airfield arrival and departure traffic flow.
- Reducing public health and safety due to a change in aviation safety risk.

4.3.2 NO ACTION ALTERNATIVE

4.3.2.1 Range Capabilities and Use

Air Force training missions utilize the airspace over WSMR. The most utilized airspace in FY 2007 was Lava/Mesa (in the Air Combat Command Training Areas shown on Figure 2.2-2), which covers the entire north section of WSMR and the Northern Call-up Area (over 1.5 million acres). Using FY 2006 through 2008 range and airspace utilization data, non-hazardous missions, including pre-test, training, and other activities, form the bulk of 28,000 scheduled hours (mostly simultaneous activities in different airspace elements) per year. The majority of these hours (55 percent) are Air Force training activities that primarily utilize the R-5107B restricted airspace over WSMR and Red Rio and Oscura Bombing Ranges (Ref# 052, 053). Air Force training activities were consistent month-to-month, except for September when Red Rio Bombing Range is closed and cleared of unexploded ordnance.

An analysis of the normalized FY 2008 data shows the area where Lava/Mesa (ATC Training in R-5107B) overlaps Red Rio and Oscura airspace, is the most heavily used airspace on WSMR (R-5107B). This area has historically not been available for return to the National Airspace System. The east central to southeastern sections of the range were the least utilized airspace over WSMR (R5107 A through G) and hence available for use by the National Airspace System. A strip of airspace which separates the actively used north section from the mid-to-south section of the airspace, called Salinas Corridor and R-5107G are scheduled approximately 40 percent of the year, making it available for use by the NAS for transient aircraft during the non-active time. The most active altitude segments over WSMR were 5,224 feet MSL (500 feet AGL) to 10,000 feet MSL bands. Most aircraft used 5,224 – 35,000 feet MSL. Activities above 35,000 feet included Air Force training in the Yonder airspace and missile testing.

Airspace over WSMR has been historically used by both the Army and the Air Force in a cooperative manner. The Air Force and Army have been able to schedule airspace use to meet the combined needs of the services. The F-177A aircraft previously assigned to Holloman AFB have been retired. The 49th Fighter Wing at Holloman AFB has begun receiving the F-22A and is scheduled to receive its full complement of 40 aircraft by FY 2011. While the F-22A would use R-5107 airspace as a primary training area, the availability of other regional military airspace (such as Beak and Talon MOA/Air Traffic Control Assigned Airspace (ATCAAs) and Cowboy ATCAA) provides the Air Force with flexibility to meet its training requirements and for WSMR to meet airspace requirements for ongoing research and development activities and other missions at WSMR.

The F-22A is a multi-role weapons system whose primary mission is air superiority, whereas the primary mission of the F-117A was tactical and strategic bombing. As such, the F-22A would fly approximately 90 percent fewer air-to-ground training sorties at Red Rio and Oscura Ranges than had previously been flown by the F-117A. Many of the F-22A air-to-ground weapons deliveries would be simulated using avionics. The F-22A would deliver 300 weapons annually as part of air-to-ground training, as compared to the F-117A, which delivered 4,793 weapons annually (Ref# 136). Other aircraft; however, would still utilize Red Rio and Oscura Ranges and the overall number of sorties flown at these ranges is expected to decrease by approximately 39 percent from 7,568 to 2,919 annual sorties. The use of other areas of R-5107 for air-to-air combat training would increase by approximately 100 percent from 11,068 to 21,964 sorties (Ref# 136). The F-22A would spend 75 percent of its time operating above 30,000 feet, but could operate as low as 500 feet AGL and as high as FL 600 (nominally 60,000 feet above MSL). F-22As would use the authorized limits of each airspace unit. The F-22A would rarely (five percent or less) fly below 5,000 feet AGL and primarily flies above 30,000 feet MSL. Actual mission altitudes would depend upon the lower and upper limits of the airspace unit being used, but it can be generally stated that F-22A aircraft operating from Holloman AFB would have a minor to moderate impact on the availability of low-level airspace for WSMR missions.

The munitions proposed for use during training for the proposed MQ-1 and MQ-9 missions flown from Holloman AFB to WSMR include GBU-12 laser guided bombs. The MQ-9 could eventually carry GBU-38 500-pound Joint Defense Attack Munition and 250-pound small diameter bombs. Live ordnance is anticipated for delivery only in the Red Rio Range. The Centennial Range and Red Rio Range would be used equally for delivery of inert ordnance. Inert Hellfire missiles could be carried by UAS for flight training purposes; however, these missiles would not be fired under the current Holloman UAS operational plans.

4.3.2.2 Main Post and Population Effects

The infrastructure development within the Main Post and the additional WSMR population associated with the EN BN would not have any effects on airspace; however, the increased population may result in more individuals potentially adversely affected by aircraft noise. These impacts are discussed in Section 4.10, Noise.

4.3.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.3.3.1 Range Capabilities and Use

4.3.3.1.1 Range Land Use

Under the Proposed Action, no changes in airspace designation are proposed. However, the number of missions that would utilize airspace may increase as discussed in Section 4.3.3.1.2.

4.3.3.1.2 Range Activities and Levels of Use

Changes in range activities involving airspace include anticipated increases in levels of airspace use for specific activities and operations as well as the introduction of new activities or operations to WSMR. Potential impacts associated with these changes are discussed below.

4.3.3.1.2.1 Ground Operations

Ground operations with no airspace component would have no direct effect on air operations. However, certain hazardous air operations (such as firing from aircraft) would require evacuation of associated land, which could curtain or conflict with ground operations. With the planned increase in ground operations under Alternative 1, scheduling between hazardous air operations and ground operations would require greater coordination. Most of the air to ground activity would continue at the Red Rio and Oscura ranges, which are the predominate air to ground ranges and are not used for ground operations.

4.3.3.1.2.2 Hazardous Operations

Airspace utilization for test programs and "hot" (hazardous) missions may increase by 25 percent under Alternative 1. However, airspace utilization for training missions would only increase for high-altitude air-to-air combat training by F-22A aircraft. Directed energy missions under Alternative 1 would increase fourfold and all other hot missions would increase by 25 percent annually. In total, Airspace Danger Zones would be expected to be activated 25 percent more frequently (increase from 254 in 2007 to 519 events annually by 2013). Established WSMR airspace scheduling procedures, as described in the WSMR Range Operations Mission Scheduling and Range Test Planning Policy (Ref# 050), should be sufficient to de-conflict current and proposed mission airspace requirements.

4.3.3.1.2.3 Air Operations

UAS test and training activities would continue to occur in WSMR restricted airspace but at increased levels under Alternative 1. Document 555-07 "User Guide for Unmanned Aerial Systems (UAS) on the National Ranges" provides guidance for range users regarding UAS programs on ranges. In accordance with this guidance, tests requiring UAS weapons to engage ground targets would be confined to established impact areas. Close scheduling and coordination of WSMR airspace would minimize any airspace conflicts with other testing and/or training operations being conducted on WSMR. Therefore, the use of the WSMR controlled airspace for UAS testing would not result in a significant impact. UAS activities would fall inside the scope of normal activities within WSMR controlled airspace. However, if a major increase in UAS airspace activity is proposed, which would result in potentially significant impacts to airspace utilization and scheduling, further environmental review and documentation may be required.

None of the indicators of significant airspace impacts, as listed in FAA Order 7400.2E, would occur under Alternative 1. No changes to existing airspace units, routes, or procedures would occur, and no new safety issues would be introduced.

Table 3.3-2 presents the historic hours for WSMR airspace utilization, as well as the hours the airspace was returned to the National Airspace System. Based upon a 25 percent increase in scheduling of airspace by new missions in the areas that are not continually restricted, the amount of time during which WSMR airspace would be returned to the FAA for use by civilian aircraft (Ref# 040) would decrease slightly. Overall, impacts to airspace would be minor and not result in a significant impact defined by FAA Order 7400.2E.

The MQ-1/MQ-9 sorties from Holloman AFB are expected to primarily use R-5111 airspace, particularly R-5111C and R-5111D. As other Certificates of Authorization are established or additional WSMR airspace is available, the MQ-1/MQ-9 training operations would expand into other airspace. Assuming each sortie results in two operations within the restricted airspace, up to 6,000 annual operations would be expected for the MQ-1/MQ-9 training missions. These operations would result in an increase of approximately seven percent in the overall WSMR airspace, which would still be far less than the operations that occurred in 2007.

4.3.3.1.3 Range Infrastructure

Typical range infrastructure, such as buildings, roads and utilities would have no impact on airspace. Very tall structures, such as new communication towers that could be proposed, could pose interference with low flying aircraft, and as such, would require special coordination with airspace managers to determine suitable locations.

4.3.3.1.4 Specialized Areas

Of the six proposed Specialized Areas under Alternative 1, only JLENS would utilize airspace. The other four are facilities that only have on the ground components. The JLENS aerostat acts as a surveillance sensor for tracking and detecting low-flying cruise missiles and UASs.

Tests would use targets towed by aircraft and UASs, and would involve 30 drones operations each year (likely from Holloman AFB). This would begin in 2010, and while facilities would be used daily, there would be flexibility to lower in the aerostat to avoid interference with other test programs. Since lowering the aerostat would require deflation of the balloon, and later re-inflation, the program would seek to minimize these events. Although locations for three sites for the Aerostat Specialized Area are not yet finalized, due to the requirement for airspace up to 13,500 feet MSL (approximately 10,300 feet AGL) on a nearly continual basis (including weekends) and facilities within WSMR's land boundaries, the most probable airspace unit utilized would be R-5107D (on the eastern edge of WSMR airspace immediately surrounding and including Holloman AFB), or the southeast portion of R-5107B.

Potential interaction with flight routes in and out of the Holloman AFB airfield are important siting considerations, requiring coordination with Holloman AFB personnel. Once selected and approved by FAA, new avoidance areas around each Aerostat site would be marked on sectional airspace charts, and included in pre-flight pilot briefings. Overall, airspace use would be a key consideration during the site selection process and environmental review for use of the airspace the JLENS Specialized Area, once a location is defined.

Additionally, the Air Force is evaluating the basing of up to three squadrons of UAS platforms at Holloman AFB (Ref# 207). Operation of these aircraft would take place within WSMR restricted airspace, requiring further coordination for scheduling of the airspace, and could potentially reduce the annual hours of airspace available for other WSMR airspace users and/or the National Airspace System.

4.3.3.2 Main Post and Population Effects

Minor increases in personnel that would occur under Alternative 1 would not affect airspace in any way.

4.3.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.3.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.3.4.1.1 Construction

The construction within the Future Development Area (such as the potential HBCT complex) would have no impact on airspace.

4.3.4.1.2 Main Post and Population Effects

The operations of a HBCT (or comparable unit) would typically occur on the ground within the Main Post or at Fort Bliss. Therefore, there would be no impact on WSMR airspace. The increased population associated with the stationing of a HBCT (or comparable unit) and support staff would result in more individuals potentially adversely affected by aircraft noise. These impacts are discussed in Section 4.10, Noise.

4.3.4.2 Training within the Southeast Multi-Use Area

Alternative 2 would include the same increases in airspace utilization in scheduling as were described for Alterative 1. Therefore, impacts to airspace resources under Alternative 2 would be the same as those listed for Alternative 1. The amount of time during which WSMR airspace could be returned to the FAA for use by civilian aircraft would potentially decrease slightly (as described for Alternative 1). Overall impacts would be the same as under Alternative 1.

4.3.5 MEASURES FOR REDUCING IMPACTS

4.3.5.1 Potential Management Practices

As discussed in 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

- WSMR has established airspace scheduling procedures (Ref# 050) that are the primary drivers of where air operations are sited. New programs should coordinate new airspace requirements with the Cox Range Control Center to conduct analysis of airspace needs relative to existing users and schedules. For example, the proposed JLENS program should be sited within restricted airspace and where there is the least impact to the NAS, Holloman, WSMR and airspace users.
- New programs should consider using currently underutilized airspace units to avoid conflicts and aim to operate in a manner that minimized use of restricted airspace to the fullest extent practicable. This may, however, not be practical for UAS utilization, since current FAA regulations limit their use to restricted airspace unless they have obtained a Certificate of Authorization from the FAA to operate outside Restricted Airspace.
- New programs should consider teaming with other airspace users to coordinate activities, such as using BCT Modernization UASs for the testing of JLENS if there can be synergistic benefits to each of those programs.
- Approval of both temporary and permanent use of restricted airspace within WSMR should involve coordination and review by regional military and FAA airspace managers if the obstruction to airspace areas is above 199 feet (per 14 CFR Part 77).

4.3.5.2 Recommended Management Actions

WMSR should continue to participate in and finalize an integrated airspace management system and allocation process between Fort Bliss, Holloman AFB, the FAA, and WSMR.

4.3.5.3 Mitigation Measures

No mitigation measures would be warranted for airspace under either action alternative.

4.4 Air Quality

This section evaluates the impacts to Air Quality by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.4.1 IMPACT METHODOLOGY

Impacts to air were assessed using existing available air emission data. Because of the broad programmatic nature of the proposed changes to land use and increase in mission activity, the methodology used at a programmatic screening-level of analysis is generally extrapolative or qualitative. This analysis includes a discussion of the region of influence for air quality; the technical approaches applied, and those factors that may be considered for determining the significance of impacts.

4.4.1.1 Region of Influence

The ROI for air quality includes parts of Doña Ana, Otero, Sierra, and Lincoln Counties, which lie within the New Mexico portion of the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region153, and a part of Socorro County within the Southwestern Mountains-Augustine Plains Intrastate Air Quality Control Region 156.

4.4.1.2 Technical Approach

The stationing of the EN BN and HBCT (or comparable unit) and other elements of the Proposed Action are very similar to actions analyzed in the *Fort Bliss, Texas and New Mexico, Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement* (Ref# 037). The features of these alternatives may still evolve and therefore, personnel, infrastructure and operational tempos have been estimated in Chapter 2 to provide an upper bound for analysis. Air modeling techniques require a degree of specificity of inputs that are not readily available at the current stage of planning. Therefore, air-emission calculations for the alternatives were derived from extrapolating air-emission data from both 2007 WSMR and 2007 Fort Bliss data.

Under the assumption that increase in emissions from normal operations would track population increases, emissions from facility operations could be semi-quantitatively assessed by multiplying baseline emissions at WSMR from 2007 (see Table 3.4-6) by fractional future increases in assigned personnel. A similar assumptive scaling approach was also used for emission analyses for construction, demolition, and ground clearing activities using emission data from similar activities that occurred at Fort Bliss, as estimated in the *Fort Bliss SEIS, 2007* (Ref# 037). Fugitive dust emissions from HBCT training at WSMR were also extrapolated from similar Fort Bliss estimates. Table 4.4-1 documents the methodology of the scaling approach.

Table 4.4-1. Methodology of Scaling Approach to Estimate WSMR Emissions

Alternative	Assumption	Calculation	Coefficients
Estimated emissions (tpy) from Facility Operations			
No Action Alternative, Alternative 1, or Alternative 2	Emissions track population increase	Emissions from Facility Operations = (FY13 population) / (FY07 population)][1] x FY07 emissions[2]	No Action Alternative: 1.216 tpy of respective pollutant (CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP) per 1 tpy in FY07 of respective pollutant CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP) Alternative 1: 1.291 tpy of respective pollutant (CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP) per 1 tpy in FY07 of respective pollutant CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP) Alternative 2: 2.252 tpy of respective pollutant (CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP) per 1 tpy in FY07 of respective pollutant CO, NO_x, SO_2, PM, PM_{10}, $PM_{2.5}$, VOC, HAP)
Construction-related emissions (tpy)			
No Action Alternative, Alternative 1, or Alternative 2	Emissions approximately proportional to Fort Bliss estimates	Estimated new building construction emissions, (tpy) - Emission estimate for each air pollutant at WSMR = (area of WSMR new construction[3]) x (estimated emission of air pollutant at Fort Bliss for building construction at Fort Bliss[4]) / (area of building construction at Fort Bliss[4]) Estimated new pavement construction emissions, (tpy) - Emission estimate for air pollutant at WSMR = (area of WSMR new pavement[3]) x (estimated emission of air pollutant at Fort Bliss for new pavement construction at Fort Bliss[4]) / (area of new pavement construction at Fort Bliss[4])	New Construction: 1.773×10^{-5} tpy of CO per s.f. 8.148×10^{-5} tpy of NO_x per s.f. 5.784×10^{-6} tpy of PM_{10} per s.f. 5.530×10^{-6} tpy of VOC per s.f. New Pavement: 8.578×10^{-7} tpy of CO per s.f. 2.407×10^{-6} tpy of NO_x per s.f. 1.408×10^{-7} tpy of PM_{10} per s.f. 1.664×10^{-7} tpy of VOC per s.f.
Maneuver training-related emissions (tpy)			
Alternative 2	Approximate emissions estimates scaled to 25 percent of estimates at Fort Bliss.	Maneuver training-related emissions - Emissions estimate (for one HBCT) for each air pollutant = 0.25 x emission estimates associated with four HBCTs training at Fort Bliss[5]	0.25 tpy per 1 tpy of respective air pollutant (VOC, NO_x, CO, SO_2, PM_{10}) at Fort Bliss

1. No Action Alternative: data from Table 2.2-9, i.e., (7,720/ 6,350); Alternative 1: data from Table 2.3-4, i.e., (8,200)/ 6,350); Alternative 2: data from Table 2.4-5, i.e., (14,300/ 6,350).
2. Data obtained from Table 3.4-6.
3. For No Action Alternative: data obtained from Table 2.2-7; For Alternative 1: data obtained from Table 2.3-4; For Alternate 2: data obtained from Table 2.4-3.
4. Data from Ref#037, Table 5.6-1.
5. Data from Ref#037, Table 5.6-9 for combustion emissions, and Table 5.6-5 for off-road PM_{10} emissions.

4.4.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to air quality resulting from the No Action Alternative, Alternative 1, or Alternative 2 include the potential of the action to affect air quality within the ROI as measured by compliance with applicable air quality standards.

Air quality standards stem from a health-based regulatory approach, and air quality standards provide a ready benchmark to gauge the extent to which any activity might impact a NAAQS or an emission threshold set by a regulation or control permit. Such benchmarks are consistent with the "significance" of an action as discussed in CEQ implementing regulations for NEPA (40 CFR Part 1508.27), in terms of severity of the impacts and degree by which the Proposed Action may affect public health. Significance also encompasses other factors such as spatial extent, degree of its certainty, and mitigation potential. Significance to air quality impacts may be assessed relative to any violation of a NAAQS, exceeding of a permitted emission threshold, allowable PSD increments where applicable to a major source, or to visibility protection for mandatory Class I Federal areas.

4.4.2 NO ACTION ALTERNATIVE

4.4.2.1 Range Capabilities and Use

Air quality impacts as a result of vehicle movements and other training activities dispersed throughout WSMR would be minor, and have been addressed in other NEPA analyses (see Section 1.8 for a list of applicable NEPA documents).

4.4.2.2 Main Post and Population Effects

Impacts to air quality from the No Action Alternative would include minor impacts. Recent decisions that are part of the No Action Alternative and that incorporate potential impact on air quality include the stationing of an EN BN on WSMR, training at Fort Bliss, expansion of the Main Post and construction of new facilities for the EN BN and construction in and around the Main Post to support garrison and test functions. Pertinent actions are analyzed for their potential impact on air quality.

For purposes of scaling the significance of potential impacts of construction emissions, estimated baseline construction data for the No Action Alternative are shown in Table 2.2-7. These data summarized total estimated new facility construction, development areas, and ground disturbance associated with various actions.

These data are transposed into construction emissions for CO, NO_x, PM_{10}, and VOCs by extrapolating from recent emission estimates made for similar general building construction and paved area construction at Fort Bliss (Ref# 037) where construction was described as temporary in nature. Again, for scaling purposes, it is assumed that emissions at WSMR would be broadly similar to estimates of emissions at Fort Bliss for similar actions. Table 4.4-2 presents estimated air emissions from a worse-case scenario of all construction and pavement projects occurring within one year. It is expected, however, that the construction and pavement projects would be staggered in terms of scheduling, though all projects would be completed by 2013.

Air pollutant emissions from construction equipment and land clearing activities would result in local short-term impacts. These levels of increased emission would not result in significant long-term impacts on regional air quality. Impacts would be of minor significance.

Table 4.4-2. Estimates of Construction-Related Emissions Under the No Action Alternative

Location	Action	Area (s.f.)	CO (tpy)	NO_x (tpy)	PM_{10} (tpy)[1]	VOC (tpy)
Main Post (built-up areas)	New construction	967,000	17.1	78.8	5.6	5.3
	New pavement	914,760	0.8	2.2	0.1	0.2
Infrastructure (range-wide)	New construction	19,000	0.3	1.5	0.1	0.1
	New pavement	2,090,880	1.8	5.0	0.3	0.3
WSMR Range	New construction	77,000	1.4	6.3	0.4	0.4
	New pavement	217,800	0.2	0.5	0.0	0.0
Total	**New construction**	**1,063,000**	**18.8**	**86.6**	**6.1**	**5.9**
	New pavement	**3,223,440**	**2.8**	**7.8**	**0.5**	**0.5**

1. $PM_{2.5}$ data were not available.
Source: Table 2.2-7 (1 acre = 43560 s.f.), Table 4.4-1, and Ref# 037

Under the No Action Alternative, totals of assigned military personnel are estimated to increase from 6,350 in 2007 to 7,720 by 2013 (see Table 2.2-9). Table 4.4-3 shows estimated total emissions of CO, NO_x, SO_2, particulates, VOCs and HAPs in 2013 from facility operations, as well as allowable permitted emissions. These estimates were made under the assumption that increase in emissions from normal operations would track population increases.

Table 4.4-3. 2013 Estimated Emissions from Facility Operations for the No Action Alternative

No Action Alternative	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC	HAPs
Allowable Emissions (tpy)	153.2	542.4	36.7	186.5	50.5	49.6	99.5	Total HAPs-24.9 Individual HAP-9.9
Total emissions in 2007 (tpy)	12.5	53.3	1.6	5.9	5.0	5.0	44.5	12.3 Total HAPs
2013 Estimated Emissions (tpy)[1]	15.2	64.8	1.9	7.2	6.1	6.1	54.1	15.0 Total HAPs

1. Population ratio = 7720 (FY2013)/6350 (FY2007) = 1.216. Values for 2013 reflect 1.216 x 2007 pollutant levels (see Table 4.4-1).
Sources: Table 2.2-9 and Table 3.4-6

Overall, total HAPs would be expected to increase by about 22 percent over 2007 levels. These estimated emissions fall well within allowable permitted levels. Under the scaling approach for significance, impacts would be minor. These levels are also several orders of magnitude less than area or point source emission inventories for WSMR host counties of Doña Ana, Otero, Sierra, Lincoln and Socorro Counties (see Tables 3.4-3 and 3.4-4).

A new 20,000-gallon JP-8 petroleum storage tank would be programmed as part of the new facilities for the EN BN complex occupying the southeast edge of the Main Post. Dispensing of JP-8 and diesel fuel is defined as an insignificant activity by the NMED Air Quality Bureau, and hence impacts ascribed to this new storage tank may be viewed as minor.

Potential indirect impacts would occur as a result of the stationing of the EN BN and other activities associated with the No Action alternative as a result of privately-owned vehicles (POVs) used at WSMR. A net increase of approximately 1,370 personnel would occur by 2013 as an outcome of the No Action Alternative. To help bound the scale of any impact, an approximate comparison can be made to a detailed analysis of indirect emissions from POVs that would be used at Fort Bliss (Ref# 037) associated with a net increase of 22,000 personnel at Fort Bliss. At Fort Bliss, the potential impact on air quality of indirect emissions from POVs was assessed to be not significant. Hence for the No Action Alternative, where the projected net increases in personnel is more than one order of magnitude less, the potential impacts on air quality would likely be minor.

4.4.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.4.3.1 Range Capabilities and Use

4.4.3.1.1 Range Land Use

Changes in land use on the range would not cause direct adverse impacts to air quality; impacts would occur due to associated changes in activities and levels of use as described below.

4.4.3.1.2 Range Activities and Levels of Use

New capabilities, which are expected to come online at WSMR as part of Alternative 1, are described in Section 2.3.1. These capabilities range from broad trends and concepts for future testing to specific programs planned for the near term. Several represent continuation of current capabilities, but may involve different combinations of activities or locations on the installation. This section describes typical impacts to air quality that could be expected during ground operations, hazardous operations and air operation activities and from their anticipated levels of use.

4.4.3.1.2.1 Ground Operations

Off-road vehicle use would result in additional emissions of tail-pipe pollutants and cause soil disturbance resulting in particulate matter emissions.

CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$, VOCs, and HAPs associated with training activities related to off-road vehicle use, generators, field operations, weapons munitions releases, could have minor local short-term impacts.

4.4.3.1.2.2 Hazardous Operations

WSMR also anticipates that test missions ("hot" missions) could increase by up to 25 percent over the next five years. Increases in missile firing and weapons impact would also result in minor amounts of air emissions, including release of particulate matter from soil impacts.

CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$, VOCs, and HAPs associated with training activities related to off-road vehicle use, generators, field operations, weapons munitions releases, could have minor local short-term impacts.

4.4.3.1.2.3 Air Operations

UAS test and training activities would continue to occur in WSMR restricted airspace, but at increased levels under Alternative 1. Direct emissions from these air operations would pose minor impacts to air quality. Likewise, indirect emissions associated with ground transportation and traffic, or resulting from personnel increases would pose minor impacts to air quality.

4.4.3.1.3 Range Infrastructure

WSMR anticipates that range infrastructure development would require reconstruction of 75 miles of existing tank trails, development of up to 170 miles of a new tank trail network, range center expansion, and construction of utilities and communication infrastructure. It is expected that construction projects would be staggered in terms of scheduling and all projects would be completed by 2013. This development could result in minor short-term impacts of increased emissions of CO, NO_x, PM_{10}, $PM_{2.5}$, and VOCs, and would not result in significant long-term impacts on regional air quality. Construction-related emissions are incorporated in emission estimates shown in Table 4.4-4.

Table 4.4-4. Estimates of Construction-Related Emissions for Alternative 1

Alternative 1	Action	Area (s.f.)	CO (tpy)	NO_x (tpy)	PM_{10} (tpy)[1]	VOC (tpy)
Range Center Infrastructure	New construction	120,000	2.1	9.8	0.7	0.7
	New pavement	0	0	0	0	0
Utilities and Tank Trails	Earthwork[2]	40,075,200	34.4	96.5	5.6	6.7
Specialized Areas	New construction	1,300,000	23.0	105.9	7.5	7.2
	New pavement	3,049,200	2.6	7.3	0.4	0.5
Total	**New construction**	**1,420,000**	**25.1**	**115.7**	**8.2**	**7.9**
	New pavement	**3,049,200**	**2.6**	**7.3**	**0.4**	**0.5**
	Utilities and tank trail development	**40,075,200**	**34.4**	**96.5**	**5.6**	**6.7**

1. $PM_{2.5}$ data were not available.
2. Emissions from tank trail development are estimated using emission factors for new pavement, see Table 4.4-1.

Sources: Table 2.3-4 (1 acre = 43560 s.f.), Table 4.4-1, and Ref# 037

4.4.3.1.4 Specialized Areas

Construction of facilities for the proposed development of Specialized Areas (Environmental Laboratory Complex, JLENS, Joint Urban RDT&E Environment, Electro-Optical .50 Caliber Range, Individual Combat Skills Course, and Local Training Area) would result in short-term emissions of criteria pollutants (CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$), VOCs, and HAPs. Combined, these areas would include up to 1,680 acres of new facility construction and clearing/grading. Fugitive dust emissions from soil disturbance would be minimized through existing WSMR construction BMPs (Ref# 155). Minor air quality impacts would occur during the operation of these Specialized Areas, although the Environmental Laboratory Complex may use equipment (chemical hoods, sandblasting chambers, etc.) that would require individual air permits. Overall, air quality would not be a key consideration during the siting or environmental review of these Specialized Areas.

4.4.3.2 Main Post and Population Effects

Under Alternative 1, totals of assigned military personnel are estimated to increase from 6,350 in 2007 to 8,200 by 2013 (see Table 2.3-4). Table 4.4-5 shows estimated total emissions of CO, NO_x, SO_2, particulates, VOCs, and HAPs in 2013 from facility operations, as well as allowable permitted emissions. These estimates were made under the assumption that increases in emissions from normal operations would track population increases.

Table 4.4-5. 2013 Estimated Emissions from Facility Operations for Alternative 1

Alternative 1	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC	HAPs
Allowable Emissions (tpy)	153.2	542.4	36.7	186.5	50.5	49.6	99.5	Total HAPs-24.9 Individual HAP-9.9
Total Emissions in 2007 (tpy)	12.5	53.3	1.6	5.9	5.0	5.0	44.5	12.3 Total HAPs
2013 Estimated Emissions (tpy)[1]	16.1	68.8	2.1	7.6	6.5	6.5	57.4	15.8 Total HAPs

1. Population ratio = 8200 (FY2013)/6350 (FY2007) = 1.291. Values for 2013 reflect 1.291 x 2007 pollutant levels (see Table 4.4-1).
Sources: Table 2.3.4 and Table 3.4-6.

Overall, total HAPs would be expected to increase by about 29 percent over 2007 levels (a five percent increase over the No Action Alternative level for 2013). These estimated emissions fall well within allowable permitted levels. Under the scaling approach for significance, impacts would be minor. These levels are also several orders of magnitude less than area or point source emissions inventories for WSMR host counties of Doña Ana, Otero, Sierra, Lincoln and Socorro Counties (see Tables 3.4-3 and 3.4-4).

4.4.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.4.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.4.4.1.1 Construction

New construction of mission support facilities for a HBCT (or comparable unit) would cause temporary emissions relating to construction vehicles and equipment, and could also result in new stationary sources of air emissions that require air permits.

In general, increased emissions related to changes in activities would include CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$, VOCs, and HAPs from construction equipment and land disturbing activities related to construction as well as local short-term impacts during operations. These levels of increased emissions would not result in significant long-term impacts on regional air quality and impacts would be minor.

Table 2.4-3 summarizes total estimated new facility construction, development areas, and ground disturbance associated with various actions under Alternative 2. Estimated emissions from these construction activities have been extrapolated from recent emissions estimates made for similar general building construction and paved area construction at Fort Bliss (Ref# 037). These estimates are shown in Table 4.4-6.

Table 4.4-6. Estimates of Construction-Related Emissions for Alternative 2

Alternative 2	Action	Area (s.f.)	CO (tpy)	NO_x (tpy)	PM_{10} (tpy)[1]	VOC (tpy)
Main Post[2] (built-up areas)	New construction	3,218,000	57.1	262.2	18.6	17.8
	New pavement	6,098,400	5.2	14.7	0.9	1.0

1. $PM_{2.5}$ data were not available.
2. Includes HBCT (core facilities, common facilities, family housing, and new schools).
Source: Table 2.2-3 (1 acre = 43560 s.f.), Table 4.4-1, and Ref# 037

Construction activities would be short term. These levels of increased emissions would be minor, with no significant long-term impacts on regional air quality.

4.4.4.1.2 Main Post and Population Effects

With the arrival of a HBCT (or comparable unit) at WSMR, the total post personnel is estimated to increase to approximately 14,300 persons by 2013, as shown in Table 2.4-5. Under the assumption that increases in emissions from normal operations would track population increases, Table 4.4-7 shows estimated total emissions of CO, NO_x, SO_2, particulates, and HAPs in 2013 from facility operations, and also lists allowable permitted emissions (pursuant to WSMR's Title V Operation Permit P085R1) as a comparative yardstick of impact.

Table 4.4-7. 2013 Estimated Emissions from Facility Operations for Alternative 2

Facility Operations	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC	HAPs
Allowable Emissions (tpy)	153.2	542.4	36.7	186.5	50.5	49.6	99.5	Total HAPs-24.9 Individual HAP-9.9
Total Emissions in 2007 (tpy)	12.5	53.3	1.6	5.9	5.0	5.0	44.5	12.3 Total HAPs
2013 Estimated Emissions (tpy)[1]	28.2	120.0	3.6	13.3	11.3	11.3	100.0	27.7 Total HAPs

1. Population ratio = 14,300 (FY2013)/6350 (FY2007) = 2.252. Values for 2013 reflect 2.252 x 2007 pollutant levels (see Table 4.4-1).
Sources: Table 2.3-5 and Table 3.4-6

These extrapolated estimates fall well within allowable air permit limits with the exception of very marginal increases in VOCs and HAPs just above allowable air permit limits. As shown in Table 3.4-5 and 3.4-6, the larger permitted sources of VOCs and traces of HAPs are stationary and portable generators (internal combustion); miscellaneous chemical sources (ranging from solvents and paints, to distributed material and rocket tests); surface painting; and unleaded fuel storage tanks. WSMR would need to develop additional BMPs to minimize VOC and trace HAP emissions from these sources. For example, WSMR is currently adopting measures to use low VOC emission latex paint as a BMP. Additional vehicle maintenance facilities would be constructed and would include HBCT support and motor pools. Consistent with AR 750-1, Chapter 3, which requires all units performing maintenance to have a maintenance SOP, WSMR should develop specific measures in a maintenance SOP to minimize VOCs and trace HAPs emissions.

Under the scaling approach, impacts would be considered moderate. These levels are several orders of magnitude less than area or point source emission inventories for WSMR host counties of Doña Ana, Otero, Sierra, Lincoln and Socorro Counties (see Tables 3.4-3 and 3.4-4).

The arrival of a HBCT (or comparable unit) at WSMR would result in an increase by FY 2013 of approximately 6,580 total post personnel and 5,120 Family members over the No Action Alternative levels, as shown in Table 2.4-5. To help bound the scale of any impact, an approximate comparison can be made to the impact of an increase of 22,000 personnel at Fort Bliss, analyzed in the *Fort Bliss SEIS, 2007* (Ref# 037). The potential emission impact from the additional POVs associated with this population increase at Fort Bliss was assessed as not significant. Hence, for Alternative 2 at WSMR, where the projected increase in personnel is approximately half the Fort Bliss increase, potential impacts on air quality would likely be minor.

HBCT vehicles traveling to and from Fort Bliss along the proposed connector tank trails would result in the release of PM from soil disturbance, although with use of BMPs to stabilize soils, these emissions would be minor.

4.4.4.2 Training within the Southeast Multi-Use Area

Off-road vehicle operations and field operations would increase substantially with the development of the Southeast Multi-use Area (120,000 acres) for intensive off-road maneuver training, increasing the potential for adverse impacts to air quality. As described in Section 2.4.1.2.3, it is estimated that HBCT maneuver requirements (considering maneuver areas and days of maneuver activity) would total approximately 88,000 km^2d (34,000 mi^2d).

Section 2.4.2.2 describes the equipment and vehicles that would be added to WSMR due to one HBCT. The approximate number of each vehicle type is shown in Table 4.4-8.

Table 4.4.8. Estimated Equipment Additions for a HBCT under Alternative 2

Type of Equipment	Approximate Number
Tactical Wheeled Vehicles (e.g. HMMWVs & convoy trucks)	900
Tracked Vehicles (e.g. M1 tanks, Bradley fighting vehicles)	360
Generator Sets	165
Non-tactical and GSA Vehicles	1,230

Source: Table 2.4-4

In order to help approximate the scale of emissions expected from maneuver training at WSMR associated with one HBCT (or comparable unit), previous estimates are drawn upon for maneuver training-related emissions for four HBCTs at Fort Bliss. Table 4.4-9 presents a summary of VOC, NO_x, CO, SO_2, and PM_{10} emissions from vehicles and generators, and PM_{10} emissions from fugitive dust as a result of track or tire movements over unpaved training surfaces adjusted to 25 percent of the Fort Bliss estimates (Ref# 037). $PM_{2.5}$ data were not available.

Table 4.4-9. Estimates of Emissions from Maneuver Training at WSMR

Combustion Emissions from Vehicles and Generators from Off-Road Maneuver Training (tpy)					Fugitive Dust PM_{10} Emissions from Off-Road Maneuver Training (tpy)
VOC	NO_x	CO	SO_2	PM_{10}	
19	345	12	2	73	3,880

Source: Ref# 037

It should be noted that air pollutant emissions resulting from the temporary use of generators for testing or back-up are considered insignificant by NMED, as are those from 200 HP generators fueled by diesel or natural gas, 500 HP generators fueled by gasoline, and larger 600 HP generators fueled by JP-4 or JP-8. Normally these exemptions apply to the temporary use of generators during training activities. In addition, available distributed electric power could be used when available, for example for use in hardened bivouacking sites (Ref# 208).

Emissions would be confined within the relatively small maneuver areas and would dilute rapidly and widely throughout the approximate 120,000 acres of the Southeast Multi-Use Area. Particulate matter (dust) constitutes the greatest part of these emissions. Much of particulate matter, which by its nature has high deposition velocities, would deposit quickly. However, during periods of high surface winds particulates would transport further. US 70 forms part of the western boundary of the Southeast Multi-Use Area. WMSR would need to develop a SOP to prevent excessive airborne dust from maneuver training during high-wind events to conform to the Natural Events Action Plan but also to ensure visibility along US 70 would not be decreased to the point where dust becomes a safety hazard. Vehicle emissions and fugitive dust emissions would disperse linearly along tank trails to and from the Main Post, but relative to those from maneuver training, these would be very small.

There is potential for the finer particles of airborne dust (e.g., $PM_{2.5}$) to remain suspended for longer timeframes that could contribute to long-term visibility degradation (e.g., haze). The repeated disturbance of soils would also make them more susceptible to becoming airborne during high-wind events. There are no models that can accurately correlate off-road vehicle generated dust or loose soils with the development of long-term haze, as haze is usually attributable to man-made sources of fine particulate matter from automobile exhaust and power plants which have been the focus of such studies. Consequently, it is uncertain to what extent, if any, off-road vehicle generated dust would degrade the long-term visual qualities of the area. As funding becomes available, WSMR would develop a protocol for continuing studies of airborne dust from off-road vehicle use to assess long-term impacts to air quality and the potential for haze issues. From these studies, WSMR would use adaptive management to develop strategies to minimize impacts to air quality. Analysis of higher emission levels at nearby Fort Bliss (Ref# 037), which included training of the HBCT units, indicated that no NAAQS violation would occur at a public boundary. While short-term air quality impacts as a result of HBCT or similar training at WSMR would be minor, the potential for long-term adverse air quality impacts is uncertain and could range from moderate to significant. The use of dust suppressants would mitigate airborne dust to some degree although impacts to long-term air quality may still be significant.

4.4.5 MEASURES FOR REDUCING IMPACTS

4.4.5.1 Potential Management Practices

As discussed in 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Management practices for air quality would generally apply to infrastructure and ground operations, although project-specific BMPs could be warranted for hazardous operations and air operations.

As described in 3.4.3.2, WSMR is a primary stakeholder in a Natural Events Action Plan for High Wind Events in Doña Anna County developed by NMED/AQB (Ref# 056, 057). The purpose of this plan is to identify and implement Best Available Control Measures for man-made sources of windblown dust that are feasible both technologically and economically. As part of the Plan, WSMR is developing a Particulate Matter Control Plan that covers emissions from construction sites, landfills, impact areas, and dirt roads, and recommends control measures. Furthermore, WSMR intends to follow County ordinances regarding erosion control and construction where practical and when it is not in conflict with the mission of WSMR.

Infrastructure

- Coordinate with WSMR Environmental Division (Air Quality Manager), prior to the use of generators not provided by WSMR.
- Deploy barriers to dust transportation from blowing soil, such as board fencing, wind fencing, and sediment fencing.
- Apply dust suppressants and ensure that such areas are stabilized (e.g., crusted) at all times, especially during high-wind conditions to stabilize inactive disturbed areas.
- Stabilize unpaved access roads and staging areas by applying dust suppressants.

Ground Operations

- Apply dust suppressants in unpaved areas where vehicle use is concentrated, to the extent practicable.
- Minimize creation of new roads; old roads and cleared areas should be reclaimed and revegetated.
- Operate vehicles at lowest speed possible on unpaved roads and off-road areas without hindering the mission.
- Use dust suppressants to control fugitive dust emissions when possible. Contact Environmental Compliance for guidance on the correct dust palliative for the specific operation. Over the large areas used for testing, maneuvering, and training such techniques would be impracticable, but deploy dust suppression techniques along tank trails and during repair activities that may expose surfaces of soils known to generate non-point fugitive dust emissions.
- Properly tune and maintain vehicle and equipment engines and shut off when not in direct use.
- Apply paving or gravel to areas disturbed by vehicular traffic.
- Use low sulfur diesel fuel (<15 parts per million) when possible.
- Encourage POV carpooling.
- Develop fuel conservation techniques.
- Modify training missions during high-wind periods (> 10 mph) to minimize transport of fugitive emissions to the extent possible.

4.4.5.2 Recommended Management Actions

Recommended management actions are described in Section 4.4.5.3.

4.4.5.3 Mitigation Measures

4.4.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

Effects on ambient air quality from the Proposed Actions would be minor. Existing management programs are adequate to mitigate adverse effects and protect air quality.

Fugitive dust emissions from soil disturbance would be minimized through existing WSMR construction BMPs (Ref #155). During site preparation or other earth-moving activities, BMPs would be implemented to minimize fugitive dust emissions, such as wetting soil surfaces, covering truckloads of dirt with tarps to reduce windborne dust, and properly maintaining equipment.

Furthermore, WSMR intends to follow County ordinances regarding erosion control and construction where practical and when it is not in conflict with the mission of WSMR.

4.4.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would develop a standard procedure for reducing or controlling airborne dust from the intensive off-road maneuvers that would occur within the proposed Southeast Multi-use Area for HBCT-type training activities. This SOP would address mitigating fugitive dust releases during high-wind events. WSMR would request funding for and develop a protocol for continuing studies of airborne dust from off-road vehicle use to assess long-term impacts to air quality and the potential for haze issues. From these studies, WSMR would use adaptive management to develop strategies to minimize impacts to air quality.

4.5 Cultural Resources

This section evaluates the impacts to Cultural Resources by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.5.1 IMPACT METHODOLOGY

Impacts to cultural resources were assessed for their potential to affect historic properties within the context of applicable laws and regulations. Of particular concern are:

- Direct impacts to archaeological, architectural, and traditional resources as a result of the Proposed Action and alternatives;
- Impacts to cultural resources from other resource management activities such as fire suppression, UXO recovery operations, and installation management that may increase or change in response to the Proposed Action and alternatives; and
- Impacts to cultural resources from recreation or other uses by the increased number of personnel;

Under Federal law, impacts to cultural resources may be considered adverse if the resources have been determined eligible for listing on the NRHP. Analysis of potential impacts to cultural resources considers direct impacts that may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activity and determining the exact location of cultural resources that could be affected. Indirect impacts generally result from increased use of an area (for example, increased erosion from ground disturbance) and may be related to population increase and improved access to areas near historic properties.

For all ground-disturbing actions of the selected alternative, compliance with Section 106 of the NHPA, including SHPO consultation, would take place prior to the project implementation. Development is underway of a PA with the New Mexico SHPO that would establish SOPs for the Army to address cultural resources. For example, if ground-disturbing activities inadvertently encountered previously unrecorded and unknown archaeological resources, the disturbance activities in that area would cease until the WSMR Environmental Division determined whether the materials warranted further actions under existing regulations (e.g., NAPGRA, ARPA, or NHPA). Until the new PA is finalized, Section 106 compliance would continue to adhere to the existing PA, the regulations in 36 CFR Part 800 and the ICRMP (Ref# 009).

4.5.1.1 Region of Influence

The ROI for cultural resources includes all areas within the boundaries of WSMR.

4.5.1.2 Technical Approach

Data was obtained from a variety of reference documents to determine potential impacts to cultural resources under each alternative.

The long history of cultural resources data collection on WSMR has resulted in information that is unevenly spread across the 2.2 million acre installation. Twelve percent of WSMR as a whole has been surveyed for cultural resources, but the majority of this research has been concentrated in the southeast portion of the installation, south of US 70. Throughout, resources that have been evaluated for NRHP eligibility are interspersed with those that were recorded before NRHP eligibility evaluations became standard practice. WSMR Environmental Division developed a predictive model in the 1990s (Ref# 061, 009) using existing data that incorporated various environmental variables (vegetation, slope, distance to water, etc.) and known archaeological site locations. The model identifies geographic locations that are sensitive for the presence of archaeological sites. The model provides useful information for describing the potential distribution of cultural resources, and it has identified geographic factors that help predict the presence of cultural resources, including playa edges, ridges, proximity to water sources, and alluvial fans. In concert with the staff's knowledge of WSMR cultural resources, the model helps the WSMR Environmental Division screen project siting requests for potential impact to historic properties. The model also helps prioritize field investigations for Section 110 compliance by highlighting areas with high sensitivity for cultural resources.

4.5.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to cultural resources are discussed below.

Currently, WSMR manages cultural resources under the 1985 Programmatic Memorandum of Agreement (PMOA) that is supplemented by the ICRMP (Ref# 009) governing management of historic properties on the installation as provided for by NHPA Section 106 and its implementing regulations (36 CFR Part 800). The PMOA, in compliance with 36 CFR Part 800, allows WSMR to complete phased identification and evaluation efforts for historic properties as needed over time. The analysis in this section complies with this requirement and with AR 200-1, which encompasses compliance with NEPA, NHPA, and associated Federal regulations (36 CFR Part 60.4, 36 CFR Part 800) that require impacts to historic properties from Federal undertakings be taken into consideration as part of the decision-making process. In addition, AR 200-1 provides guidance for implementation of Army policy regarding compliance with all laws and regulations associated with historic properties management.

Five properties of traditional cultural and religious importance have been identified at WSMR (Salinas Peak, North Oscura Peak, Victorio Peak, Hembrillo Canyon rock art site at Hembrillo Spring, and the Sweetwater Spring on Salinas Peak). WSMR also manages the military site on top of Tula Peak. Any action that could affect Tula Peak would require WSMR to consult with the Mescalero Apache. In addition to these sites, other archaeological historic properties are also potentially important to Native Americans. These could include mountain peaks, other prominent geographical features, and a variety of other sites, such as those containing rock art.

WSMR is in the process of consulting with the New Mexico SHPO to develop a PA that would take the place of the current 1985 PMOA. The PA would outline responsibilities and SOPs for the management of historic properties on WSMR. In the meantime, WSMR would continue to coordinate with the New Mexico SHPO regarding NRHP eligibility on previously unevaluated sites, public awareness, and impact mitigation strategies in accordance with the 1985 PMOA and the 1988 Historic Preservation Plan, supplemented by the ICRMP and other existing agreements.

For this EIS, impact analysis for historic properties has employed guidelines and standards set forth in NHPA Section 106's implementing regulations (36 CFR Part 800) and historic property management procedures at WSMR outlined in the ICRMP's SOPs 1 through 8 (Ref# 009). In accordance with Section 106, once an action is determined to be an undertaking, impacts to historic properties are assessed by: (1) identifying the nature and location of all elements of the Proposed Action and alternatives; (2) comparing those locations with identified historic properties, sensitive areas, and surveyed locations; (3) determining the known or potential significance of historic properties that could be affected; and (4) assessing the extent and intensity of the effects. The impact assessment process for historic properties centers on the concept of significance. Federal laws and regulations require Federal agencies to manage historic properties (i.e., resources that are eligible for inclusion in or are listed in the NRHP). A summary of NRHP eligibility criteria for historic properties in the areas affected by the Proposed Action and other alternatives is presented in Section 3.5.

An action results in an adverse effect to a historic property when it alters qualities of the resource, including relevant features of its environment or use, that make it eligible for inclusion in the NRHP (36 CFR Part 800.9[b]). Potential adverse effects could include the following:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from, or alteration of the character of the property's setting, when that character contributes to the property's qualification for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting if setting is integral to the property's significance;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease, or sale of the property if the sale removes the property from Federal protection.

The threshold of when these adverse effects would be significant is based on the factors of context and intensity. It will vary for each resource or combination of resources, and will be addressed throughout the remainder of Section 4.5.

Although Section 106 requires Federal agencies to consider all findings of effect whether beneficial or not, only adverse effects require mitigation.

Potential sources of impacts that were considered for this EIS include:

- Ground disturbance, including erosion and deposition, resulting from actions such as construction, demolition, operation, and maintenance of facilities; training activities; and operation, management, and maintenance of training areas.
- Vibration, noise, and visual impacts resulting from construction, training, operations, or maintenance.
- Access-related impacts resulting in increased vandalism due to improved access.

4.5.1.3.1 Facility Construction and Demolition

Facility and infrastructure construction and demolition activities that could potentially impact historic properties include foundation or trench excavation, grading or filling, asphalt removal, heavy machinery movement, soil compaction, and renovation or demolition of historic buildings or facilities. New structures or additions to structures with designs that are not compatible with existing historic properties could also be considered adverse effects, particularly within the boundaries or viewshed of the historic district in the Main Post. These activities could adversely affect existing historic properties in areas that have not been previously cleared for renovation or construction by the WSMR Environmental Division cultural resources staff.

Several historic properties at WSMR are managed through agreements that operate in conjunction with the WSMR ICRMP, as described below. The agreements address project effects and appropriate impact mitigations to specific architectural resource types or groupings. When applicable, WSMR would use these program comments as part of Section 106 compliance. The agreements include mitigation of effects from all actions up to and including renovation, repair, and demolition of the buildings and associated landscapes. Two of these agreements are the PA among DoD, ACHP and National Conference of State Historic Preservation Officers Regarding the Demolition of World War II Temporary Buildings, effective June 7, 1986, and the Trinity Site National Historic Landmark, managed through a MOU between New Mexico Historic Preservation Division and Department of the Army (WSMR). Other nationwide Program Comments and Historic Contexts negotiated with the ACHP, National Conference of State Historic Preservation Officers, and the DoD and/or the Army cover additional property types present on WSMR. Covered property types include: Capehart and Wherry-era (1949-1962) Housing; Cold War Era (1946-1974) Unaccompanied Personnel Housing; World War II and Cold War Era (1939-1974) Ammunition Storage Facilities; and World War II and Cold War Era (1939-1974) Army Ammunition Production Facilities and Plants and Army airfields.

4.5.1.3.2 Operations and Maintenance of Test and Training Areas

Ground-disturbing activities that occur on WSMR can potentially impact historic properties either through destruction of the resource or through damaging the resource's integrity, a key criterion for determining a historic property's eligibility for nomination to the NRHP. These activities could include maintenance and operation of training facilities; vehicle maneuvers and associated activities; small arms, gunnery, and artillery activities; ordnance delivery; firefighting; human trampling; non-military actions such as hunting and recreation; and indirect results of ground disturbance such as increased erosion.

Blowing sediment from ground disturbing activities can affect historic properties. Wind-aided erosion can expose archaeological deposits, affecting context and revealing artifacts. Archaeological sites in dune areas are particularly vulnerable to this effect. Conversely, blowing sediments can bury or obscure archaeological sites, in certain cases providing a beneficial effect as the site becomes protected from inadvertent damage and casual collecting.

Vibration effects to historic properties can originate from a variety of sources, including ground sources such as construction and blasting, vehicle traffic, and aircraft overflights. Historic properties have been shown to be susceptible to impacts from vibrations, depending on a number of factors such as decibel level, proximity, and overpressure (Ref# 209, 210, 211). Studies have established, however, that subsonic noise-related vibration damage to structures, even historic buildings, requires high decibel levels generated at close proximity to the structure and in a low frequency range (Ref# 212, 213, 214, 215). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to result in potential structural damage (Ref# 214), and even at 130 dB, structural damage is unlikely.

There is evidence on both sides of the issue as to the effects of helicopter overflight on architectural resources. Although noise and vibration levels from helicopters are less than those produced by low-flying jet aircraft (Ref# 215), the duration of noise and vibration is considerably longer from helicopter overflight. Extremely close and low overflights (50 feet) by heavy (more than 20,000 pounds) helicopters have a high probability of damaging architectural resources (Ref# 215); however, helicopter flights that approach within 300 feet have not been demonstrated to damage historic properties (Ref# 214). Archaeological resources are unlikely to experience adverse effects from aircraft overflight. No data exists that would indicate that surface artifact scatters and subsurface archaeological deposits are affected by vibrations resulting from subsonic aircraft overflight.

Actions that could potentially impact a resource's setting include the addition of new roads, buildings, or features; removal of fences and other features; changes in vegetation; or changes in land use out of character with traditional uses. The effects of noise and visual intrusions on historic properties may be related to setting, if the setting of a historic property comprises an integral part of the characteristics that make that resource eligible for listing in the NRHP. Because of modern development, this is often not the case for historic properties. Even in rural areas, noise intrusions from vehicles and machinery may create a noise environment inconsistent with the historic setting of the properties. Noise and visual impacts may be of less importance to historic properties whose NRHP eligibility rests primarily on their scientific importance, such as archaeological sites or sites eligible because of their technical and/or scientific characteristics. There are no architectural or archaeological historic properties identified on WSMR for which setting has been defined as a characteristic essential to the resource's NRHP eligibility. This does not preclude identifying setting as a defining characteristic as cultural resources continue to be identified and evaluated.

Audible intrusions could also have potentially adverse impacts to the setting of certain properties of traditional cultural and religious importance. For example, traditional ceremonies and rituals by Native Americans may depend in part on isolation, solitude, or silence. An aircraft flying overhead, even at high altitudes, could be deemed an auditory or visual intrusion if it occurs during a ceremony or at another inappropriate time.

Access or improved access to an area can result in impacts to historic properties. Similarly, higher levels of activity resulting from population increase and from test and training activities can also impact historic properties. Historic properties such as buildings, large village sites, rockshelters, or rock art are likely targets for vandalism because these are typically the most visible resources. When these historic properties are located near roads, they become more vulnerable.

Fire can cause major damage to various types of historic properties, and activities that significantly increase fire risk may have an adverse effect on those resources. Range fires on WSMR can result from weapons firing in the impact areas and SDZs and from various activities within the training areas. The necessary and unavoidable fire suppression efforts, including road and fire-break construction, vehicle and foot traffic, and trenching, can be nearly as destructive as the range fires themselves. Fire management practices that involve ground disturbance or use of fire retardants delivered by aircraft have the potential to damage rock art sites and archaeological sites. Fires can also result from maintenance and repair of buildings. Vandalism can also increase fire risk.

Other sources of impacts include recreation and hunting where these activities are permitted within WSMR.

4.5.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, ongoing activities and previously analyzed programs continue. Effects to historic properties are managed through the existing ICRMP and SOPs, or through the agreements described in Section 4.5.1.3. The effects of development projects encompassed in the No Action Alternative have been considered in previous NEPA documents.

4.5.2.1 Range Capabilities and Use

WSMR is in the process of consulting with the New Mexico SHPO to develop a PA that would take the place of the current 1985 PMOA, which currently governs WSMR's cultural resources management in compliance with NHPA.

The Trinity National Historic Landmark and SNAs would not experience any change in land use under this alternative. New range uses and improvements would be subject to established review and consultation practices, and therefore, impacts to historic properties would not change.

4.5.2.2 Main Post and Population Effects

Under the No Action Alternative adherence to the regulations implementing Section 106 of the NHPA and consultation with the SHPO would ensure that there would be no adverse effects to historic properties from ongoing projects on WSMR. Should adverse effects occur, then WSMR would mitigate them in consultation with the ACHP, SHPO and concerned Tribes.

4.5.2.2.1 Prehistoric and Historic Resources

Ongoing projects on the Main Post and throughout the remainder of WSMR have been cleared through the WSMR Environmental Division for their potential to have adverse effects on archaeological and architectural historic properties. Actions that occur within previously disturbed land are unlikely to have adverse effects. In some instances, additional survey may be required if the activity occurs in an area that has not been surveyed to modern standards; however this would have been stipulated through the NEPA process for these projects. If previously unrecorded resources are encountered, then SOPs, as described in the ICRMP (Ref# 009), would be followed.

Arrival of almost 3,000 personnel (both Staff and Family members) on WSMR for the EN BN could result in an effect on archaeological and architectural resources. Increased visits to sensitive locations, particularly archaeological sites, can result in erosion, trampling, and possibly vandalism. Increased visits to architectural resources can also result in effects; however, these effects are likely to be moderate to minor because of the remoteness and inaccessibility of most of the installation. Education and continued adherence to the SOPs outlined in the ICRMP would provide a measure of protection to historic properties.

No cultural resource impacts would occur from EN BN, whose major training operations would largely occur outside WSMR on Fort Bliss, where they are covered by the Fort Bliss PA. Should it be decided that the EN BN conduct major training exercises on WSMR, potential impacts to sites would be addressed through the NEPA and Section 106 processes.

Approximately 220 acres would be disturbed under the No Action Alternative, including 120 acres on the Main Post. Surveying of the Main Post has identified five archaeological sites. Impacts to these five sites, if any, would be addressed through the NEPA process and the Section 106 process. Because of the high level of previous disturbance at the Main Post it is extremely unlikely that previously unknown or undisturbed historic properties (i.e., archaeological resources that are eligible for the NRHP) would be located.

Building construction under the No Action Alternative includes demolition on the Main Post. All architectural resources on the Main Post have been evaluated for NRHP eligibility, including those that could be considered within the Cold War context. The NRHP-eligible WSMR historic district on the Main Post includes 52 Cold War-era buildings. Demolition of seven of these buildings, as called for under current plans, would be an adverse effect. WSMR Environmental Division would follow 36 CFR Part 800, including SHPO coordination to determine appropriate mitigation plans.

4.5.2.2.2 Native American Resources

Five potential TCPs have been noted on WSMR: Salinas Peak, North Oscura Peak, Victorio Peak, Hembrillo Canyon rock art site at Hembrillo Spring, and Sweetwater Spring on Salinas Peak. Areas sensitive to the presence of such resources are generally included within the locations that come under land use constraints, particularly the San Andres and Oscura Mountains. WSMR continues to consult with the Mescalero and Tigua regarding any concerns or specific areas of note on WSMR. In addition, Tula Peak is a TCP identified by the Mescalero Apache and, although located on Holloman AFB, is the location of a military site managed by WSMR. As with the five known TCPs on WSMR, consultation must occur if an Army action could affect Tula Peak. Human remains of Native American origin, previously located on WSMR and removed to Santa Fe after the WSPG was established, have been inventoried in accordance with NAGPRA (Ref# 061).

No effects are anticipated to properties of traditional cultural and religious importance from the stationing of the EN BN or the continuation of ongoing test and training operations. In all cases, a determination of adverse effect to a TCP that resulted from an activity would require consultation with the SHPO, ACHP and interested Tribes.

4.5.2.2.3 Paleontological Resources

Paleontological resources of special concern are concentrated in the Plio-Pleistocene Mammalian Paleontology geologic SNA. Located on the eastern margin of the San Andres Mountains, this SNA extends from the Lake Lucero/Dunes EMU into the southeastern Upper Tularosa Basin EMU. The most vulnerable fossil resource consists of the fossil footprints, although other fossils (camel, mammoth, horse, etc.) can also be impacted by military mission operations. Primary effects to this resource consist of natural erosion, or erosion related to construction and operations.

Information on SNAs is incorporated into the WSMR GIS system and used in planning operations (Ref# 074). Fencing prevents oryx from accessing the fossil prints. In the event of encountering a previously unrecorded paleontological resource, WSMR would follow SOP 8, Paleontological Resources (Ref# 009).

Paleontological resources could be affected by the stationing of the EN BN, if it results in increased visits to the Plio-Pleistocene Mammalian Paleontology SNA. Adherence to SOP No. 8 (Ref# 009), however, would reduce effects to minor or none.

Any planned construction is unlikely to result in an effect to paleontological resources on WSMR. Fossils are concentrated in the Plio-Pleistocene Mammalian Paleontology geologic SNA, part of which is in an area of environmental land use constraint. Avoidance of the fossils, particularly the footprints, would avoid any impact.

4.5.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.5.3.1 Range Capabilities and Use

4.5.3.1.1 Range Land Use

This section describes potential impacts to cultural resources that may result as changes in land use proposed under Alternative 1 occur. These changes are most likely to affect archaeological and paleontological sites.

4.5.3.1.1.1 Prehistoric and Historic Resources

The greatest source of potential effects to archaeological sites concerns the change in land use from that meeting the definition of Primary Test Zone to Augmented Test Zone. This change would expose the non-renewable resource of archaeological sites to the potential for damage or destruction through activities that did not occur under the previous land use classification.

WSMR is actively pursuing a PA with the New Mexico SHPO (Ref# 061). Until the PA is finalized, WSMR would adhere to the SOPs provided in the current ICRMP (Ref# 009). Specific operations would require clearance through the WSMR Environmental Division. Clear zones would eventually be established where operations could proceed without review. Areas that had not been cleared would require archaeological survey.

It is unlikely that architectural resources would experience effects solely from the change in land use classification; however, facilities dating from the Cold War era that have not been inventoried would require evaluation for NRHP eligibility.

4.5.3.1.1.2 Native American Resources

No impacts would be expected as described in Section 4.5.2.2.2.

4.5.3.1.1.3 Paleontological Resources

As with prehistoric and historic resources, the effects to paleontological resources would come from the additional types of activities that would be allowed through the change in land use. Significant paleontological resources have been found north of US 70; therefore, the potential exists for impacts to occur.

4.5.3.1.2 Range Activities and Levels of Use

Actions associated with each Activity Category are outlined in Appendix A. As there are over a dozen Activity Categories, many of which utilize similar actions, they have been grouped into four Activity Classes (see Section 4.1.2), which include Infrastructure, Ground Operations, Hazardous Operations, and Air Operations, to make the analysis more streamlined. Below are typical impacts that could occur under Alternative 1. Section 4.5.5 discusses measures for reducing impacts, by category that should be employed and utilized during planning to minimize impacts and avoid the potential for significant impacts to occur. Overall, WSMR would continue to comply with Section 106, and would follow the 1985 PMOA and 1988 Historic Preservation Plan, in addition to the SOPs outlined in the ICRMP for all its future mission activities.

4.5.3.1.2.1 Ground Operations

There is the possibility for archaeological or paleontological site disturbance as well as erosion or deposition to these sites. The possibility of overuse is also a potential effect. In order to minimize any adverse effects to cultural resources WSMR would follow the SOPs provided in the current INRMP (Ref# 074) and ICRMP (Ref# 009) and would continue to consult with the New Mexico SHPO.

4.5.3.1.2.2 Hazardous Operations

There is the possibility for erosion or deposition at archaeological or paleontological sites to occur; however, WSMR would follow the SOPs provided in the current ICRMP (Ref# 009) and would continue to consult with the New Mexico SHPO.

4.5.3.1.2.3 Air Operations

No impacts to cultural resources would result from air vehicle operations.

4.5.3.1.3 Range Infrastructure

There is the possibility for archaeological or paleontological site disturbance as well as erosion or deposition to these sites from construction of permanent structures, construction of roads/trails and land clearing/grading. In order to minimize any adverse effects to cultural resources, WSMR would follow SOPs provided in the current ICRMP (Ref# 009) and would continue to consult with the New Mexico SHPO.

4.5.3.1.3.1 Prehistoric and Historic Resources

Activities that move off established roads or routes and cause surface disturbance have the potential to affect archaeological sites. A number of areas have been cleared for such activities (Ref# 061), and there are plans to designate other areas that are particularly sensitive for the presence of cultural resources; these latter would be marked on the ground and be part of the GIS database. Siting considerations and BMPs would include avoidance of these areas. Most planned activities would require clearance through the WSMR Environmental Division. As currently specified in the 1985 PMOA and 1988 Historic Preservation Plan, and supplemented by the ICRMP (Ref# 009), in the event that previously unrecorded or unevaluated resources are located, WSMR would comply with Section 106 of the NHPA through application of the SOPs.

Architectural resources on the Main Post are unlikely to be affected by changes in activity levels and use. New construction, undertaken in the context of an active military installation, would be in keeping with the setting of the existing structures within the WSMR Historic District, so that changes in the viewshed would not be an adverse effect. Similarly, at the Main Post and throughout WSMR, construction near existing resources would not adversely affect their NRHP eligibility; however, many of these facilities have not been evaluated for NRHP eligibility, and physical changes such as renovation or demolition would require determinations of effect in line with Section 106 of NHPA and the ICRMP (Ref# 009).

Outside the Main Post, there are archaeological sites, ranches, trails, test facilities and Trinity National Historic Landmark that are listed on or eligible for listing on the NRHP. These locations are considered sensitive and would be avoided in the planning process as WSMR Environmental Division clears activities. Approximately 150 miles of tank trails would be developed for a North-South route along existing range roads. The development of these routes and final site locations would require archeological surveys. Alterations to or removal of historic structures, including buildings and test facilities, could be an adverse effect, which would require coordination with the New Mexico SHPO. If these structures have not yet been inventoried and evaluated for NRHP eligibility, then coordination with WSMR Environmental Division is necessary to comply with the inventory, evaluation and determination of effect requirements of Section 106 and the ICRMP SOPs.

In all cases, a determination of adverse effect to a historic property that resulted from an activity would require consultation with the SHPO, ACHP and interested Tribes.

4.5.3.1.3.2 Native American Resources

No impacts would be expected as described in Section 4.5.2.2.2.

4.5.3.1.3.3 Paleontological Resources

Ground disturbing activities in the vicinity of paleontological resources could adversely affect the resources.

4.5.3.1.4 Specialized Areas

The six proposed Specialized Areas would include facilities for both testing and training operations. Because extensive soil disturbance (clearing, grading, excavation) would be required for construction of these facilities, proposed sites would require cultural resource surveys and locations would need to be determined in accordance with existing and future agreements with the SHPO. Overall, cultural resources would be a key consideration for the siting and environmental review of the six Specialized Areas.

4.5.3.2 Main Post and Population Effects

The increase of assigned military personnel and dependents on WSMR (from 6,930 in 2007 to 9,740 in 2013) could result in an effect on archaeological and architectural resources. Increased visits to sensitive locations, particularly archaeological sites, can result in erosion, trampling, and possibly vandalism. Increased visits to architectural resources can also result in effects; however, these effects are likely to be moderate to minor because of the remoteness and inaccessibility of most of the installation. Education and continued adherence to the SOPs outlined in the ICRMP would provide a measure of protection to historic properties.

4.5.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.5.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.5.4.1.1 Construction

Construction, depending on location, can adversely affect historic properties. Although HBCT (or comparable unit) stationing would be unlikely to affect historic properties, in some instances it would be necessary to complete the Section 106 process, including consultation with the SHPO, before proceeding with a project. All projects would be coordinated with the WSMR Environmental Division. The following is a discussion of the potential effects to cultural resources resulting from the construction of a HBCT (or comparable unit).

4.5.4.1.1.1 Prehistoric and Historic Resources

The Main Post has been surveyed for the presence of archaeological resources, and at least five archeological sites have been located, which consisted of ceramics, lithics, and burnt rocks. These sites have not been evaluated for NRHP eligibility. Although it is unlikely that proposed infrastructure projects would adversely affect archaeological resources due to the high level of disturbance present throughout the Main Post, any ground disturbance in the vicinity of archeological sites would be required to follow Section 106 review, as specified in the 1985 PMOA, the 1988 Historic Preservation Plan and the ICRMP SOPs.

Most of the area proposed for HBCT construction that would occur adjacent to the Main Post has been surveyed for archaeological resources. Compliance with Section 106 would include coordination with the WSMR Environmental Division to identify historic properties (e.g., archaeological sites that are eligible for listing on the NRHP); WSMR would follow the SOPs identified in the ICRMP, including consulting with the SHPO regarding mitigation of adverse effects.

Buildings on the Main Post have been evaluated for NRHP eligibility. In addition to the Main Post Historic District, several other buildings have been determined to be eligible. If alterations to eligible buildings affected their NRHP eligibility, then this could be considered an adverse effect, and mitigation measures would be developed in consultation with the SHPO, or in accordance with the PA once it is in place.

4.5.4.1.1.2 Native American Resources

No impacts would be expected as described in Section 4.5.2.2.2.

4.5.4.1.1.3 Paleontological Resources

Infrastructure changes are unlikely to affect paleontological resources, as no known significant resources have been found within the area of the Main Post.

4.5.4.1.2 Main Post and Population Effects

The following is a discussion of the potential main post and population effects resulting from the stationing of a HBCT (or comparable unit).

4.5.4.1.2.1 Prehistoric and Historic Resources

An increase in population and the resulting increase in use could lead to impacts to historic properties outside the Main Post. People recreating and occupying areas with the potential for the presence of historic properties, particularly archaeological sites, can inadvertently cause damage from trampling and surface disturbance. Although intentional looting and vandalism are not anticipated these are also possible results.

4.5.4.1.2.2 Native American Resources

No impacts would be expected as described in Section 4.5.2.2.2.

4.5.4.1.2.3 Paleontological Resources

Paleontological resources are subject to the same potential for impacts from population increases as archaeological resources. It is unlikely, however, that HBCT operations would impact paleontological resources on WSMR, as no known significant resources have been found south of US 70.

4.5.4.2 Training within the Southeast Multi-Use Area

Implementation of Alternative 2 would require close coordination with the WSMR Environmental Division to ensure compliance with Section 106 of the NHPA and the ICRMP, due to the intensity of the activities proposed.

4.5.4.2.1 Prehistoric and Historic Resources

The Southeast Multi-Use Area of WSMR has the highest concentration of surveys for cultural resources. Planned cultural resources surveys for archaeological sites are to be concentrated in this area, so that WSMR would be in compliance with Section 106 of NHPA and the ICRMP. Known sites that have been identified but not evaluated for NRHP eligibility, and that are located where ground-disturbing activities are proposed, would be evaluated prior to the initiation of HBCT training on WSMR. Up to 100 miles of tank trails could be developed in and surrounding the Southeast Multi-Use Area adjacent to existing dirt roads. The WSMR Environmental Division would conduct surveys and work with trail planners to determine the optimal locations for the trails to avoid cultural resources.

4.5.4.2.2 Native American Resources

No Native American traditional cultural properties have been identified in the Southeast Multi-Use Area; therefore, no impacts would be expected.

4.5.4.2.3 Paleontological Resources

Paleontological resources are not documented within the proposed Southeast Multi-Use Area of WSMR. If such resources were located, then WSMR would comply with the appropriate regulations and mitigate impacts, in accordance with SOP 8 (Ref# 009). Any effects to paleontological resources due to HBCT training are unlikely, as no known significant resources have been found south of US 70.

4.5.5 MEASURES FOR REDUCING IMPACTS

4.5.5.1 Potential Management Practices

As discussed in 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Existing practices at WSMR for the protection of cultural resources are addressed in the WSMR ICRMP, WSMR SOPs and governed by provisions within various MOUs. In general, ground disturbing activities and new facilities should be located in areas where historic properties (e.g., archeological sites, historic buildings) would not be affected. In areas where surveys have not been completed, the WSMR Environmental Division would conduct surveys.

Potential management practices for cultural resources would generally apply to infrastructure and ground operations, although project-specific BMPs could be warranted for hazardous operations and air operations.

Infrastructure

- Survey and identify historic properties and evaluate eligibility for listing on the NRHP; coordinate with New Mexico SHPO on a suitable mitigation strategy for eligible sites.
- Notify the WSMR Environmental Division immediately if any historic or archaeological resources are discovered during construction activities.

Ground Operations

- WSMR Environmental Division reviews all training requests and any other ground operation requests. As an undertaking under 36 CFR Part 800, military training is subject to review and consultation with the SHPO and ACHP.
- Designate “no entry” areas with staking or other effective measures, avoiding demarcated sensitive areas. Comply with Section 106, including notifying WSMR Environmental Division, if previously unrecorded resources are identified.
- Identify historic properties and consult with SHPO for known routes, cleared with WSMR Environmental Division or survey. Also evaluate eligibility of structures off the Main Post.
- Notify the WSMR Environmental Division immediately if any historic or archaeological resources are discovered during ground disturbing operations.

General

- Conduct cultural resource awareness training for personnel conducting ground operations. Monitor sensitive cultural sites during and after ground operations by WSMR personnel.
- Avoid unnecessary site disturbance during explosive ordnance disposal, within the bounds of safety.

4.5.5.2 Recommended Management Actions

- Consult with the SHPO to develop additional programs to minimize the potential loss or damage of archaeological resources.
- Implement the PA between the Army and SHPO.
- Develop protocols for monitoring sensitive cultural sites during and after ground operations. Request additional funds if necessary.

4.5.5.3 Mitigation Measures

4.5.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

Existing WSMR policies, including the 1985 PMOA and the 1988 Historic Preservation Plan, along with the ICRMP (Ref# 009) would ensure compliance with all cultural resources laws and DoD regulations. These include AR 200-1 and NHPA, particularly Section 106. Section 106 compliance includes identification of resources that may be affected by an undertaking, evaluation for NRHP eligibility, evaluation of effect, and development of mitigation measures to reduce any adverse effects. These procedures are also spelled out in the ICRMP through SOPs. Surveys have revealed the presence of archeological sites within the Main Post. The alteration of these sites would be considered an adverse effect under Section 106, although these impacts would be mitigated to less than significant levels through existing compliance practices, consultation and documentation. Furthermore, WSMR would implement the PA between the Army and the SHPO as a mitigation measure that would govern future actions. WMSR would also abide by its decision to ensure that any areas authorized for off-road maneuver or intensive ground operations would be surveyed and mitigated for archeological and other cultural resources. WSMR would request additional resources (funding and manpower) to manage cultural resources surveys and mitigation measures as necessary relative to the degree of anticipated ground disturbance and construction.

4.5.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would implement the same mitigation measures described for Alternative 1. Surveys have revealed the presence of archeological sites within the proposed Future Development Area (potential HBCT complex). Therefore, any proposed development in that area would be subject to the procedures described for Alternative 1. Similarly, WSMR would ensure that areas of authorized use within the Southeast Multi-Use Area would be surveyed and mitigated for archeological and other cultural resources. WSMR would request additional resources (funding and manpower) to manage cultural resources surveys and mitigation measures as necessary relative to the additional degree of anticipated ground disturbance and construction under Alternative 2.

4.6 Earth Sciences

This section evaluates the impacts to Earth Sciences by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.6.1 IMPACT METHODOLOGY

Proposed facilities development and test and training activities associated with changes in land use and testing of future technologies have the potential to affect soils throughout WSMR. The following sections address the region of influence, impact methodology, and potential impacts to soils from the alternatives. No changes to geology or impacts on geological resources are projected under any alternative.

4.6.1.1 Region of Influence

The ROI for soils encompasses all lands within WSMR boundaries that may be affected by proposed changes from facility construction and changes in test or training locations and intensity, with a focus on the Southeast Multi-Use Area, where the majority of the intensive off-road vehicle training would occur under Alternative 2.

4.6.1.2 Technical Approach

As noted in Section 3.6, the USDA NRCS is currently conducting a new soil survey that will redefine the 1976 soil series, providing a finer level of description and detailed physical properties of each soil type. This revision is planned to be finished by 2010. The only updated data currently available are within the Southeast Multi-Use Area; however, these data are currently in draft form and subject to change. To develop a comprehensive characterization of all of WSMR, the updated data were merged with the older soil survey data on the rest of WSMR using GIS software and a geodatabase. As a result, the current soil conditions and limitations described in this section are more detailed for the Southeast Multi-Use Area, while summarizing all of WSMR soils for a few key characteristics.

For the proposed changes to land use and activity categories and increases in testing and training activities, a qualitative assessment was conducted, based primarily on the likelihood of the proposed activities to cause accelerated erosion. A qualitative matrix was developed to identify the potential of a specific activity category to affect soils.

For Alternative 2, the proposed footprint of the Southeast Multi-Use Area was overlaid on top of the draft soils data using GIS. Due to the lack of detailed projections on the frequency, timing, and distribution of different types of vehicles used for training in the Southeast Multi-Use Area, potential impacts are based on estimated annual levels of activity for an BCT Modernization-like test program under Alternative 1 and a HBCT (or comparable unit) for Alternative 2 (annual requirement).

The impact analysis considered the following effects:

- **Loss of Vegetation/Habitat** – permanent loss of vegetation/habitat resulting from a transformation of native vegetative communities to bare ground, pavement or infrastructure, or landscaped areas.
- **Loss of Biological or Physical Crust –** loss of biological or physical crust due to compressional disturbances to ground surfaces.
- **Crushing of Vegetation** – damage to vegetation without direct removal of vegetation potentially could lead to the declined health or death of the individual plant. This could in turn lead to a change in species composition and increase in erosion.
- **Temporary Erosion –** soil movement due to temporary activities that could result in a temporary increase in stormwater pollution, dust generation, vegetation loss,, and/or accelerated erosion potential.
- **Desertification/Erosion** – long-term degradation of land as a result of a loss of vegetation and soil erosion.

4.6.1.3 Factors Considered for Determining Significance of Impacts

The effects on soils are related to the areal extent of the impacts and the length of time necessary for the soils to recover or stabilize following surface disturbance. Recovery is defined as reestablishment of soil stability, hydrologic function, and protective covers such as vegetation and biological crust. The status of these indicators is used to measure the health of the land and sustainability of soils. Full recovery reestablishes the ecological processes in soils so that they:

- Support the normal range of plant communities for site conditions and soil type;
- Capture, store, and safely release surface water;
- Are stable, resisting accelerated erosion; and
- Have biological or physical crust cover and vegetative species that support the integrity of the natural soil biotic community (Ref# 084).

The length of time for full recovery varies depending on the soil type, climatic conditions, size of the area disturbed, and land use during recovery. At WSMR, full recovery of the ecological processes of the soil is unlikely in areas that experience repeated disturbance, especially when combined with drought conditions that often occur. This analysis assumes that management and mitigation measures can only achieve limited recovery, meaning that the site is stable and resistant to accelerated erosion from wind or water following surface disturbance, but from a practical standpoint may not reach full recovery due to the lengthy periods required in this desert climate.

Due to the importance of maintaining soil biological and physical crusts, vegetative cover, and soil productivity in order to sustain soil stability and a healthy ecosystem, activities that disrupt or destroy these resources would cause adverse impacts to soils. If biological or physical crusts, vegetative cover, and soil productivity were damaged to the point that their recovery would be lengthy or infeasible, these adverse impacts would be significant.

4.6.2 NO ACTION ALTERNATIVE

4.6.2.1 Range Capabilities and Use

Overall, minor impacts to soils would occur under the No Action Alternative; on-going testing and training activities at WSMR have undergone environmental review and are in various stages of implementation. Ongoing range capabilities and construction of infrastructure would alter small areas converted to facilities use, and other areas disturbed during construction would be stabilized and/or revegetated to prevent further erosion. Ongoing and previously approved testing and training activities have the potential to cause soil compaction, loss of biological crusts, and subsequent soil erosion. However, WSMR's existing environmental management processes are adequate to avoid or minimize soil erosion based on its levels of construction and test mission activities. The WSMR Environmental Division coordinates with the ITAM and Range and Training Land Assessment initiatives to help avoid adverse soil impacts and restore degraded areas of range land.

4.6.2.2 Main Post and Population Effects

Construction of new facilities at the Main Post would disturb approximately 120 acres of land. Most of this area would be covered with facilities or pavement, increasing the impervious surface, reducing infiltration of rain water into the soil, and increasing runoff. Areas not covered with impervious surface would be revegetated or otherwise stabilized to prevent erosion. Within the context of the 1,527-acre Main Post, which is intended as a built-up area, this level of impact would be minor.

Population changes would not in themselves affect earth sciences, other than through facilities construction as described above.

4.6.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Direct effects on soils primarily consist of physical disturbance of the near-surface soil layers, resulting in accelerated erosion, increased soil compaction, and loss of vegetative cover. Indirect effects on soils include reduced surface water infiltration with an associated increase in surface water runoff and poor plant growth or seed germination. Both direct and indirect effects on soils would occur as a result of surface-disturbing activities proposed under Alternative 1 such as off-road vehicle maneuvers and construction of buildings, roads, firing ranges, and other facilities.

Hot deserts with summer rainfall, like the Chihuahuan Desert that encompasses WSMR, are dominated by biological crusts at or near the soil surface. Soils with healthy biological crusts supply conditions favorable to plant growth because they provide high amounts of nutrients (especially nitrogen) and plant-available water, both of which are limiting factors for plant growth in desert conditions (Ref# 216). Soils with well-established and undisturbed biological crusts have from two to 130 times greater resistance to soil erosion than less well-developed crusts or bare soil. Biological crusts on finer soils (textures dominated by clay or silt) recover more quickly from disturbance and are more resistant to wind erosion than on sandy soils. Recovery of soil biological crust is related to the frequency and intensity of surface disturbance; the more frequent and intense the disturbance, the longer time the crust takes to recover. Sandy soils in areas of low precipitation have the longest recovery time (Ref# 082).

Burial of biological crusts through deposition resulting from wind or water erosion kills organisms in the crust, eliminating the crust's function in soil stabilization and nutrient contribution that is needed for soil productivity. Vegetative cover may also be damaged by wind and water erosion through abrasion, burial, or deposition of dust on plants, which reduces their ability for photosynthesis, minimizes evapotranspiration, and causes increased soil surface temperatures (Ref# 217). A study performed at the JER in the Chihuahuan Desert near WSMR documented that soils 650 feet or more downwind from areas of bare soils were affected by surface burial or abrasion that caused decreased vegetative cover and dune formation (Ref# 217, 218).

Wind and its transport of soil particles are influenced by vegetation and terrain at different scales. Soil roughness and vegetative cover affect the local transport and deposition of soil particles by sheltering the soil from the force of the wind, slowing down wind speeds, and trapping soil particles that move to the bare areas between plants. Damage to vegetation and crusts expose bare soil to wind, which picks up and transports soil particles until structures, tall vegetation, hills, mountains, or mesas reduce wind speeds to the point where the particles are deposited. If vegetation and soil crusts are damaged or destroyed by surface disturbance, without adequate recovery periods, wind erosion would cause the bare ground to expand downwind until slowed by terrain (Ref# 218).

Water erosion is more localized at WSMR but can cause substantial damage, especially along unpaved roads and disturbed areas with steep slopes. Water erosion can result in downstream sedimentation, especially along arroyos, streams, and in wetland areas.

4.6.3.1 Range Capabilities and Use

4.6.3.1.1 Range Land Use

Land use designations under Alternative 1 would result in two main changes that have the potential to affect soils: (1) expand the Main Post by 6,160 acres and (2) convert 1,618,000 acres to Augmented Test Zone, allowing for off-road vehicle use on a total of 1,825,200 acres. Off-road vehicle use and ground operations would be concentrated within 1,053,000 acres that exclude environmental and operational constraints (that also excludes areas with greater than 40 percent slope). Tables 4.6-1, 4.6-2, and 4.6-3 present the potential for wind and water erosion in the area of the proposed Main Post expansion and in the proposed Test Maneuver Area within the Augmented Test Zone, respectively.

Table 4.6-1. Erosion Potential in the Main Post Expansion Area

Water Erosion	Wind Erosion	Acres	Percent Total
Moderate	Moderate	15	<1
Slight	Slight	1,780	29
N/A[1]	N/A[1]	95	2
Severe	Slight	555	9
Severe	Moderate	3,612	59
Unclassified		103	2
Total		**6,160**	**100[2]**

1. These soils have not yet been classified by NRCS.
2. Totals may not equal 100 percent due to rounding.

Table 4.6-2. Erosion Potential in Augmented Test Zone (Land Use C) Test Maneuver Area

Degree	Water Erosion		Wind Erosion	
	Acres[1]	Percent[2]	Acres[1]	Percent[2]
Slight	617,800	58	271,800	26
Moderate	126,000	12	217,500	21
High	0	0	91,400	9
Severe	217,500	20	433,000	41
Not Applicable	91,400	9	38,300	4
Total	**1,052,700**	**100**	**1,052,000**	**100**

1. Source: 1976 Soils Survey data. Area of least constrained for off-road test maneuver as described in Section 2.3.1.2.1.
2. Totals may not equal 100 percent or add up to same area due to rounding.

Table 4.6-3. Combined Wind and Water Erosion Potential in Augmented Test Zone (Land Use C) Test Maneuver Area

Water Erosion	Wind Erosion	Acres[1]	Percent[2]
Slight	Slight	50,600	5
Slight	Moderate	119,900	11
Slight	High	35,800	3
Slight	Severe	410,200	39
Slight	N/A	<250	<1
Moderate	Slight	34,600	3
Moderate	Moderate	66,700	6
Moderate	Severe	22,200	2
Moderate	N/A	2,500	<1
Severe	Slight	187,800	18
Severe	Moderate	30,900	3
N/A	Moderate	<250	<1
N/A	High	55,600	5
N/A	N/A	35,800	3
Total[2]		**1,053,000**	**100**

1. Source: Based on 1976 Soils Survey data. Area of least constrained for off-road test maneuver as described in Section 2.3.1.2.1.
2. Totals may not equal 100 percent or add up to same area due to rounding.

Based on these data, the Main Post expansion area has a high portion of highly erodible soils and would require specific management practices to control erosion during and following construction. Following construction, landscaping and designed features can minimize further soil loss.

Off-road maneuver for test activities could involve up to 65 vehicles operating in areas up to 61,800 acres in size for several consecutive days. For analysis it is assumed that these operations would occur in areas as depicted in Figure 2.3-3. A total of 14,800 acres of off-road disturbance (from wheels and tracks) would occur for a typical test year (all users). This represents less than two percent of the least constrained off-road land proposed under Alternative 1. As shown in Tables 4.6-2 and 4.6-3, the least constrained land has low water erosion potential, but half of the area has high and severe wind erosion potential. Areas with relatively low water potential tend to have high-wind erosion potential. While there may be localized soil impacts, particularly in areas with high wind and water erosion potential, overall impacts, given the small area affected, would be slight to moderate. WSMR could minimize impacts to soils by rotating activities and assigning test activities to areas that meet test requirements and have more stable conditions.

Use of the remainder of the Augmented Test Zone (for occasional, more limited, and scripted off-road purposes) would require coordination with the Environmental Division. Discretion to site these activities to avoid sensitive resources, including sensitive biological crusts, would minimize impacts to soil and vegetative covers. Other factors, such as vehicle speed and load-bearing weight could also be considered in selecting suitable sites for these events.

4.6.3.1.2 Range Activities and Levels of Use

Impacts on soils from Alternative 1 would depend on the type of activity as well as the extent, intensity, and frequency of each action. Many of the activities proposed in Alternative 1 do not have siting locations. Due to the lack of current detailed soils data, these activities would need to be analyzed further when that information is available.

Table 4.6-4 provides the potential type of impact that could result from each Activity Category. The degree of impact or the ability to avoid impacts would depend on the site selected, the type of activities authorized, their intensity, duration, and the conditions or restrictions applied to the activity. Ground disturbing activities in areas with slight wind or water erosion potential would have the least adverse impacts on soil.

Table 4.6-4. Potential Soil Impacts from Activities

Activity Category	Description
Mission Support Facility	Construction of mission support facilities would permanently alter soil conditions covered by facilities and pavement. Areas disturbed during construction but not subsequently covered would be prone to wind and water erosion unless they were stabilized and revegetated.
Specialized Areas	The effects of Specialized Areas would depend on (1) the location selected, (2) the extent of the area disturbed, (3) whether undeveloped and unpaved areas would be subject to repeat disturbance, and (4) post-disturbance stabilization measures employed. See Section 4.6.3.1.4 for more detailed discussion of impacts from individual Specialized Areas.
On-Road Vehicle Use	On-road vehicle travel could result in accelerated erosion, especially in areas of moderate to severe erosion potential. Unpaved roadways with higher slopes would be particularly vulnerable to accelerated water erosion, which can result in severe rutting and downstream sedimentation of arroyos and streams.
Off-Road Vehicle Use (ultra lightweight)	Off-road travel by lightweight vehicles would be unlikely to significantly affect soils unless it occurred in sensitive areas with intact biological crusts or in areas of severe erosion potential.

Table 4.6-4. Potential Soil Impacts from Activities (continued)

Activity Category	Description
Off-Road Vehicle Use (other)	Off-road use by heavier vehicles can have significant impacts on soils, depending on (1) the size of the area affected, (2) the frequency of repeat disturbance, (3) the soil's erosion potential, and (4) slope. Repeated use of areas with moderate or severe erosion potential, especially areas of severe water erosion potential and steep slopes, would result in significant impacts both at the location of use and potentially off site due to wind- or water-borne sediments. Use of relatively flat areas with slight erosion potential would have localized impacts but would not be expected to have significant indirect effects.
Dismounted Operations	Dismounted operations would not have significant impacts on soils unless conducted frequently in areas of severe erosion potential.
Field Operations	Field operations could result in substantial localized impacts in small areas where digging is performed and vehicles are congregated. Impacts would not be significant unless a large number of personnel and vehicles congregate in an area during a rain storm. In such an event, serious soil disturbance could result in water erosion and downstream sedimentation, especially if located in proximity to an arroyo or wetland.
Surface Weapons Firing (surface-to-surface, surface-to-air)	Surface weapon firing is conducted at improved firing sites and would not adversely affect soil outside those sites.
Airborne Weapons/Munitions Release (with evacuation)	Airborne weapons release would not affect soil.
Airborne Weapons/Munitions Release (without evacuation)	Airborne weapons release would not affect soil.
Directed Energy Systems	Use of directed energy systems would not affect soil.
Instrumentation and Communication Systems	Installation of instrumentation and communication systems would have minor, localized impacts on soils in the area of installation. Post-installation soil stabilization would prevent erosion, especially in areas of steep slopes.
Weapons Impact	Weapons impact would permanently alter soil in the impact area and has the potential to contaminate soils with chemicals and/or explosives.
Surface Danger Zone	SDZs would not of themselves affect soil. If a weapon missed its target and fell within an SDZ, cleanup activities would result in soil disturbance. The recovery time could be lengthy if the incident disturbed biological crust or occurred in an area of severe erosion potential.
Airspace Danger Zone	Airspace danger zones would not affect soil unless a mishap occurred. In that event, contamination by fuel and hazardous materials and disturbance during cleanup activities could result in significant localized impacts.
Air Vehicle Operations	Air vehicle operation would not affect soil.

In summary, the activities that most affect soil would be construction of Mission Support Facilities, including development and use of tank trails; development and use of Weapons Impact areas; and Off-Road Vehicle Use. Facilities construction would permanently affect relatively small areas, altering the land converted to facilities use, but other areas disturbed during construction can be repaired through revegetation. Impact areas and tank trails also significantly alter soil conditions over a relatively small area, but repeated use prevents recovery, with limited options for stabilization to retard erosion. Impacts from facility and infrastructure construction are discussed in more detail in Section 4.6.3.1.3. Off-road vehicle use has the potential to affect the most extensive area. The significance of the impact depends on the intensity of use and the type of soil affected. Impacts from off-road vehicle maneuvers are discussed in more detail in the following section.

4.6.3.1.2.1 Ground Operations

Although dismounted operations and field operations can adversely affect soils, especially with frequent, repeated use, the activity with the most potential for widespread effects is Off-Road Vehicle Use. Off-road vehicle maneuvering has the potential to compact soils and damage vegetation and soil crusts, exposing the soils to wind and water erosion. Cross-country travel by vehicles has been shown to compact soils, crush vegetation and crusts, and accelerate soil erosion (Ref# 216). The effects of vehicle track disturbance (whether wheeled or tracked vehicles are used) can be severe. Limited recovery of soil stability and ground or vegetative cover would be all that could be expected once surface disturbance occurs.

Repeated off-road vehicle travel at one location on the ground, whether by tracked vehicles or rubber-tired vehicles, is likely to damage vegetation and disturb surface soils. The extent and significance of the damage to ground cover and soils increases as the number of passes at one location increases. High frequency and density of maneuvers by wheeled and tracked vehicles, as well as concentrations of troops on foot, would be likely to lead to increasing areas of bare ground and creating spaces for invasion by non-native and/or undesirable plants. Wheeled and tracked vehicles transport seeds from area to area, increasing the risk of inoculating new areas with invasive plant species. This would result in locally adverse impacts that would spread downwind over time.

Surface disturbance has different impacts under wet and dry conditions but can adversely affect soils in both. Because the organisms in biological crusts are brittle when dry, disturbance in dry conditions is more destructive and the crusts take longer to recover (Ref# 082). Soil compaction from vehicle traffic is more likely to occur in wet conditions on soils with finer textures (high proportions of clay or silt) resulting in reduced water infiltration, increased runoff, and less suitable conditions for plant growth. On straight paths, rubber-tired vehicles are more likely than tracked vehicles to compact soils under wet conditions. Disturbance of surface soil layers and damage to vegetation and ground cover are more likely to be caused by tracked vehicles under either wet or dry conditions.

Recovery of soil biological crusts is related to the frequency and intensity of surface disturbance—the more frequent and intense the disturbance, the longer time the crust takes to recover. When crusts are completely removed or are damaged over large or continuous areas (as in vehicle tracks), the recovery of biological crusts is generally slow, especially in areas with low precipitation and sandy soils. Recolonization of the organisms that form biological crusts in disturbed areas occurs mostly from adjacent areas, so the size and shape of the disturbed area affects recovery rates. Under good conditions, damaged biological crusts take at least 10 years without further disturbance to recover (Ref# 082). Disturbance of biological crusts by vehicles and foot traffic (human and livestock) has been demonstrated to reduce nitrogen input from crusts on all soils immediately by 25 to 40 percent on silty soils and from 76 to 89 percent on sandy soils, with a decrease of 80 to 100 percent over time. A primary reason for this is that the compression caused by traffic damages the ability of the organisms within the top few inches of soil to perform photosynthesis and nitrogen fixation (Ref# 082). Soils with high gypsum content are more resistant to disruption of biological crusts by vehicle traffic.

Off-road vehicle use under Alternative 1 is projected to affect approximately 14,800 acres annually within the Augmented Test Zone. Excluding off-limit areas and slopes greater than 40 percent, an estimated 1,053,000 acres could be used for maneuver-to-test operations. Thus, off-road vehicle maneuvers could affect approximately 1.3 percent of the available area on an annual basis. If activities are sited to avoid biological crust, potential significant impacts can be avoided (Ref# 005). Similarly, if activities are sufficiently dispersed (so that the likelihood of multiple passes in one spot are low based on size of the operational area, number and type of vehicles, and duration); occur on soils with low erodibility and high trafficability; and rotational siting is used based on monitoring, then off-road activities under Alternative 1 would have only low to moderate impacts on soils. Conversely, if activities would cause multiple passes, or occur on highly erodible soils or areas with biological crusts with little flexibility to relocate into other areas, then significant localized impacts could result. However, the area affected would be a relatively small percentage of the installation.

4.6.3.1.2.2 Hazardous Operations

Hazardous operations can adversely affect soils through ground disturbance and accelerated erosion, as described above, or by contaminating soils with chemicals and explosives. Repeated use of impact areas would cause loss of soil in a localized area. The significance of the impact would depend on the size of the area affected and the potential for erosion to cause down-wind or downstream effects.

4.6.3.1.2.3 Air Operations

Air operations would not affect soils unless they also included hazardous (i.e., air-to-ground weapons) operations.

4.6.3.1.3 Range Infrastructure

Earthmoving for construction of roads and new facilities would excavate or at least alter soil layers, removing vegetation and exposing soils to wind and water erosion. Proposed facility and infrastructure projects would disturb approximately 4,200 acres dispersed throughout the range. This represents one-third of one percent of the land area of WSMR. Approximately half that area would be permanently altered and the rest would be restored. Construction of 150 miles of new tank trails would cause a permanent disturbance to soils and increase the potential for wind and water erosion. If soils with moderate to severe erosion hazards are disturbed and left untreated, significant erosion would be expected, resulting in loss of soil productivity and offsite damage. Water erosion would be a particular problem, especially on steeper slopes with severe erosion potential, where deep ruts could ultimately become a travel hazard for tanks.

While soils would be changed by earthmoving activities, the effects would be localized and would be unlikely to result in significant indirect impacts to water resources or air quality. BMPs, erosion and sediment controls, and stormwater management measures would be implemented to reduce effects. Examples of BMPs to control erosion include application of gravel or chemical dust palliatives, as necessary, which prevents or alleviates dust nuisance.

4.6.3.1.4 Specialized Areas

The six proposed Specialized Areas include facilities for both testing and training operations. Impacts in areas with slight erosion potential would be confined to the area disturbed. Impacts in areas with severe erosion potential could be significant, depending on the extent and success of post-construction restoration. Soils would be a key consideration for the siting and environmental review of the Joint Urban RDT&E Environment, the Electro-Optical .50 Caliber Test Range, the Individual Combat Skills Course and the Local Training Area, as these would experience frequent ground disturbance associated with outdoor training. Soils would be a minor concern for the siting of the Environmental Laboratory Complex although after construction, soil erosion and disturbance would be negligible. JLENS would occupy a very small footprint with little off-road activity, also resulting in negligible impacts to soils. The following paragraphs address each proposed Specialized Area individually.

4.6.3.1.4.1 Environmental Laboratory Complex

Development of the Environmental Laboratory Complex would alter approximately 1,600 acres of soil. Impacts would be localized and erosion and related off-site effects could be minimized through post-construction soil stabilizing and reseeding.

4.6.3.1.4.2 Joint Land Attack Cruise Missile Defense Extended Netted Sensor

Development of the JLENS site would remove and/or cover over approximately 20 acres. Post-construction erosion would be minimized by paving. Areas disturbed during construction that are not paved could be stabilized with reseeding or application of physical stabilizers. JLENS operations would not substantially affect soil.

4.6.3.1.4.3 Joint Urban Research, Development, Testing and Evaluation Environment

This Specialized Use would effectively involve construction of a small town or village. Approximately 1.2 acres would be extensively disturbed during construction. Use of the complex could result in continual disturbance of approximately 1,300 acres, making recovery essentially impossible. If the complex is located in an area of slight erosion potential, impacts would be minor. Location in an area of moderate or severe erosion potential could result in continued erosion and related off-site impacts, which could be avoided through application of physical soil stabilizers.

4.6.3.1.4.4 Electro-Optical .50 Caliber Test Range

This range would involve clearing and grading approximately 12 acres, constructing berms, constructing a 785,000 s.f. rose target area, and developing approximately 6,400 s.f. of facilities. The areas cleared and developed would experience a relatively permanent loss of soil, for a localized impact affecting approximately 30 acres. Depending on the erodibility of the selected site, the cleared lanes could be subject to ongoing erosion if they are not stabilized. The potential for erosion problems would be low if the facility were located in an area with slight wind or water erosion potential. More serious erosion problems in areas of moderate to severe erosion potential could be avoided by stabilizing the ground along the firing ranges and in the compass rose after grading.

4.6.3.1.4.5 Individual Combat Skills Training Area

Development of this area could disturb up to 60 acres of soil. Repeated training in this area would redisturb the soils and create ongoing erosion if the area is not stabilized. The requirement for this area to be relatively flat would reduce the erosion potential, especially for water erosion. If this complex is located in an area of moderate or severe wind erosion potential, however, localized impacts could be substantial.

4.6.3.1.4.6 Local Training Area

This training complex would directly alter soils on approximately 12 acres within the overall 12,800 acre area. Activity would include travel by heavy wheeled and tracked vehicles on a relatively continuous basis. The affected area would have very low recovery potential, and continuous susceptibility to erosion could result in off-site impacts. If disturbance is located where wind and water erosion are slight, impacts would be low. However, if this activity occurs in areas with moderate or severe erosion potential, this could result in substantial localized impacts. Given the extent of the disturbance, the impact would be moderate.

4.6.3.2 Main Post and Population Effects

The effects on soils in the Main Post would be the same as under the No Action Alternative as no additional construction or development is projected within the Main Post. However, construction of new range infrastructure (Section 4.6.3.1.3) and Specialized Areas (Section 4.6.3.1.4) would result in varying degrees of impacts on soils.

4.6.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.6.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.6.4.1.1 Construction

Development of the proposed Future Development Area would result in an estimated surface disturbance of 244 acres within the facility boundaries and an additional 202 acres of disturbance for a construction laydown area (based on dimensions of the proposed area), essentially causing temporary disturbance in the entire 300-acre site. Tables 4.6-5 and 4.6-6 summarize the water and wind erosion potential for the soils within the proposed Future Development Area and its associated construction laydown area.

Table 4.6-5. Erosion Potential in the Proposed Future Development Area

Water Erosion	Wind Erosion	Acres	Percent Total
Slight	Slight	60	25
Severe	Moderate	184	75
Total		**244**	**100**

Table 4.6-6. Erosion Potential in the Proposed Future Development Area Laydown Area

Water Erosion	Wind Erosion	Acres	Percent Total
Slight	Slight	145	72
Severe	Moderate	57	28
Total		**202**	**100**

Based on these data, the Future Development Area has a high portion of highly erodible soils and would require specific management practices to control erosion during and following construction. Following construction, landscaping and designed features can minimize further soil loss.

While soils would be changed by earthmoving activities, the effects would be localized and indirect impacts to water resources or air quality could be avoided through implementation of post-construction soil stabilization and/or revegetation.

4.6.4.1.2 Main Post and Population Effects

Population increases associated with HBCT (or comparable unit) stationing would have no effects on soils other than the construction effects described above. Maintenance activities, fuel storage, and use of hazardous materials and petroleum products would be similar to operations currently performed at

WSMR in connection with test and training programs. Measures are in place to prevent contamination of soils and respond to inadvertent spills.

4.6.4.2 Training within the Southeast Multi-Use Area

In addition to the impacts described for Alternative 1, intensive off-road vehicle maneuvers in the Southeast Multi-Use Area under Alternative 2 have the potential for significant impacts. The type of impacts to soils from Alternative 2, Southeast Multi-Use Area would be similar to those described for off-road maneuvering under Alternative 1. Direct effects to soil resources are primarily due to physical disturbance to the upper layers and the disruption of soil biological processes, compaction of soils, crushing vegetation and biological crusts, and increasing soil erosion. Indirect effects on soils include reduced surface water infiltration, an associated increase in surface water runoff, and poor plant growth or seed germination. Both direct and indirect effects on soils would occur from off-road vehicle maneuvers in the Southeast Multi-Use Area.

Compared to Alternative 1, off-road vehicle impacts within the Southeast Multi-Use Area would be greater due to a higher intensity and frequency of use for the area. The approximate amount of disturbed area resulting from off-road activity (including wheeled and tracked vehicles) would be 148,000 acres annually (e.g., the entire 120,000-acre Southeast Multi-Use Area would be disturbed or driven over once or more if maneuvers were evenly distributed). In reality, a number of areas are likely to be exposed to repeated use and others may not be affected in any given year. For purposes of analysis, it is assumed that the entire area, except sites that are designated off-limits, would be disturbed.

A study of the effects of M1A1 tanks on McGregor Range at Fort Bliss (Ref# 219) documented that three passes with a tank in dry conditions produced the most water erosion on the site during periods of intense rainfall and the highest dry season total sediment loss, compared to locations with a single pass and undisturbed control sites. Three passes with the tank under dry conditions created the highest amount of bare ground, resulting in more runoff, less water infiltration, and more physical soil crusting than the same type of tank use under wet conditions. The study reported that tracked vehicles are especially destructive when they turn because this action crushes and uproots vegetation and compacts soil. The study concluded that vehicle maneuvers should be scheduled “with regard to landscape suitability” and “capacity to sustain disturbance,” and “should reflect necessary recovery periods … and be monitored for progress” (Ref# 219).

A study designed to evaluate the effects of military training using M1A2 tanks on vegetation structure and wind erosion was conducted at the Idaho Army National Guard Orchard Training Area (Ref# 220). Three previously undisturbed blocks of land with similar soils and vegetation were treated by simulating straight (no turning) tank travel of one, two, four, and eight consecutive passes at approximately 30 miles per hour, with each vehicle following the one in front. This study concluded that the untracked sites were stable even at the highest wind speeds, and that even one pass was sufficient to make soil surface conditions “significantly less stable” than the undisturbed areas, but there was not a major decrease in the vertical vegetation structure that minimizes wind erosion. The critical threshold for M1A2 tracking on this area dominated by grasses and forbs was concluded to be four consecutive passes, because significant damage to the vegetative canopy and accelerated soil erosion resulted.

A majority of the soils within the Southeast Multi-Use Area have Excellent or Good trafficability ratings (see Table 3.6-3), indicating that the soils have the capacity to support maneuvers under both wet and dry conditions. During wet periods, tracked vehicles may form ruts and degrade areas (making them difficult to use) in areas with soil of higher clay content.

Approximately 47 percent of the soils within the Southeast Multi-Use Area are considered to be severely impacted by wind and 52 percent are considered to be moderately impacted by wind (see Table 3.6-2). Wind erosion can be accelerated if the surface is disturbed and the vegetation is damaged or removed. Use of wind erosion control BMPs such as application of water or chemical dust palliatives would not be practical over widespread areas. Soil stabilization practices such as the preservation of existing vegetation, hydraulic mulch, hydroseeding, soil binders, or erosion control mats would also be impractical given the high degree of use to meet training requirements (in addition to other test uses). Shrubs and coppice dunes within the Southeast Multi-Use Area slow down the local wind speeds so wind erosion abrades the bare soil in between plants, but the coarser soil particles loosened by maneuvers that are transported in the wind get trapped before traveling long distances. Assuming the shrubs and dunes act as obstacles to vehicle travel, making it likely that tracked and wheeled vehicles would drive around and not over them, it is anticipated that the amount and size of the areas of bare ground would generally be limited to areas between the dunes.

Accelerated wind erosion resulting from increased areas of bare ground due to damaged vegetation would be a significant impact under Alternative 2. The high frequency and density of projected maneuvers by wheeled and tracked vehicles, as well as the concentrations of troops on foot, would be likely to lead to increasing areas of bare ground or mesquite coppice dunes in areas where they do not currently exist. This would result in locally adverse impacts that would spread downwind over time.

The majority of habitat within the Southeast Multi-Use Area (mesquite coppice dune, shrubland, and grassland) could experience widespread, locally significant degradation throughout the 120,000 acres, or six percent of the total WSMR land area. Because of the frequent training that would occur in this area, these significant but localized impacts to soils would continue to occur and would not be fully mitigable.

Yearly rotation of areas experiencing minor to moderate disturbances could allow for limited habitat restoration and prevent long-term habitat degradation; however, this would tend to concentrate activities and increase the potential for repeated operations (leading to vegetation loss) in other parts of the Multi-Use Area. Impacts could be reduced by limiting heavy off-road vehicle use to designated areas to reduce widespread significant impacts and take into account the time of year exercises occur (wet versus dry soils) as soil compaction from vehicle traffic is more likely to occur in wet conditions on soils with finer textures. Impacts to habitat would be further reduced if sensitive grasslands and erosive soils were avoided or limited in frequency and type of use. High training demands may make these limitations impractical, however.

Up to 100 miles of additional tank trails would be developed within and around the Southeast Multi-Use Area, primarily adjacent to existing dirt roads. The tank trails would temporarily disturb up to 910 acres of land during construction and up to 300 acres permanently for operations. On a permanent basis, these tank trails would disturb less than one percent of the Southeast Multi-Use Area. Tank trails and unimproved roads would be most susceptible to water erosion because ruts and gullies would act as drainages that could accelerate erosion and lead to down-slope sedimentation, especially in less flat areas. To the extent practicable, using existing roadway corridors would minimize loss of soils in new areas.

4.6.5 MEASURES FOR REDUCING IMPACTS

4.6.5.1 Potential Management Practices

Adverse impacts from the Proposed Action on soil can be reduced through site selection that avoids highly erodible soils, biological crusts, and sensitive habitats such as grasslands. Adverse impacts of facility construction can be minimized by siting and designing facilities to take into account soil limitations and characteristics. This information would be available once the new soil survey is completed. It is unlikely that significant impacts from intensive off-road vehicle use can be reduced to insignificant levels, but application of the following siting considerations would alleviate the severity of the impacts under Alternatives 1 and 2.

Siting considerations to reduce effects on soils include:

- Rotate locations of off-road vehicle test operations to allow for periods of rest and recovery of soil cover.
- Limit locations of activities (particularly off-road vehicle maneuvers and field operations) to those soils that have slight wind and water erosion potential and good trafficability where possible, and avoid areas with severe erosion limitations and low trafficability.
- Restrict intensive and frequent off-road vehicle maneuvering and other ground disturbing activities in grasslands and other communities with erosive soils.

Management practices for soil conservation would generally apply to infrastructure (construction) and ground operations, although project-specific BMPs could be warranted for hazardous operations. BMPs implemented during and after construction to minimize soil erosion and offsite sedimentation in drainages include:

- Use well maintained silt fences, detention basins, daily site inspections, and other BMPs to limit or eliminate soil movement, stabilize runoff, and control sedimentation.
- Cover disturbed areas not covered with impervious surfaces, such as roofs and paved areas, with native vegetation following construction to minimize erosion.
- Use appropriate excavation practices to reduce the chance for sides to cave during excavation of trenches for such structures as footers and utility lines.

Examples of additional BMPs to control wind erosion may include application of water or chemical dust palliatives, as necessary, which would prevent or alleviate dust nuisance. However, these may not be practical in large areas. In addition, soil stabilization practices such as the preservation of existing vegetation, hydraulic mulch, hydroseeding, soil binders, or erosion control mats could also be effective.

Restricting intensive, heavy off-road vehicle activity on clay soils during wet periods, when feasible, would reduce formation of deep ruts and gullies.

Accelerated soil erosion along tank trails and in areas disturbed by infrastructure improvements could be reduced by stabilizing the ground surface with gravel or soil binding materials or improving vegetative cover in areas of reduced ground cover. If practicable, artificial or vegetative windbreaks could be installed in selected areas of intensive off-road vehicle maneuvers susceptible to wind erosion.

4.6.5.2 Recommended Management Actions

The 1976 soil survey used in this analysis for WSMR (except the Southeast Multi-Use Area) defined few classes of soil types and does not always accurately reflect what soil types relate to current ecosite descriptions. The new soils data (used for the Southeast Multi-Use Area) is in draft form. For these reasons, all proposed ground-disturbing actions could include validation of soil types and ecosite descriptions to properly assess impacts.

4.6.5.3 Mitigation Measures

4.6.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

Due to the variability in timing, duration, frequency, and location of off-road vehicle maneuvers, adaptive management would be the main method for identifying mitigation measures to reduce the significant effects of the Proposed Action and alternatives. WSMR would develop workplans for mitigating impacts to soils and request Army funding to implement these plans. Adaptive management requires a carefully designed, continuous monitoring program. Monitoring would assess the condition of the lands and the environment to aid in the design of mitigation measures, as well as track compliance with required mitigation measures and evaluate their effectiveness in accomplishing the projected reduction in impacts.

Mitigation measures for monitoring and rehabilitating vegetation loss (which would also reduce soil erosion) are described in Section 4.7.5.3.1. In addition, erosion of roads and trails should be specifically monitored to identify prevention, maintenance, and repair actions needed to maintain stability.

If mitigation measures developed through the adaptive management approaches described above are effective in maintaining soil stability, they would also mitigate the indirect effects of dust generation and sedimentation resulting from accelerated erosion.

Also, WSMR would request funding to complete soil surveys of applicable portions of the installation. This information would be a necessary foundation for effective adaptive management and siting decisions.

4.6.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would implement the same mitigation measures described for Alternative 1. WSMR would request additional resources (funding and manpower) to conduct soil surveys and mitigation measures as necessary relative to the additional degree of anticipated ground disturbance and construction under Alternative 2.

4.7 Biological Resources

This section evaluates the impacts to Biological Resources by implementing the No Action Alternative, Alternative 1, and Alternative 2. A list of vegetation communities and sensitive species within WSMR is provided in Appendix F.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives. Appendix F provides additional information regarding major vegetation map units and sensitive species at WSMR.

4.7.1 IMPACT METHODOLOGY

Impacts to biological resources were assessed by reviewing the proposed changes in land use, existing and potential changes to activity categories, and testing and training requirements as described in Chapter 2 to determine which activities have the potential to impact either directly or indirectly biological resources. The factors for determining the significance of potential impacts are further discussed in Section 4.7.1.3.

For those potential actions that contain a known "footprint" such as the proposed construction projects around the Main Post and built-up areas, the proposed tank trail locations, and the Southeast Multi-Use Area, a detailed analysis of existing biological resources within these sites and an assessment of potential impacts were conducted. For these actions, the proposed footprint was overlaid on top of existing biological resource data using GIS. Potential acreages of impact were then quantified using GIS. For non-stationary resources (i.e., wildlife), the habitat quality and potential for species occurrence within the footprints were evaluated as a basis for potential impacts to wildlife species.

For those actions that are more programmatic in nature, such as the proposed changes to land use and activity categories and increases in testing and training activities, a qualitative assessment was conducted regarding the potential for impacts to biological resources.

If an impact was determined possible, a secondary analysis was conducted to determine if existing policies, plans, procedures, or restrictions are in place to protect the resource from potential impacts resulting from the Proposed Action and alternatives. This analysis was performed by evaluating the biological resources discussed in Section 3.7 to proposed facilities development and training activities associated with changes in land use and testing of future technologies.

4.7.1.1 Region of Influence

The ROI for biological resources includes all lands within WSMR boundaries, including portions of the Tularosa Valley Basin, northern portions of the Jornada del Muerto Basin known locally on WSMR as the Stallion Range, the San Andres Mountains, and Oscura Mountains. This includes areas within WSMR boundaries occupied by White Sands National Monument, JER, and SANWR; however existing limitations of use and management of these areas would remain unchanged. Although certain activities, such as missile intercepts and F-22A fly-overs, involve the use of restricted airspace and call-up areas outside of WSMR boundaries, impacts to biological resources within these areas from testing activities is highly unlikely, and therefore, these areas are excluded from the ROI for biological resource analysis. The one exception where the ROI has been increased is for the Federally-listed threatened Mexican spotted owl. The USFWS requested the BA (see Section 3.7.5.1) include evaluation of this species as it occurs beneath the airspace to the east of WSMR, which is affected by the Proposed Action.

4.7.1.2 Technical Approach

Data was obtained regarding vegetation, wildlife, threatened and endangered species, and wetland and arroyo riparian areas using GIS and existing documentation.

When evaluating impacts, it was assumed that existing biological resource policies, plans, procedures and restrictions would continue when implementing the action alternatives. These existing policies, plans, procedures, and restrictions at WSMR to protect sensitive biological resources include:

- The 2002 WSMR INRMP (Ref# 074) which provides management guidance and use restrictions for WSMR testing and training to reduce impacts to natural resources; including designation of SNAs.
- The Northern Aplomado falcon ESMP (Ref# 106) which details compliance, recovery, and monitoring strategies for the species including continued coordination with the USFWS; assistance in recovery efforts through species reintroduction at or adjacent to WSMR; grassland habitat conservation and restoration when compatible with the military mission; and continued installation-wide surveys for the Aplomado falcon in moderate to highly suitable habitat.
- Northern Aplomado falcon surveys would be conducted (by biologists under USFWS permit only) for activities in desert grassland habitat.
- If an active Northern Aplomado falcon (or suspected) is observed during the survey or planning phase of a proposed facility, WSMR Environmental shall be notified immediately to conduct follow-up surveys and assist with project siting. WSMR is required to report sighting within 24 hours to the USFWS.
- WSMR would not "take" adult Aplomado falcons, eggs, nests, or nestlings in accordance with the MBTA.
- The White Sands Pupfish Cooperative Agreement (Ref# 107) which designates essential and limited use pupfish habitat and use restrictions within these areas.
- Restrict ground operations within pupfish habitat.
- Perform periodic water sampling of pupfish streams to monitor water quality conditions.
- The ESMP for Todsen’s pennyroyal (Ref# 108) which designates essential habitat and use restrictions within these areas. Since the preparation of the ESMP, an additional 11 populations have been discovered at WSMR. Figure 3.7-2 “Area of Known Todsen’s Pennyroyal Populations, Critical Habitat, and Unsurveyed Suitable Habitat” includes those areas in which additional populations have been found outside of the Todsen’s pennyroyal SNA.
- Restrict ground disturbing activities within the Todsen’s pennyroyal habitat area (critical habitat, existing populations, and unsurveyed suitable habitat. This includes, but is not limited to, mission support facilities, specialized areas, off-road vehicle use, dismounted operations, field operations, surface weapons firing, weapons impact, directed energy systems, and instrument and communication systems.
- Airborne Weapons/Munitions release activities would not occur over or adjacent to the Todsen’s pennyroyal habitat area unless WSMR has determined that the activity would not affect Todsen’s pennyroyal, or unless the USFWS concurs with a not likely to adversely affect determination for a particular activity. If an adverse affect determination is made the activity would only occur in accordance with formal USFWS consultation.

- All other activities proposed within unsurveyed potential habitat (see Figure 3.7-2) will be coordinated with the WSMR Environmental Division. If adequate surveys are conducted to demonstrate that Todsen's pennyroyal is absent then an area can be used for ground disturbing activities. This does not include designated Critical Habitat or known populations and the half-mile buffer around each known population; these areas will remain off-limits to ground disturbing activities.
- The 2008 ITAM Five Year Plan (Ref# 221) which details mission strategies to achieve sustainable use of military lands by promoting proactive management and conservation of ecological function within the diverse landscapes for the purpose of ensuring no net loss of testing and training capability. The program provides data, contributes towards the development of land management decisions, participates in the development of installation level planning efforts and attempts to prevent environmental degradation through proactive project planning rather than focusing on land rehabilitation after an activity occurs.
- The 2008 Range and Training Land Assessment Five Year Plan (Ref# 090) which contains objectives, methodology, and models to assess current and future range land and ecosystem health and prioritizes monitoring areas.
- Current siting considerations, requirements, and BMPs, which have been developed to avoid impacts to sensitive resources from WSMR activities include:
- Siting of new facilities, activities and roads to avoid or minimize impacts to wetland and arroyo riparian areas in compliance with E.O. 11990.
- Siting of new facilities and activities should avoid or minimize potential harm to sensitive and protected, threatened and endangered plant and animal species (Ref# 111). Any undocumented or inadequately surveyed areas where ground disturbing activities would occur and where suitable sensitive species habitat exists should be surveyed by a qualified biologist for threatened and endangered species.
- Lay access routes into and out of project areas to minimize Federally-listed species habitat disturbance or fragmentation. Clearly flag disturbance boundaries to restrict travel outside of construction boundaries should occur.
- Notify WSMR Environmental Division immediately if any sensitive species is sighted during construction or other ground disturbing activities (Ref# 111).
- For all new construction of power lines, implement guidelines contained within "Service Guidelines on the Siting, Construction, Operation and Decommissioning of Communication Towers" for protecting raptors from electrocution including, where appropriate, burying all new construction of power lines to avoid bird collisions or electrocutions (Ref# 014).
- Restrict or limit ground operations away from species at-risk populations and habitat.
- Avoid activities during bighorn sheep calving period where known populations exist.
- Protect migratory bird resources in accordance with the WSMR Commander's Guidance on the MBTA (Ref# 014).

If the resource remains unprotected and vulnerable to impacts from the Proposed Action and alternatives, consideration was then given based on requirements under the Proposed Action (i.e., spatial constraints, etc.) whether or not avoidance mechanisms (such as those provided in Section 2.5) could be implemented to reduce significance of impacts.

4.7.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to biological resources resulting from the No Action Alternative, Alternative 1, or Alternative 2 include:

- Potential for the action to degrade critical or protected habitat (e.g., SNAs, riparian, arroyo, and wetland areas, nesting areas, watering areas, etc.) for wildlife;
- Potential for the action to degrade the ecosystem to the extent that biodiversity is impaired;
- Potential for the action to destroy habitat and prevent biological communities in the area from reestablishing themselves after the habitat is disturbed;
- Potential for the action to create habitat fragmentation;
- Potential for the action to interfere with the movement of any native resident or migratory wildlife species;
- Potential for the action to adversely impact threatened, endangered, or sensitive species or destroy or adversely modify Critical Habitat;
- Potential for the action to cause substantial mortality or displacement of species;
- Potential for the action to promote the spread of invasive, non-native species;
- Potential for the action to cause substantial damage to vegetation communities; and
- Potential for the action to violate Federal and State regulations governing biological resources including the Endangered Species Act, E.O. 11990, the MBTA and E.O. 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds," and the Fish and Wildlife Conservation Act.

4.7.2 NO ACTION ALTERNATIVE

Impacts to biological resources from the No Action Alternative from ongoing missions would be low. The degree of impacts would continue to be minimized through implementation of existing measures (Section 4.7.1.2).

Certain existing land use constraints occur within WSMR (see Figure 2.2-1). Table 4.7-1 includes those constraints associated with biological resources and provides limitations of use implemented by WSMR to protect those resources. The corresponding acreages, limitations of use, and management of these areas would remain unchanged, regardless of the alternative selected. In addition, land use designation, access to, and environmental restrictions for the JER, White Sands National Monument Co-Use Area, and Conservation/Protected Areas would remain unchanged. Therefore, neither the No Action Alternative nor Proposed Alternatives would alter the type or level of impact to biological resources within the areas listed in Table 4.7-1.

4.7.2.1 Range Capabilities and Use

Existing testing and training operations would continue throughout the existing designated land uses. Existing procedures implemented by WSMR to reduce biological impacts for these activities would continue to be followed, such as the INRMP and other WSMR Environmental Division guidance.

Table 4.7-1. Biological Environmental Constraints

Constraint	Acres	Limitations of Use
SNAs	83,333	SNAs warrant special management practices and restrictions or limitations of military use. Military use and access to delineated SNAs are minimized to authorized essential military requirements (i.e., recovery). Logging, livestock grazing, and road construction are prohibited within SNAs.
Springs	323	Mission testing and training activities are restricted from these resources to protect water quality.
Todsen's Pennyroyal[1]	4,070	This area includes designated critical habitat, known populations, and a one-half mile buffer around known populations. Ground disturbing activities are not allowed to occur within this area. Air-vehicle operations (overflights by missiles or other systems) are permitted, but airborne weapons/munitions releases activities will not occur over or adjacent to Todsen's pennyroyal habitat area unless WSMR has determined that the activity will not affect Todsen's pennyroyal, or unless the USFWS concurs with a not likely to adversely affect determination for a particular activity. Hunting and recreational activities are also prohibited.
Potential Todsen's Pennyroyal Habitat (unsurveyed)	17,930	WSMR habitat modeling has determined that 8,246 acres of this area is potentially suitable Todsen's pennyroyal habitat; however, this area has not yet been surveyed. There is also 9,592 acres of non-habitat buffer area included around the potential habitat that is not required to be surveyed. Similar use restrictions, as for designated critical habitat, apply to the entire area until surveys can be conducted to determine the presence or absence of the species. If an adequate survey (as agreed to by the USFWS and WSMR) is completed and if the species is determined to be absent, then the area surveyed (and associated non-habitat buffer area) can be removed from the protected area and used for ground disturbing activities. If the Todsen's pennyroyal is present, then the population and a half- mile buffer area around it would be added to the 4,070 acres of Todsen's pennyroyal restricted area.
Essential Pupfish Habitat[1]	6,650	All non-emergency vehicular traffic is restricted within Essential Habitat with the exception of use of existing improved and unimproved roads. All non-emergency activities shall be restricted within Essential Habitats, unless the responsible WSMR, Holloman AFB, or White Sands National Monument official is consulted. In the case of emergency activities, which may affect habitats of White Sands pupfish, such as chemical spills, debris recovery from military activities, or carrion removal, NMDGF and USFWS shall be notified and conferred with, as appropriate.
Limited Use Pupfish Habitat[1]	22,240	Limited Use areas are adjacent to existing pupfish habitat, which must be managed to ensure that degradation of Essential Habitat does not occur through direct or indirect effects such as contaminant runoff and excessive soil erosion. Similar restrictions of use to Essential Pupfish Habitat apply.

1. Acreages are also included in the SNAs acreage and have been separately addressed due to ESMP/Cooperative Agreement limitations.
Source: Ref# 074, 097, 107, 108

4.7.2.2 Main Post and Population Effects

As determined in the *Final Environmental Assessment for 2nd Engineering Battalion Transition*, stationing of the EN BN at WSMR would have no significant impact on biological resources (Ref# 004). The development would be sited near existing infrastructure and developed areas, reducing impacts to biological resources. In addition, no sensitive species, habitats or wetlands are located within the proposed area.

Direct impacts would occur to vegetation and wildlife habitat from construction of additional facilities on the Main Post. The degree of impact would depend on the location of facilities and activities and their proximity to existing infrastructure and activities. Facilities would be sited within the Main Post, which already contains high levels of human disturbance and activity, minimizing biological resource impacts.

Impacts to wetland and arroyo areas would likely be avoided, minimized, or mitigated through siting footprints of these actions outside of these resources. In addition, no sensitive species or habitats are known to occur within the Main Post; therefore, impacts to sensitive species would be unlikely.

4.7.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.7.3.1 Range Capabilities and Use

This section describes the proposed changes to land use and activities under Alternative 1 and their associated impacts to biological resources. Table 4.7-2 provides the potential type of impact which could be expected from future actions The degree of impact or the ability to avoid impacts would depend on the site selected, the type of activities authorized, their intensity, duration, and the conditions or restrictions imposed under which they may operate.

Table 4.7-2. Types of Biological Impacts

Impact Type by Impact Trigger	**Construction of Roads/Trails**	**Trail/Off-road Use**	**Construction of Permanent Structures**	**Use of Temporary Structures**	**Production of Noise**	**On-road Vehicle Traffic**	**Pedestrian Traffic**	**Ground Disturbance (bivouacking, digging)**	**Airspace Use**	**Ground Target Impact**	**Debris Fallout**	**Land Clearing/Grading**	**Collision Potential**
Loss of Vegetation/Habitat – permanent loss of vegetation/habitat resulting from a transformation of native vegetative communities to bare ground, pavement or infrastructure, or landscaped areas.	•		•									•	
Degradation of Habitat – permanent reduction in the quality of habitat through the loss of species diversity, introduction of invasive plant species, reduction of food resources, reduction of shelter/cover and human disturbance.		•		•			•	•				•	
Habitat Fragmentation – formation of isolated patches of habitat often resulting in decreased species diversity, changes in species community composition and degradation of overall habitat quality.	•	•						•				•	
Decreased Species Diversity – reduction of the abundance and diversity of plant and animal species within available habitats; often associated with degradation of habitat and habitat fragmentation.	•	•						•				•	
Change in Vegetative Species Composition – change in the type and number of species within a community as well as the proportion of one species to another. For example a grassland community may become encroached by shrubs or the amount of bare ground in a shrubland may increase.	•	•	•	•						•		•	
Introduction/Spread of Invasive Species – introduction or spread of existing invasive plant species into native communities; often associated with degradation of habitat and loss of species diversity.	•	•	•			•		•					

Table 4.7-2. Types of Biological Impacts (continued)

Impact Type by Impact Trigger	**Construction of Roads/Trails**	**Trail/Off-road Use**	**Construction of Permanent Structures**	**Use of Temporary Structures**	**Production of Noise**	**On-road Vehicle Traffic**	**Pedestrian Traffic**	**Ground Disturbance (bivouacking, digging)**	**Airspace Use**	**Ground Target Impact**	**Debris Fallout**	**Land Clearing/Grading**	**Collision Potential**
Crushing of Vegetation – damage to vegetation without direct removal of vegetation could lead to the declined health or death of the individual plant. This could in turn lead to a change in species composition, loss of habitat, or increase in erosion.		●		●			●	●		●		●	
Desertification/Erosion – degradation of land as a result of a loss of vegetation and soil erosion.		●		●				●		●		●	
Loss of Wetland – loss of wetland habitat either through direct fill or alteration of surface or groundwater hydrology.	●	●	●					●				●	
Alteration of Wetland – changes to wetland function and quality.	●	●	●	●				●				●	
Impact to Protected Species – direct "take" of species or indirect impacts such as noise or human activity harassment.	●	●	●	●	●	●	●	●	●			●	●
Impact to Critical Habitat – loss, degradation, human disturbance or fragmentation of critical habitat.	●	●	●	●				●				●	
Impact to SNA – loss, degradation, human disturbance or fragmentation within areas designated as SNAs.	●	●						●				●	
Startling Behavior – disturbance to wildlife species causing a change in species behavior or movement.		●			●	●	●	●	●	●			
Interrupt Nesting/Breeding – activities occurring during the nesting or breeding season, which have the potential to disturb nests or disrupt breeding.		●			●	●	●	●	●	●			
Interrupt Migration/Wildlife Corridor – interruption of wildlife movement; often associated with habitat fragmentation, and avoidance.		●			●	●	●	●	●	●		●	●
Ground Nest/Burrow Destruction – ground disturbance resulting in the destruction of ground nests and burrows.	●	●	●	●		●	●	●		●		●	
Avoidance/Displacement – change of species behaviors to avoid locations of human activity and displacement of individual species resulting from loss of habitat.	●	●	●	●	●	●	●	●	●	●		●	

4.7.3.1.1 Range Land Use

The proposed change of land use classifications would not have a direct impact on biological resources; however, the change of activities associated with the change in land uses would directly impact biological resources as discussed in Section 4.7.3.1.2. As stated under the No Action Alternative, land use designation and existing access and use restrictions for the JER, White Sands National Monument Co-Use Area, and Conservation/Protected Area would remain unchanged.

Alternative 1 would increase 1,618,000 acres of Augmented Test Zone, allowing for approximately 1,100,000 acres to permit off-road vehicle use. Off-road use in these areas would be primarily used for activities such as BCT Modernization testing events. As the amount of range land would be expanded to allow this type of activity, it could be assumed that these types of testing events could happen more frequently and would occur at locations throughout areas of WSMR classified as Augmented Test Zone. Table 4.7-2 indicates that off-road vehicle use has the potential to cause adverse impacts to biological resources. Therefore, increased area of off-road vehicle use has the potential to cause widespread adverse biological impacts throughout areas classified as Augmented Test Zone. Similar to the No Action Alternative, however, existing policies, management plans, and accepted BMPs (Section 4.7.1.2) would remain in effect for these land uses, the approximate 83,300 acres detailed in Table 4.7-1 would remain protected, and existing use constraints would continue to be implemented.

New Impact Areas are currently not sited, and therefore further environmental review would be required once siting locations are determined. Creation of a new impact area would cause concentrated adverse biological impacts and loss of biological resources in that area.

An increase in Range Centers and Built-up Areas would result in a loss of up to 7,000 acres of vegetation on WSMR. Table 4.7-3 summarizes the acres that could be lost for each vegetation type with the expansion of the Main Post and Stallion Range.

Expansion of the Main Post area would result in a loss of up to approximately 6,700 acres of vegetation. Mesquite coppice dunes comprise 47 percent of the area, creosote shrublands comprise 33 percent, three percent consists of other shrublands, 11 percent consists of grasslands, and the remaining percentage contains already disturbed areas.

Table 4.7-3. Vegetative Communities Within the Main Post and Stallion Range Expansion Areas

Community	Main Post Acres	Stallion Range Acres
Shrublands	2,300	20
Grasslands	730	25
Patchy	3,200	5
Mixed	150	0
Barren/Disturbed	320	50

Expansion of Stallion Range would result in a loss of up to approximately 100 acres of vegetation. Almost half of this area (50 percent) would consist of already disturbed areas, while 25 percent would be grasslands, and the remaining 25 percent would be comprised of shrublands.

Up to an additional 200 acres of vegetation could be disturbed from the expansion of one or two other range centers, such as Oscura, as these range centers could each expand by approximately 100 acres to support test requirements (see Section 2.3.1). As the proposed expansion of these areas have not been sited, direct impacts to vegetative communities cannot be quantified.

An increase in Range Centers and Built-Up Areas in Alternative 1 would result in a loss of approximately 7,000 acres of habitat primarily consisting of mesquite coppice dunes, shrubland, and grassland; all common habitat types occurring within WSMR. Species mortality would occur within these areas or species would relocate to adjacent suitable habitat types. This loss of habitat would constitute less than 0.5 percent of available habitat within WSMR, and would, therefore, result in minor impacts. In addition, expansion onto the existing Main Post and Stallion Range would utilize portions of previously disturbed areas and would reduce the overall amount of habitat fragmentation within WSMR, as development would be concentrated within existing developed areas south of US 70.

None of the proposed Main Post or Stallion Range area expansions would be located in critical habitat, SNAs, or locations where threatened or endangered species are known to occur; therefore, negligible impacts to sensitive species would be anticipated from construction activities and development of these locations provided existing policies, management plans, and accepted BMPs (see Section 2.5) are followed.

An approximate 1.5-acre wetland is located within the proposed expansion for the Main Post and no wetlands are known to occur within the Stallion Range area expansion; therefore impacts to wetlands due to Main Post and Stallion Range construction would be none to minor from construction activities and development of these locations provided guidelines in Section 4.7.5 are followed.

4.7.3.1.2 Range Activities and Levels of Use

The WSMR Environmental Division, with support from the ITAM Program and monitoring, would continue to assess testing and training use effects on the environment and would implement measures to avoid degradation of range land. Many of the activities and Specialized Areas proposed in Alternative 1 do not have siting locations, and therefore, would need further environmental review on a site by site basis.

The activities that would cause the greatest amount of impact to biological resources are primarily land-based such as: infrastructure (e.g., mission support facilities and specialized areas) and ground operations (e.g., off-road vehicle use, field operations, and dismounted operations). Both of these activity types can result in ground disturbance, which can be directly tied to the degradation of habitat for terrestrial and aquatic life.

Future infrastructure and ground operations activities could potentially cause significant impacts. These activities could result in decreased species diversity and harm to protected species. Impacts that could result from new infrastructure and ground operations include:

- The loss/degradation of habitat through loss/crushing of vegetation, change in vegetative community composition, introduction/spread of invasive species, habitat fragmentation, desertification/erosion, loss/alteration of wetland, and ground nest/burrow destruction.
- The avoidance and displacement of wildlife from the presence of people, systems, and facilities as well as the generation of associated noise. This could also result in interruptions of nesting and breeding locations, interruptions to migration/wildlife corridors, and startling behaviors.

Direct mortality of individuals could occur through collisions with vehicles and equipment. Impacts would be minor if existing policies, plans, and accepted BMPs (see Section 4.7.1.2) were employed and necessary measures for reducing biological impacts were applied (see Section 4.7.5). Of particular importance would be the continued implementation of restricted uses within SNAs and locations designated critical habitat.

The proposed increase in mission activities at WSMR would not be expected to cause adverse impacts to oryx populations as WSMR would continue to implement its existing hunting program at the same levels as it currently does. WSMR would continue to monitor oryx populations on the installation and, should the oryx population level and/or distribution be altered due to altered mission frequencies and locations, WSMR would revise their hunting strategies as necessary. This could include an increase in the number of hunting permits WSMR issues.

4.7.3.1.2.1 Ground Operations

Impacts on biological resources from ground operations would be directly related to their type, location, duration, intensity, and soil and weather conditions. Vehicle operations on established paved and unpaved roads within WSMR would have minimal incremental impact on biological resources. Dismounted operations for environmental conservation actions and recovery operations (without digging) would occur infrequently with relatively small adverse disturbance to the lands, and would provide an overall long-term benefit to the environment.

Off-road vehicle use, large dismounted operations (foot Soldier maneuvers), and field operations (such as large-scale bivouacking and installation of tent cities) would cause heavier land disturbance over a potentially large area of land. These types of ground operations would have the potential for long-term significant impacts, particularly at WSMR where the ability of vegetation to re-establish after disturbance or crushing is low. These activities could result in decreased species diversity and harm to protected species. Although WSMR policies would prohibit or restrict ground operations within SNAs and locations designated critical habitat, significant impacts to other biological resources would be likely. Impacts to biological resources that could result from ground operations include:

- The loss/degradation of habitat through loss/crushing of vegetation, change in vegetative community composition, introduction/spread of invasive species, habitat fragmentation, desertification/erosion, loss/alteration of wetland, and ground nest/burrow destruction.
- The avoidance and displacement of wildlife from the presence of people, systems, and facilities as well as the generation of associated noise. This could also result in interruptions of nesting and breeding locations, interruptions to migration/wildlife corridors, and startling behaviors.
- Direct mortality of individuals through collisions with vehicles and equipment.

Impacts to Vegetation
Off-road maneuvering areas would increase from 207,000 acres to 1,825,200 acres; of which the majority would be located in shrublands (607,000 acres) and grasslands (557,000 acres) (Table 4.7-4). Activities associated with off-road maneuvering under Alternative 1 would be similar to that described in the *Future Combat System Initial Integration Phase Testing Environmental Assessment* (Ref# 005), and would be of short duration (generally less than five days) and low intensity.

Table 4.7-4. Vegetative Communities Designated as Current and Proposed Augmented Test Zone Areas

Community	Current Land Use C Acres	Proposed Land Use C Acres
Woodlands	175	133,000
Shrublands	28,730	607,000
Grasslands	7,200	557,000
Patchy	144,540	224,000
Mixed	13,195	219,000
Barren/Other	13,360	85,000

The approximate annually disturbed area resulting from off-road activity (including wheeled and tracked vehicles) could range from approximately 15,000 acres (smallest operational area) to 494,000 acres (largest operational area). In addition, approximately 1,000 additional acres would be disturbed as a result of field and pedestrian operation around the nodes.

Off-road impacts under Alternative 1 would represent an annual disturbance of less than 1 percent (16,000 acres) to 27 percent (495,000 acres) of the entire 1,825,000 acres designated for proposed off-road use. This percentage range could increase depending upon off-road activity restrictions within sensitive habitats listed in Table 4.7-1 and restricted activities within other environmental considerations such as steep slopes, erodible soils, and culturally sensitive areas. As a wide span of activities encompass off-road use, certain activities involving, for instance, lightweight equipment and minimal ground disturbance could be permitted within environmentally sensitive habitats, as determined by the WSMR Environmental Division. Therefore, the exact locations of activities would be determined by specific activity and locations would vary on an annual basis.

As steep slopes (slopes exceeding 40 percent) present the largest single environmental constraint (803,000 acres), this EIS for a comparison also analyzes a second scenario (upper bound) of potential annual off-road impacts if WSMR chose to restrict off-road use within steep slopes. The percentage range of disturbance to available land would increase (1.4 percent to 44 percent) if steeply sloping mountainous terrain were excluded from off-road use. Impacts to vegetation resulting from off-road maneuvering and field operations under Alternative 1 would be moderate on an annual basis if activities were restricted to smaller operational areas (e.g., reuse of areas within a calendar year). Although the larger operational areas would limit the amount of repeated reuse of an area within a calendar year (spreading out the intensity of ground impact on a yearly basis), the overall percentage of land area (and vegetation) subject to disturbance would be greatly increased. Annual use of larger operational areas could cause significant impacts to vegetation, including loss of vegetation, desertification, and a greater potential for the introduction of invasive species.

Off-road operational area use within the 1,825,000 acres could be rotated to reduce long-term ecological damage such as erosion and desertification, especially when smaller annual operational areas are used. For example, annual operations used 22,700 acres, or two percent of the suitable Land Use C (excluding steep slopes), which would allow off-road operational area rotations for up to 50 years. Under this scenario, a 50-year period of non-use, if needed, could be established for areas experiencing degradation, loss of vegetation, or areas containing invasive species and allow natural or managed restoration. As the size of annual operational areas increases, the time available for off-road rotation and ecosystem recovery would decrease, decreasing opportunities for sustainable management of range lands. If the largest annual operational area was used year after year (495,000 acres) and only suitable Land Use C areas were used, ecosystems would only have approximately one to two years to recover before they would be re-used for off-road activities.

Although WSMR would have flexibility on an annual basis of operational area size and re-use to accommodate specific annual off-road activities, shorter durations of recovery periods would likely result in an increased potential for significant long-term impacts. Marginally degraded areas could be avoided in subsequent years to allow for natural or managed restoration, however, the duration of restoration as discussed, would depend on operational area size. The spread and introduction of invasive species is a concern throughout the installation. An increase in activities, which include ground disturbance such as construction, off-road maneuvering, and field operations, can increase the risk of spread and introduction of invasive species.

Regardless of operational area size, localized significant impacts in terms of vegetation loss and desertification, particularly in disturbed areas containing higher erosive soils such as grasslands, would occur. Grasslands represent approximately 30 percent (557,000 acres) of the vegetative communities within the 1,825,000 acres. Larger annual operational areas would also increase the potential of significant impact to grassland communities. WSMR would continue to monitor range land impacts required by responsible land steward principles outlined in AR 350-19, and would identify degraded rangelands for restoration. In addition, WSMR could choose adaptive management (Section 4.7.5) as a mitigation strategy for adverse impacts. Additional measures for reducing biological impacts, which could be implemented to reduce significance of impacts to vegetative communities, are also presented in Section 4.7.5.

Impacts to Wildlife

A majority of the testing activities would have minor impacts on wildlife (Table 4.7-2). An increase in mission support facilities, off-road vehicle use, and field operations could have a moderate to significant impact depending on the location of the activity. As the frequency of these activities is projected to increase, and a larger portion of WSMR would be opened up to off-road maneuvering, activities could potentially affect larger areas of habitat, species, and cause degradation and fragmentation on a larger portion of the installation.

The expansion of Augmented Test Zone would have the greatest potential for significant impacts to habitat. As shown in Table 4.7-2, off-road vehicle use has the potential to degrade habitat, cause fragmentation, decrease species diversity, and affect species behavior. Activities associated with off-road maneuvering under Alternative 1 would be similar to that described in the *Future Combat System Initial Integration Phase Testing Environmental Assessment* (Ref# 005), and would be of short duration (generally less than five days) and low intensity, minimizing the duration of disturbance to wildlife within these areas as well as the extent and intensity of potential degradation.

Approximately 16,000 acres to 495,000 acres of habitat would be disturbed annually from off-road activity. As stated for vegetation, these impacts would represent a less than one percent to 44 percent disturbance of the land area to be designated for off-road vehicle use depending upon the size of operational areas and exclusion of less suitable lands. Minor to moderate impacts to habitat would likely occur under utilization of small annual operational areas. Regardless of annual operational area size, areas of wildlife habitat would likely be degraded and would require idle periods (multiple consecutive years) of non-use for natural or managed restoration. Therefore, depending upon the size of operational area, frequency of use and sensitivity of habitat (i.e., grasslands, SNAs, aquatic, steep slopes) significant impacts to habitat (permanent degradation or loss) could occur. As discussed for vegetation, grassland would be the most vulnerable habitat type to ground disturbance impacts and, therefore, those species that prefer grassland habitat could be adversely impacted. Those species preferring shrub habitats could benefit due to shrub encroachment.

Species within significantly degraded habitat would either relocate to adjacent similar habitat types or perish. In addition, the introduction of off-road vehicle use would increase the potential for vehicle impact and mortality, causing moderate although infrequent adverse impacts to species populations. The potential for significant impacts to wildlife habitat would likely be avoided or reduced provided sustainable management practices are followed, such as rotation of off-road use areas, and avoidance of sensitive communities listed in Table 4.7-1 and sensitive vegetative communities such as grasslands. Measures for reducing biological impacts presented in Section 4.7.5 could be implemented to reduce significance of impacts to wildlife and quality of habitat.

Impacts to Sensitive, Threatened and Endangered Species

Potential impacts to sensitive plant and animal species would be similar to those discussed for vegetation and wildlife. WSMR has prepared a BA for four Federally-listed species known to occur either at WSMR or beneath the high altitude airspace east of WSMR. This assessment has concluded that land use changes and associated activities use may affect, but is not likely to adversely affect populations of the Todsen's pennyroyal, southwestern willow flycatcher, and Mexican spotted owl and is not likely to jeopardize the continued existence of the nonessential experimental population of the Northern Aplomado falcon. The USFWS has concurred with these determinations in a letter dated September 24, 2009 (see Appendix E for the BA and USFWS letter).

Testing and training activity impacts on Federally-protected species would be avoided or minimized through adherence to existing policies, management plans, and accepted BMPs (Section 4.7.1.2). Those sensitive species listed in Appendix F that prefer grassland habitat could experience the greatest degree of adverse impact, as this habitat would be the most vulnerable to disturbance and would be difficult for recovery. These impacts would be reduced or avoided if appropriate measures are employed (see Section 4.7.5).

Impacts to Wetlands and Arroyo Riparian Drainages

Impacts to wetlands and arroyo riparian drainages under Alternative 1 would primarily result from those activities involving new land disturbance including mission support facilities, specialized areas, off-road maneuvering, and field operations. Ground disturbance activities could result in the total loss (fill) of wetlands, or alteration and disruption to wetlands, arroyo flow, and riparian areas. In addition, these activities could result in the loss or disturbance to vegetation within existing wetlands and riparian areas. The level of impact to these resources would depend on proposed facilities, testing, and training. By siting footprints away from wetlands and arroyo riparian drainages, impacts to these resources would likely be avoided.

Increases in testing and training activities could impact wetland, arroyo, and riparian resources; however, avoidance requirements under E.O. 11990, Protection of Wetlands, would direct testing and training away from these resources when impacts are determined to be avoidable. Unavoidable significant impacts from off-road maneuvering activities could include erosion and degradation of stream banks and riparian area, hydrological alteration (soil rutting) and changes of community composition to wetlands, alteration of floodwater flows, increased turbidity in active stream channels if traversed by off-road activities, and sedimentation into adjacent waterways from off-road maneuvering in riparian areas. Use of larger annual operational areas could potentially avoid off-road maneuvering impacts to wetland and arroyo resources as larger land area would be available to avoid these resources. However, small annual operational areas could potentially be sited to completely avoid arroyo crossing and avoid direct impacts to these resources. E.O. 11990 would continue to direct WSMR to avoid impacts to these resources. Mitigation for impacts to these resources under Section 404 permitting, however, would not be required as wetland and water resources within WSMR drain into isolated basins which are not classified as navigable waters (i.e., are non jurisdictional under Section 404 of the Clean Water Act). WSMR may, however, be required to do mitigation if activities affecting wetland and water resources adversely impact (directly or indirectly) pupfish habitat and water quality (i.e., through increased turbidity, causing hydrological alteration).

4.7.3.1.2.2 Hazardous Operations

Hazardous operations (e.g., surface weapons firing, directed energy systems, and air vehicle operations) could also cause adverse impacts to biological resources; however, these would not be expected to be greater than moderate impacts due to their locations and relatively short durations. Weapons impact activities could cause similar adverse impacts as those described for infrastructure and ground operations activities above; however, they would not be expected to be greater than moderate impacts. Other hazardous operations, such as surface weapons firing, could cause habitat degradation and fragmentation, which can lead to decreased species diversity as well as impacts to protected species. Other adverse impacts would include avoidance and displacement of wildlife, startling behavior, interruptions to nesting and breeding, and interruptions to migration/wildlife corridors from increased noise and the presence of systems. Overall, adverse biological impacts resulting from hazardous operations would be reduced or avoided provided existing policies, management plans, and accepted BMPs (see Sections 2.5 and 4.7.1.2) are followed.

4.7.3.1.2.3 Air Operations

Air operations are not anticipated to impact biological resources within WSMR. As previously stated, the preliminary conclusion of the BA is that activities may affect, but are not likely to adversely affect populations of the Mexican spotted owl and are not likely to jeopardize the continued existence of the nonessential experimental population of the Northern Aplomado falcon.

4.7.3.1.3 Range Infrastructure

Tank trails would be adjacent to existing roads, therefore minimizing impacts, and would result in minor to moderate impacts to vegetation and habitat. The proposed North-South Tank Trail conceptual alignment contains three locations that would cross areas designated as pupfish Limited Use Habitat. The conceptual siting of the proposed tank trail would run along Range Road 7 and Range Road 8 on the North/west side of the existing road. However, WSMR would coordinate with the NMDGF and USFWS as described in Table 4.7-1 to ensure that the construction and operation of the proposed tank trail would not adversely affect population of White Sands pupfish. Mitigation measures would include re-routing the tank trail to avoid Limited Use and Essential pupfish habitat (an option that seems feasible based on the local terrain) or working with NMDGF and USFWS to develop BMPs to prevent or limit sedimentation of streams or other adverse impacts where these areas could not be avoided. The 20 miles of proposed connector tank trails between the Main Post and Fort Bliss would follow the existing road network to the extent practicable to minimize impacts to vegetation and habitat.

Potential measures discussed in Section 4.7.5 with regard to invasive species would be followed, minimizing the potential for further spread or invasion.

4.7.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. Each of the Specialized Areas would require land clearing and permanent facilities that would collectively remove several hundred acres of native vegetation. However, this vegetation loss would be minor, representing a very small portion of WSMR’s natural environment. Nevertheless, biological resources would be a key consideration during the siting process to avoid conflict with protected habitat/species, and minimize impacts to biological resources.

The specific locations of these Specialized Areas have not been determined, however, it is likely the JLENS Specialized Area would occur south of US 70. As limited sensitive biological resources exist south of US 70, overall adverse impacts to biological resources would be minor.

4.7.3.2 Main Post and Population Effects

No construction would occur within the Main Post beyond what was described under the No Action Alternative. Minor increases in personnel that would occur under Alternative 1 may result in minor increases in recreational uses of natural lands; however, it is unlikely that associated disturbances would produce any measurable impact on biological resources in terms of habitat alterations. Recreational uses that produce loud noises (e.g., dirt bike riding) could result in startling behaviors and avoidance by wildlife; however, no new designated recreational areas are proposed and increases in these human activities would be expected to be marginal, if they increase at all.

4.7.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.7.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.7.4.1.1 Construction

Infrastructure required for a HBCT (or comparable unit) would result in the development of approximately 300 acres of previously undisturbed lands in the Future Development Area. As this action is site-specific in nature, as opposed to the primarily programmatic nature of proposed land use changes in Section 4.7.3.1.1, quantifiable impacts to biological resources can be discussed. The following text provides specific impacts to biological resources.

4.7.4.1.1.1 Impacts to Vegetation

Development of the proposed Future Development Area would result in an estimated loss of 300 acres of vegetation. Forty-six percent of this area is mesquite coppice dunes, with 34 percent comprising creosotebush shrublands. The remaining area is mixed lowland desert scrub (three percent) and existing roads (16 percent). The overall adverse impact on vegetative resources would be minimal due to the amount of this vegetation type present on the adjacent lands and the overall net decrease on WSMR for these vegetation types would be minimal.

4.7.4.1.1.2 Impacts to Wildlife

Development of the proposed Future Development Area would result in an estimated loss of 300 acres of habitat, primarily consisting of mesquite coppice dunes and creosotebush shrublands. Species mortality would occur within these areas or species would relocate to adjacent suitable habitat types. This loss of habitat would constitute less than 0.1 percent of available habitat within WSMR, and would therefore, result in minor impacts to wildlife. In addition the proposed Future Development Area would utilize existing disturbed areas (16 percent), reducing overall adverse impacts to habitat including habitat fragmentation. The concentrated development for HBCT infrastructure and location of tank trails adjacent to existing roads would also reduce adverse impacts of habitat fragmentation.

4.7.4.1.1.3 Impacts to Sensitive, Threatened and Endangered Species

Development of the proposed Future Development Area would not be located in critical habitat, SNAs, or locations where Federal threatened or endangered species are known to occur; therefore no direct impacts to Federal threatened or endangered species are anticipated. The increased population and impervious surface associated with Alternative 2 could increase water levels within Davies Tank through an increase in stormwater and wastewater discharges, potentially indirectly impacting a recently observed southwestern willow flycatcher (June 2009). This could result in changes in the riparian vegetation around Davies Tank, which could affect southwestern willow flycatcher nesting habitat. As only a single individual was observed at Davies Tank, it is not currently known whether the onsite habitat is being used by this species or the sighting was of a single transient happening to pass through the area. Considering a single individual was sighted and WSMR has not historically hosted this species, overall impacts to population levels would be minor. WSMR would continue to monitor the area for this species and determine if a resident population exists. WSMR would consult with USFWS on any modifications to Davies Tank prior to construction or a change in water levels.

4.7.4.1.1.4 Impacts to Wetlands and Arroyo Riparian Drainages

One substantial arroyo exists within the proposed Future Development Area. Development of the area would be located away from this arroyo or any other areas found to contain wetland, arroyo, or riparian areas, therefore, no significant impacts to these resources would be anticipated from construction activities and development of these locations provided existing policies, management plans, and accepted BMPs (Section 4.7.1.2) are followed.

4.7.4.1.2 Main Post and Population Effects

Population increases associated with a HBCT (or comparable unit) would have no direct impact on biological resources other than the construction effects described above and the operational hazards to vegetation (i.e., vegetation crushing and loss) and wildlife (i.e., behavioral disturbance and vehicle collisions) as described above.

4.7.4.2 Training within the Southeast Multi-Use Area

As Alternative 2 incorporates all of Alternative 1, an additional 1,618,000 acres (similar to Alternative 1) would be converted to Augmented Test Zone and approximately 1,100,000 acres would possibly permit off-road vehicle use. Therefore, biological resource impacts discussed in Section 4.7.3 would apply to Alternative 2. Impacts to biological resources from Alternative 2, however, would be greater than those described under Alternative 1. The following characterizes additional impacts associated with Alternative 2.

The type of impacts to biological resources from Alternative 2, Southeast Multi-Use Area would be similar to those described for off-road maneuvering Alternative 1 having the potential to cause significant impacts to biological resources. Adverse impacts could include a significant loss of vegetation/habitat, degradation of habitat, habitat fragmentation, decreased species diversity, change in vegetative species composition, crushing of vegetation, desertification/erosion, loss of wetland, alteration of wetland, startling behavior, interruption of nesting/breeding, interruption of migration/wildlife corridor, ground nest/burrow destruction, and avoidance/displacement behaviors. Therefore, increased areas of off-road vehicle use have the potential to cause widespread biological impacts (further discussed below) throughout the Southeast Multi-Use Area shown in Figure 2.4-1.

4.7.4.2.1 Impacts to Vegetation

Compared to Alternative 1, off-road vehicle use within the Southeast Multi-Use Area would likely result in locally significant impacts to vegetation due to a higher intensity and frequency of use for the area.

The approximate amount of disturbed area resulting from off-road activity (including wheeled and tracked vehicles) would be up to 120,000 acres annually. As a result, the entire Southeast Multi-Use Area would be potentially disturbed during one year’s worth of training.

The majority of the Southeast Multi-Use Area contains mesquite coppice dunes (74 percent). Five percent of this area is grasslands, while the remaining 21 percent is comprised of other shrublands or existing disturbed areas. Impacts on vegetation resulting from off-road maneuvering under Alternative 2 would be less significant if activities were restricted to mesquite coppice dunes and other shrublands lacking erosive soils (which are described in Section 3.6.5 and depicted in Figures 3.6-1 and 3.6-3). The entire Southeast Multi-Use Area, however, would likely be subject to training and associated ground disturbance impacts. Crushing and loss of vegetation, desertification, and conversion of vegetative communities would likely occur within the entire Southeast Multi-Use Area, with a greater degree of impact occurring to more sensitive grassland communities. Significance of impacts could be reduced provided measures to reduce biological impacts presented in Section 4.7.5 are implemented.

4.7.4.2.2 Impacts to Wildlife

Compared to Alternative 1, off-road vehicle impacts within the Southeast Multi-Use Area would likely result in locally significant impacts to wildlife habitat due to a higher intensity and frequency of use for the area. The majority of habitat within the Southeast Multi-Use Area (mesquite coppice dune, shrubland, and grassland) could experience widespread local significant degradation throughout the 120,000 acres, or six percent of the total WSMR land area. As the entire Southeast Multi-Use Area would likely be required for annual training, yearly rotation of areas experiencing minor to moderate disturbances, as discussed in Alternative 1, for off-road use would be unlikely.

Individual populations of wildlife within the 120,000 acres would experience significant impacts due to loss and degradation of habitat, and increased disruption due to noise, ground disturbance, and human activity within the 120,000 acres. These species would either adapt to increases of human use and disturbance or would be required to relocate elsewhere within WSMR or surrounding lands. Individual species unable to relocate would perish. Significance of impacts could be reduced provided measures to reduce biological impacts presented in Section 4.7.5 are implemented.

Currently, the majority of oryx hunting and oryx populations on WSMR occur north of US 70. Hunting in areas north of US 70 would not be expected to be directly affected by mission activities in the proposed Southeast Multi-Use Area or Local Training Area, which would be located south of US 70. Hunting opportunities would still be made available in areas south of US 70 under Alternative 2 and the intensity of oryx hunts would continue at their current levels or would be increased should WSMR's oryx population statistics deem it necessary.

4.7.4.2.3 Impacts to Sensitive, Threatened and Endangered Species

Development of the Southeast Multi-Use Area would not be located in critical habitat, SNAs, or locations where threatened or endangered species are known to occur; therefore, no significant impacts to sensitive species would be anticipated from construction activities and development within these locations.

4.7.4.2.4 Impacts to Wetlands and Arroyo Riparian Drainages

Development of the Southeast Multi-Use Area would be located away from areas containing wetlands with the exception of an approximate 0.2-acre wetland. Arroyo and riparian areas would be significantly impacted if these resources could not be avoided during training activities. Unavoidable significant impacts from off-road maneuvers could include erosion and degradation of stream banks and riparian area, alteration of floodwater flows, increased turbidity in active stream channels if traversed by off-road activities, and sedimentation into adjacent waterways from off-road maneuvering in riparian areas. Significance of impacts could be reduced provided measures to reduce biological impacts presented in Section 4.7.5 are implemented.

4.7.5 MEASURES FOR REDUCING IMPACTS

4.7.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Potential management practices for biological resources would generally apply to all four Activity Classes (Infrastructure, Ground Operations, Hazardous Operation, and Air Operations. Regardless of activity, coordination with the WSMR Environmental Division is required to identify and avoid sensitive species and their habitat and project proponents are required to notify WSMR Environmental Division of sensitive species sightings. The following management practices could be implemented in addition to existing accepted policies, management plans, and BMPs outlined in Section 4.7.1.2.

Infrastructure

- Site of new access roads to minimize potential habitat disturbance resulting from diversion of storm run-off from existing drainage patterns (Ref# 111).
- Site facilities within existing disturbed areas or adjacent to disturbed areas to avoid ecological fragmentation while supporting mission requirements (Ref# 014).
- Locate new roads to minimize habitat fragmentation and adverse impacts to ecological integrity while supporting mission requirements (Ref# 014).
- Plan for and maintain a screen of undisturbed, natural vegetation between sensitive habitat features and any new, permanent roads or facilities, where practicable, to buffer impacts to sensitive habitats. Conduct seeding, reseeding, or transplanting of vegetation where natural vegetation must be destroyed or does not provide a screen to establish or enhance a screen (Ref# 111).
- Avoid impacts to large yucca trees in grasslands when possible. Large yucca trees are used for nesting by a variety of raptors, including the endangered Northern Aplomado falcon.
- Avoid interfering with yucca pollination by the yucca moth, tests requiring the use of *Bacillus thuringiensis* should not take place during the month of June, the peak flowering time of soaptree yucca (Ref# 111).
- Inspect all erosion control material for presence of invasive species prior to installation.
- Design security/stadium lighting along fences and other facilities to minimize light beyond the designated security zone. Providing either gaps in lighting or utilizing infrared lights in suspected wildlife movement corridors would be important to facilitate these animals natural use of the landscape. Where security lights shine on any habitat areas, keep the intensity level less than 1.5 foot candles. Shield all lights from the top to prevent up-lighting (Ref# 014).
- Minimize noise levels for day or night construction and maintenance for all projects affecting Federally-listed animals. Place all generators in baffle boxes (a sound-resistant box, which is placed over or around a generator), have an attached muffler, or use other noise-abatement methods in accordance with industry standards (Ref# 014).
- Wash all construction vehicles and heavy equipment of mud, dirt, and plant material in order to reduce the risk of spreading and introducing invasive species.

Ground Operations

- Restrict intensive and frequent off-road maneuvering and other ground disturbing activities in grasslands and other communities with erosive soils to the extent practicable.
- Wash tactical vehicles and heavy equipment of mud, dirt, and plant material in order to reduce the risk of spreading and introducing invasive species.
- Maximize use of existing roads and trails in planning site access. Design all new roads to avoid stream crossings and/or arroyos to the extent practicable to minimize the risk of erosion or adverse effects to aquatic or floodplain habitats. Use areas already disturbed by past activities or those that would be used later in construction for staging, parking, and equipment storage to the extent possible.

Hazardous Operations

- Position radars so no potential raptor perches are included in the hazard area.
- Avoid lasering in the direction of bighorn sheep habitat or operate at reduced power levels if laser beam has the potential to strike bighorn sheep eyes.
- Site new impact areas away from biologically sensitive areas.

Air Operations

- There are no existing siting considerations or BMPs for air operations relative to biological resources except as provided for in existing species-specific MOUs or as determined on a project-specific basis, outlined under relevant NEPA documents.

General

- Restore disturbed areas with reduced vegetative cover. One example of an area that most often requires reseeding are black grama/longleaf mormon tea grasslands. Only native grasses, forbs, and shrubs indigenous to WSMR and suitable to replace extant vegetation within the habitat would be used during revegetation unless otherwise directed by the WSMR Environmental Division. Plant species beneficial to wildlife wherever possible (Ref# 111).
- To prevent drowning of migratory birds or other wildlife, avoid open top liquid storage containers on job sites or provide USFWS-approved escape ramps (Ref# 014).
- Monitor sites closely for presence of invasive species following construction or in areas where intensive and frequent off-road maneuvering occurs (Ref# 014).
- Schedule activities and/or construction and maintenance for roads, fences, or other facilities, which must be built closer than two miles to occupied Northern Aplomado falcon habitat between August 1 and January 31 to avoid the falcon breeding season, to the maximum extent possible. Locate staging areas for equipment and supplies as far away as practicable from Northern Aplomado falcon habitats (Ref# 014).
- Conduct activities during daylight hours to avoid noise and lighting issues for activities, and/or construction, and maintenance, closer than two miles to occupied Northern Aplomado falcon habitat. Shield all lights to direct illumination only onto the work site if construction or maintenance work activities would continue at night; use the minimum wattage needed and the minimum number of lights (Ref# 014).

4.7.5.2 Recommended Management Actions

Based on the actions proposed under Alternatives 1 and 2, WSMR should undertake the following management actions:

- Update the 2002 WSMR INRMP. INRMPs are typically updated every five years to ensure natural resource conditions are accurate and that INRMP management goals are relevant to both protecting natural resources and maintaining mission requirements.
- Identify vulnerable/sensitive grasslands in Land Use Classification C and the proposed Southeast Multi-Use Area as an environmental constraint. Any off-road uses in these areas would require coordination and approval with WSMR Environmental Division prior to operations. Limitations may define duration or level of activity, vehicle types and numbers, speed of vehicles, and specific seasonal or weather restrictions, for example.
- Develop SOPs and revise existing environmental awareness training plans to ensure that the large numbers of incoming Soldiers, Families, and employees (civilian and contractor) receive initial and recurring awareness training regarding environmental constraints and testing and training limitations concerning biological resources, particularly with regard to field operations and off-road vehicle use.
- Continue the implementation of MOUs with Federal and State wildlife agencies.
- Where feasible to the WSMR mission, manage range lands to conserve all species on the installation listed by the State of New Mexico as threatened or endangered in accordance with State laws and Army regulations and guidance.
- Request increased Army funding for monitoring and collecting data on training impacts and data from other areas prone to degradation from off-road vehicle use to develop adaptive management strategies and revise and develop new monitoring protocols.
- Request increased Army funding for Land Rehabilitation and Maintenance to support range land restoration and sustainability projects to offset impacts induced by training and increased off-road vehicle use.

4.7.5.3 Mitigation Measures

4.7.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

The potential for significant biological impacts would primarily exist from the increased land available for off-road testing and training activity under Alternative 1. These impacts would result from the loss/degradation of natural vegetation communities and associated wildlife habitat. WSMR, in its INRMP, has stated a standard on the installation of preserving ecologically important vegetation communities in sufficiently large enough blocks to minimize habitat fragmentation while supporting mission requirements (Ref# 074). Consequently, WSMR would monitor areas used for ground disturbing activities and develop strategies to rehabilitate areas where significant vegetation is lost due to human activities. WSMR's goal would be to limit man-made vegetation loss to less than 30 percent in areas approved for ground disturbing activities.

This strategy would minimize the potential for broad habitat fragmentation to occur from man-made activities and minimize impacts to natural vegetation communities in the process. Methods of achieving this goal could include intensive habitat restoration activities (e.g., stabilizing soils, reseeding, etc.), timing and rotating the locations of off-road vehicle use to allow for proper restoration to succeed, and limiting activities to highly localized areas so as to continually affect the same areas at a rate of less than

30 percent of the total vegetation cover. In order to achieve this, a heavy emphasis would be placed on utilizing an adaptive management approach that allows for variation in environmental conditions and an informed response to such variation. As part of using adaptive management, WSMR would be able to determine what type and location of specific mitigation measures would be needed to protect or restore biological resources through biological monitoring of lands subject to off-road vehicle use.

Through procedures outlined in both the INRMP and ITAM Program, WSMR already conducts activities that involve surveying and monitoring installation lands for biological resources. These on-going monitoring efforts document biological conditions that are used for preventing impacts from existing testing and training activities and to justify funding for restoration activities and for supplemental monitoring efforts. Under an adaptive management strategy, additional monitoring studies and increased funding for INRMP and ITAM projects would be required in assessing testing and training impacts throughout the 1,825,000 acres having the potential for off-road activities. Proposed mitigations would then be implemented for preventing or restoring biological impacts and a period of monitoring and research would occur to determine the success of the mitigation efforts. Testing and training activities would then be modified, if necessary, based on an analysis of the data collected with cycles of further measurement and adjustment to reach and sustain biological resource management objectives contained within the INRMP and range land sustainability objectives contained within the ITAM plan.

In order to undertake such management actions, WSMR would need to fund and implement a monitoring and restoration program to the level necessary for expanded activities. Also, WSMR would request funding to update their INRMP to reflect the new mission capabilities and land use alterations on the installation.

WSMR would coordinate with the NMDGF and USFWS to ensure that the construction and operation of the proposed tank trail would not adversely affect population of White Sands pupfish. Mitigation measures would include re-routing the tank trail to avoid Limited Use and Essential pupfish habitat (an option that seems feasible based on the local terrain) or working with NMDGF and USFWS to develop BMPs to prevent or limit sedimentation of streams or other adverse impacts where these areas could not be avoided.

4.7.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would implement the same mitigation measures described for Alternative 1. WSMR would request additional resources (funding and manpower) to conduct biological surveys and mitigation measures as necessary relative to the additional degree of anticipated ground disturbance and construction under Alternative 2.

4.8 Water Resources

This section evaluates the impacts to Water Resources by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.8.1 IMPACT METHODOLOGY

Impacts to water resources were assessed by reviewing the proposed changes in land use, existing and potential changes to activity categories, proposed construction and population effects, and testing and training requirements as described in Chapter 2 to determine which activities have the potential to directly or indirectly impact water resources. The criteria used to evaluate whether these potential impacts are considered significant are listed in Section 4.8.1.3. Potential and recommended management actions, as well as mitigation measures are also discussed and should be implemented to reduce any adverse impacts that are presented. The existing surface water and groundwater environments are described in Section 3.8.

4.8.1.1 Region of Influence

The ROI for water resources includes the surface and groundwater resources that supply and exist on WSMR as well as the watersheds located within WSMR's boundaries. This includes lakes, springs, ponds, streams, creeks, and sinks and the following three watersheds: Jornada del Muerto Basin (HUC 13020210), Tularosa Valley Basin (HUC 13050003), and Jornada Draw Basin (HUC 13030103) (described in Section 3.8.3.1).

4.8.1.2 Technical Approach

Data was obtained from reference documents and GIS-based mapping applications to determine potential impacts to water resources under each alternative. The analysis of groundwater resources is based on a April 2009 Draft Potable Water Resources Report (Ref# 151).

For potential actions that have a known footprint, such as the proposed tank trail and construction of additional facilities around the Main Post and built-up areas, an analysis of surface waters and groundwater was conducted using recent GIS data. The analysis included streams, springs, creeks, lakes, ponds, and wells located within one mile of the proposed tank trail and built-up areas. The centerline of the proposed tank trail was used as a baseline with a 1-mile corridor (half-mile on each adjacent side of the tank trail). The proposed additional facilities around the Main Post and built-up areas have siting locations. However, an exact footprint of these facilities has not been established. Therefore, a one mile radius around the siting locations was used for analysis. The potential actions were also evaluated in a broader sense for watershed level effects.

Typical actions associated with the construction of facilities having a known footprint may have the potential to impact water resources. However, it is assumed that these facilities would be sited to avoid sensitive areas and that WSMR would continue to employ a variety of BMPs to protect water resources from adverse impacts, including but not limited to:

- All construction activities (e.g., ground-disturbing and routine maintenance activities) would be reviewed by the WSMR Environmental Division to ensure compliance with applicable regulations and implementation of appropriate BMPs.
- All surface waters, floodplains, and wells would be avoided when placing new facilities.

- Stormwater management strategies would be implemented as prescribed in the latest storm water management plans for the various WSMR facilities (Ref# 111).

Typical actions associated with the testing and training activities also have the potential to impact water resources. However, it is assumed that WSMR would continue to employ the following to the maximum extent practicable, to protect water resources from adverse impacts.

- WSMR would select potential suitable maneuver-to-test areas in consultation with the Environmental Division with ITAM Program support and would implement actions to reduce erosion and reclaim these lands, where feasible, following use.
- WSMR would demarcate off-limits areas (such as potable well sites) using methods that are clearly visible to field participants.
- Frequently disturbed areas would continue to be sampled following maneuvers to evaluate soil susceptibility to erosion.
- All surface waters and wells would be avoided when placing targets.

Therefore, the impact levels presented herein reflect these environmental practices for the siting of new projects and authorizing and monitoring activities.

For actions that are programmatic in nature (i.e., where project-specific information, such as site location, has not yet been defined) potential and recommended management actions have been proposed under four Activity Classes (i.e., Infrastructure, Ground Operations, Hazardous Operations, and Air Operations) that would reduce adverse impacts to water resources. Proposed mitigation measures are also presented for reducing anticipated adverse impacts to water resources.

4.8.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts resulting from the No Action Alternative, Alternative 1, or Alternative 2 include:

- Substantially alter surface flow conditions, patterns, or rates;
- Cause substantial flooding or siltation;
- Substantially degrade surface water quality with regard to biota either directly or indirectly as a result of bioconcentration or bioaccumulation which would reduce the existing or future beneficial uses of the water;
- Substantially decrease availability of surface water to wildlife;
- Substantially increase the potential to adversely affect ground water quality;
- Cause noncompliance to applicable water quality standards;
- Substantially lower an aquifer water table or potentiometric surface such that aquifer depletion would be a concern;
- Substantially alter hydrology;
- Substantially alter ground water recharge to an aquifer; or
- Substantially increase risks associated with human health or environmental hazards.

4.8.2 NO ACTION ALTERNATIVE

4.8.2.1 Range Capabilities and Use

Under the No Action Alternative, impacts to water resources from current ongoing mission activities would persist. As a result, impacts from these actions may alter current baseline conditions.

Testing and training activities would continue to occur as described in Section 2.2. These activities would continue to have the potential to adversely impact water resources through contamination of surface and groundwater resources and the alteration of surface water flow patterns during storm events from increased development of impermeable surfaces.

Impacts under the No Action Alternative would likely be avoided or reduced to minor through incorporation of existing environmental practices in the siting of new projects.

The No Action Alternative includes all test and training operations that have been approved but not yet implemented at WSMR. A number of these actions are currently under environmental review and others have undergone previous evaluation. The actions that have already been evaluated were found to have negligible increases of groundwater withdrawal and low probabilities of debris from testing programs affecting/contaminating surface or groundwater.

4.8.2.2 Main Post and Population Effects

The EN BN Development Area is planned to occupy approximately 70 acres on the southeast edge of the Main Post, east of Hughes Road, and South of Watertown Avenue. As determined in the *Final Environmental Assessment for 2nd Engineering Battalion Transition*, stationing of the EN BN at WSMR would have no significant impact on water resources (Ref# 004). The Main Post experiences sheet flow, which leads to several arroyos and small ditches. The additional facilities would be sited away from surface waters; however, the facilities and housing would increase impermeable acreage around the Main Post area. Considering that this location would be adjacent to the Main Post, it is anticipated that existing stormwater infrastructure would be utilized in combination with new infrastructure to adequately control runoff and provide for flood control. Construction activities would conform to WSMR’s general construction standards, which include measures to protect water resources (see Section 3.8.1). Additionally, potential and recommended management actions outlined in Sections 4.8.5.1 and 4.8.5.2 should be employed and/or adhered to. Therefore, minor impacts to surface water resources would occur during construction or operation.

Approximately 657,000 s.f. of facilities not dedicated to the EN BN would be constructed on the Main Post. Planned construction, including projects currently underway on the installation would total approximately 1 million s.f. and a total of approximately 120 acres of ground disturbance. Infrastructure developments are estimated to contribute an additional 100 acres of ground disturbance throughout the 2.2 million acre installation.

Impacts would likely be avoided, minimized, or mitigated from siting footprints of these actions outside of sensitive water resource areas. The degree of impact would also depend on the location of facilities and activities and their proximity to existing infrastructure and activities. Impacts to water resources would be minor if appropriate potential and recommended management actions discussed in Sections 4.8.5.1 and 4.8.5.2 are followed.

Eleven supply wells provide potable water for the Main Post and surrounding facilities. As stated in Section 3.8.2.3, a 2009 Draft Potable Water Resources Report concluded that with some modifications to WSMR’s water supply infrastructure, wells on the Main Post and in Soledad Canyon can produce up to

717 million gallons per year of potable water while limiting continuing aquifer drawdown enough to maintain the production yields of the wells and prevent saline intrusion (Ref# 251). It is estimated that under the No Action Alternative potable water use would be approximately 390 million gallons per year (see Section 4.12, Facilities and Infrastructure), which would be well within the aforementioned safe yield of 717 million gallons per year. In addition, WSMR would continue to employ water conservation measures, as well as potential and recommended management actions described in Section 4.8.1.2 to protect groundwater resources. Therefore, minor impacts to groundwater resources would result during construction or operation.

The stationing of the EN BN has undergone previous environmental review which determined that no significant impacts to water resources would occur (Ref# 004) and the size of the proposed development area is small in relation to the size of the watershed; therefore, no greater than minor to no impacts on the Tularosa Valley watershed would be expected.

4.8.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.8.3.1 Range Capabilities and Use

This section describes the proposed changes to land use and activities under Alternative 1 and their associated impacts to water resources. The primary change in range capability would allow more off-road activity, using a variety of tracked and wheeled vehicles and equipment. The potential types of impacts which could be expected from future actions and the degree of impact or the ability to avoid impacts would depend on the site selected, the type of activities authorized, their intensity, duration, and the conditions or restrictions imposed under which they may operate.

4.8.3.1.1 Range Land Use

The proposed changes to land use classifications would not have a direct impact on water resources. The change in Activity Categories associated with the change in land uses could have a direct impact on water resources.

Range Centers and built-up areas would be expanded by 7,000 acres to allow for future developments as opposed to the 2,000 acres under the No Action Alternative. The majority of this expansion (6,700 acres) would be concentrated around the Main Post and other projects to support an increase in personnel and activities on the installation. It is also assumed that the Stallion Range Center and possibly the North Oscura Range Center could each expand by approximately 100 acres to support larger battlefield test scenarios including but not limited to vehicle and equipment fueling, maintenance facilities, Soldier and test participant billeting and storage for munitions and supplies. The majority of these expansions would occur in areas that have been previously disturbed.

Under Alternative 1, an additional 2,000 acres would be re-classified and used as Impact Areas. This area would be used for new live-fire testing and training. The proposed additional impact areas have yet to be sited; however, operational needs and lack of conflicting resource concerns would determine suitable sites. The degree of potential impacts within these locations would depend on their proximity to surface water features and potable wells.

4.8.3.1.2 Range Activities and Levels of Use

The types of impacts resulting from activities at WSMR under Alternative 1 would be similar to those discussed in the No Action Alternative, however, the conversion of some land use classifications (e.g.

Augmented Test Zone) (see Table 2.3-1) could cause increases in the frequency and areas allowed for testing and training activities, particularly off-road vehicle use. This in turn increases the potential for adverse impacts.

4.8.3.1.2.1 Ground Operations

Under Alternative 1, most of the area meeting the definition of Primary Test Zone would be converted to Augmented Test Zone to expand the overall range of activities to include off-road uses. Currently, 207,200 acres are designated for off-road vehicle use under the No Action Alternative. Alternative 1 would add 1,618,000 of Augmented Test Zone allowing for approximately 1,100,000 acres where off-road vehicle use could possibly be permitted. The degree of impact to surface water resources could be moderate but would depend on the location, frequency, and extent of off-road vehicle use. The use of tracked and wheeled off-road vehicles could substantially alter surface water flow conditions, patterns, and rates should these vehicles be allowed to operate within surface water features. Disturbances from these vehicles could severely alter bottom contours and bank morphologies of surface waters, as well as introduce large amounts of sediments. This would increase the probability of flooding as well as decrease available surface water and habitat for wildlife.

Pedestrian operations would include activities such as refueling of test vehicles. Any potential impacts associated with the leaking of substances (i.e., fuels, oils, and other lubricants) into soils and entering groundwater aquifers would be avoided through the use of BMPs to prevent spills or leaks. The chance of spills from test vehicles reaching the groundwater is unlikely as groundwater ranges from 70 to 3,500 feet throughout the range however, the use of BMPs would be implemented regardless as a precaution. See Section 4.11, Hazardous Materials and Hazardous Wastes, for more information regarding the WSMR Spill Prevention Plan.

The off-road test activities would have a moderate to minor impact on surface waters depending on the event size. Should a battalion sized event occur they would likely disturb an area of 14,800 acres annually. Throughout the WSMR installation, there are no areas of this size that do not contain some form of surface water feature (i.e., stream, pond, spring etc.) therefore, these actions would result in a moderate impact. Impacts would be minimized if the appropriate management actions discussed in Sections 4.8.5.1 and 4.8.5.2 are followed. When a platoon size event occurs, they would utilize 85 percent less land area than a battalion-sized event, where the probability of impact would be reduced to minor if management actions are followed. Use of the "least constrained" portion of Land Use Classification C, Augmented Test Zone, would avoid environmental constraints which include Big Salt Lake and slopes greater than 40 percent (where majority of the intermittent streams occur), thus reducing impacts to surface water and reducing the potential for soil erosion.

4.8.3.1.2.2 Hazardous Operations

Ground target impacts have the potential to create large-scale alterations to landforms and topography. If located in close proximity to surface waters, ground target impacts could severely alter hydrology and surface flow conditions, increase flooding potential, and decrease the availability of water for wildlife. These activities could also be a potential source of surface and ground water contamination.

4.8.3.1.2.3 Air Operations

Should air vehicle operations encounter complications (i.e., emergency landings) the potential release of aircraft fuel or ground impact could potentially degrade surface water quality through siltation and/or contamination as well as affect existing potable wells depending on the location emergencies may occur.

4.8.3.1.3 Range Infrastructure

The proposed 150-mile tank trail, to link the south of WSMR with the north, would be located adjacent to existing Range Road 7. An analysis of streams, springs, creeks, lakes, ponds, and wells located within one mile of this tank trail was conducted utilizing GIS. The centerline of the proposed tank trail was used as a baseline with a 1-mile corridor (half-mile on each adjacent side of the tank trail). Through this analysis it is known that one perennial stream (Salt Creek, which is also White Sands Pupfish Habitat) is within the proposed tank trail corridor study area; however, the proposed tank trail would not cross it. The tank trail may cross several intermittent streams, which outflow to Salt Creek when flowing. As a mitigation for biological resources WSMR would route the tank trail to avoid Limited Use Pupfish Habitat. Therefore, it is likely that several of these intermittent streams would not be crossed; however, if the intermittent streams cannot be avoided, the use of potential management practices and recommended management actions in Sections 4.8.5.1 and 4.8.5.2 would aid in reducing possible impacts to water resources preventing significant impacts. Mockingbird Spring is the only spring within the tank trail study area. There are over a dozen wells also located along the 150-mile long study area, most of which are monitoring wells. The proposed tank trail would not affect water quality or use of these wells although any fuel or hydraulic fluid leaks or spills from vehicles using the trail may cause groundwater contamination if they are not immediately cleaned up.

4.8.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. Each of the Specialized Areas would require land clearing and permanent facilities that would collectively disturb several hundred acres of land and could cross one or more intermittent streams, cause changes in water runoff patterns, or introduce new sources of water pollution. For example, near the Main Post, the location of proposed Specialized Areas should be evaluated for their proximity to potable wells with respect to well-head protection. It is likely that new facilities located near the Main Post would utilize existing potable water sources and tie into existing sanitary sewer systems. However, where facilities would be located at impractical distances to use existing utilities, new water wells and septic systems could be required which could affect groundwater quality, availability, and flow direction. Therefore, water resources would be a key consideration during the siting process and environmental review of these Specialized Areas.

4.8.3.2 Main Post and Population Effects

The arrival of about 480 additional civilian and contractor employees (above the No Action Alternative) would create a minor increase in demand for potable water to a total of 402 million gallons per year (see Section 4.12, Facilities and Infrastructure). The 2009 Draft Potable Water Resources Report has indicated that, with some modifications to WSMR's water supply infrastructure, wells on the Main Post and in Soledad Canyon can produce up to 717 million gallons per year of potable water while limiting continuing aquifer drawdown enough to maintain the production yields of the wells and prevent saline intrusion (Ref# 251). Therefore, it is expected that moderate impacts to groundwater resources would occur under Alternative 1.

4.8.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.8.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.8.4.1.1 Construction

Construction would use minor amounts of water (from groundwater sources at WSMR) for activities such as mixing concrete and washing equipment. Construction activities could involve the use of substances that could potentially contaminate surface and ground waters. Also, earth moving activities around surface waters and the installation of features that cross waterways could result in increased sediment loads entering water bodies, which can result in altered hydrology and flow conditions, increased flooding potential, and ultimately, a decrease in the availability of water for wildlife. Construction activities would adhere to WSMR's general construction standards (Ref# 155), which include measures to protect water resources (see Section 3.8.1), thus minimizing the potential for adverse construction-related impacts to occur.

4.8.4.1.2 Main Post and Population Effects

The arrival of a HBCT (or comparable unit) at WSMR would result in an increase of approximately 3,800 military personnel and an estimated 6,100 military Family members. An additional 300 housing units may be constructed at WSMR for HBCT Families. The Draft 2009 Potable Water Resources Report concluded that with some modifications to WSMR's water supply infrastructure, wells on the Main Post and in Soledad Canyon can produce up to 717 million gallons per year of potable water while limiting continuing aquifer drawdown enough to maintain the production yields of the wells and prevent saline intrusion (Ref# 251). It is estimated that under Alternative 2, potable water demand would be 570 million gallons per year (see Section 4.12, Facilities and Infrastructure), well within the aforementioned safe yield. Therefore, moderate impacts to groundwater resources would be expected under Alternative 2.

Impacts to surface water resources resulting from Alternative 2 would depend on the type of activity as well as the extent, intensity, and frequency of each action. Many of the activities proposed do not have siting locations and would need to be analyzed further under NEPA on a site-by-site basis. Potential impacts are similar to those described under the No Action Alternative, however, as the frequency of these activities is projected to increase and a larger portion of the installation would be opened up to off-road maneuvering, activities could potentially be greater and affect a larger portion of the installation. There is one ephemeral stream (Anvil Creek) running through the eastern portion of the Future Development Area, which should be avoided during construction activities to minimize the potential for impacts to occur.

An increase in mission support facilities, off-road vehicle use, field operations, and testing activities could have a moderate increase of impact depending on the location of the activity. If potential and recommended management actions outlined in Sections 4.8.5.1 and 4.8.5.2 are followed, impacts could be reduced to minor.

4.8.4.2 Training within the Southeast Multi-Use Area

Portions of the Southeast Multi-Use Area, which may be off limits due to environmental constraints, would be clearly marked in the field to define the operable training area. The Southeast Multi-Use Area does not contain many surface water features except for a 2.5 mile intermittent stream one mile north or Oro Grande Range Camp and a 0.5 mile intermittent stream due north of Oro Grande Range Camp. There is potential to cause adverse impacts to water resources as the level of use and intensity of tracked and wheeled vehicles for this area would increase, as well as, the construction of up to 100 miles of additional tank trails. Should these vehicles be allowed to operate within or along the banks of surface water features potential impacts could include the alteration of hydrology due to possible changes in stream bed and bank morphologies as well as associated decreases of surface water quality from sedimentation. This sedimentation would be more severe during times of water flow in the intermittent streams as the water would carry the sediment loads downstream. When the intermittent streams are dry the deposited sediment loads may have time to become compacted or conversely blow away should the soils be highly susceptible to wind erosion. Additionally, hydrology changes may result in increased sheet flow and flooding potential that may be caused from ground disturbances. These impacts do not take into consideration that the field operations to take place in the Southeast Multi-Use Area could be sited to avoid sensitive areas (e.g., areas susceptible to severe water erosion, Figure 3.6-3). Any potential impacts associated with the leaking of substances (i.e. fuels, oils, and other lubricants) into soils and entering groundwater aquifers would be avoided through the use of BMPs to prevent spills or leaks. The chance of spills reaching the groundwater would be unlikely as groundwater ranges from 70 to 3500 feet throughout the range. However, the use of BMPs would be implemented regardless as a precaution. See Section 4.11, Hazardous Materials and Hazardous Wastes, for more information regarding the WSMR Spill Prevention Plan. WSMR could employ the variety of management actions discussed in Sections 4.8.5.1 and 4.8.5.2 to protect water resources from adverse impacts.

4.8.5 MEASURES FOR REDUCING IMPACTS

4.8.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Management practices for water resources would generally apply to infrastructure, ground operations, and hazardous operations. Air operations would not affect water resources except under unusual circumstances.

Infrastructure

- Site specialized areas with the review and approval of the Master Planning Board.
- Design all new roads to avoid stream crossings and/or arroyos to minimize erosion and adverse effects.
- Use areas disturbed by past activities later in construction for staging, parking and equipment storage.
- Ensure that potential sources of contamination (i.e., septic tanks, chemical storage, underground storage tanks) are located away from potable wells.
- Implement specific potable water quality monitoring requirements for the Main Post and selected outlying areas based on the 2009 Draft Potable Water Resources Report.
- Lay recycled tire mats (i.e., rubber mats) on top of temporary access roads utilized during construction to prevent or reduce erosion.
- Perform detailed hydrographic studies to ensure new distributions of groundwater would allow sufficient groundwater aquifer recharge for future uses.

- Utilize water conservation measures to maximum extent practicable (e.g. efficient landscaping and recycling waste water).
- Construct structures that require stream crossings only when necessary and design them using the most direct route. Plan the construction of water crossings for periods of low flow conditions. Locate crossing sites that have low, stable banks, a firm stream bottom and minimal surface runoff when possible.
- Construct new roads that require crossing washes (arroyos) at right angles to the washes (arroyos) to the extent practicable. Conduct all construction and maintenance activities in a manner that minimizes disturbance to vegetation, drainage channels, and intermittent stream banks.

Ground Operations

- Use a screening process designed by WSMR's ITAM Program, in collaboration with other appropriate organizations, to select potential suitable maneuver-to-test areas.
- Restrict mission activities from intercepting over or near critical areas such as pupfish habitat (Ref# 111).
- Restrict crossings of streams, rivers, creeks, lakes, ponds, floodplains, and wells to the extent feasible and use hardened crossings to the extent practicable.
- Restrict intensive and frequent off-road maneuvering and other ground disturbing activities in severe erosive soil and water erosion areas, which are described in Section 3.6.5 and depicted in Figures 3.6-2 and 3.6-3.
- Demarcate off-limits areas (such as well sites) using methods that are clearly visible to field participants.
- Clearly mark maneuver-to-test areas on easy-to-use field charts with precise coordinates listed and provide markers in the field.
- Perform environmental monitoring throughout ground deployment areas to ensure units are adhering to proper environmental requirements and restrictions.
- Conduct periodic water sampling of pupfish streams to monitor water quality to determine any adverse impacts of ground operations.
- Maximize the use of existing roads and trails in planning site access.
- Provide environmental briefings on water resources, including pupfish habitat, to all field personnel prior to deployment.
- Consider weather and ground conditions when scheduling activities to minimize potential impacts to surface waters, such as erosion and the spread of contaminants, that may by exacerbated by sheet flow during storm events.
- Locate equipment, maintenance and fueling areas away from surface waters or wells.

Hazardous Operations

- Avoid all ephemeral channels when placing targets.
- Ensure all targets remain located away from potable wells.
- Avoid streams, rivers, creeks, lakes, ponds, floodplains, and wells during all hazardous operations.

4.8.5.2 Recommended Management Actions

Based on the actions proposed under Alternatives 1 and 2, WSMR should undertake the following management actions:

- Update the 2002 WSMR INRMP (Ref# 074) which provides management guidance and use restrictions for WSMR testing and training to reduce impacts to natural resources. Update this document to reflect any changes or adoptions that would occur as a result of this EIS.
- Educate Soldiers, Families, and WSMR staff regarding environmental constraints and testing and training limitations concerning water resources, particularly with regard to field operations and off-road vehicle use.
- Finalize a WHPP.
- Finalize the Draft Potable Water Resources Report and implement its recommendations should a decision to station a HBCT (or comparable unit) be reached.
- Delineate a Wellhead Protection Area using modeling or an arbitrary 1,000-foot radius around all drinking water source wells where no construction, placement of facilities, parking or hazardous material storage can occur to protect against contamination (Ref# 222).

4.8.5.3 Mitigation Measures

4.8.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As discussed throughout this section the increase of off-road activity can have many detrimental effects to water resources. Full recovery from disturbance can be a slow process. WSMR should create and employ an adaptive management plan for recovery of disturbed areas. Failure to take proper care of the soil would result in the land losing moisture, which would make it vulnerable to wind erosion. The combination of this and a drought could lead to a dust bowl effect. Maintaining soil stability would mitigate the indirect effects of dust generation and sedimentation resulting from accelerated erosion of existing intermittent streams and arroyos.

Furthermore, WSMR would coordinate with the White Sands National Monument on any tank trail or road improvements in the vicinity of the Monument to develop methods to prevent flash flood events from washing unnatural debris into the Monument.

WSMR has established BMPs based on land use classification to provide guidelines for avoiding significant water resource impacts from existing known actions and from future undefined actions. These BMPs are treated as guidelines for project planning and contain principals in avoiding impacts during the planning or construction process or through facilitating restoration activities following construction or use. If potential and recommended management actions are followed for future activities, then no regulatory or administrative mitigation measures would be warranted.

4.8.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would finalize the Draft Potable Water Resources Study and implement its recommendations to ensure the continued sustainable use of groundwater on the installation. These actions could include replacing wells within the Main Post and piping water from Soledad Canyon to the Main Post. WSMR would also apply for funding of specific water conservation projects and education programs after evaluating methods to conserve water.

4.9 Safety

This section evaluates the impacts to Safety by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

Proposed facilities development, training activities, and testing of future technologies at WSMR have the potential to present health and safety hazards to WSMR military, civilian staff, and the public. The safety hazard categories examined in this EIS are range safety, UXO, and occupational hazards including ionizing and non-ionizing radiation, and natural hazards. Existing conditions and management procedures for safety are described in Section 3.9, Safety.

Potential impacts associated with hazardous substances, hazardous wastes, and solid wastes are further described in Section 4.11, Hazardous Materials and Hazardous Waste. Potential impacts to public safety and emergency response assets on WSMR and the surrounding communities are addressed in Section 4.14, Socioeconomics.

4.9.1 IMPACT METHODOLOGY

Impacts to safety were assessed by evaluation of proposed facilities development, training activities, and testing of future technologies at WSMR and the likelihood for potential safety risks to WSMR military and civilian staff, as well as the public adjacent to or passing through WSMR.

4.9.1.1 Region of Influence

The ROI for safety includes all of the land and infrastructure on WSMR, as well as that on remote properties owned or otherwise managed (e.g., call-up areas) by WSMR for test activities.

4.9.1.2 Technical Approach

Data was obtained from WSMR staff and reference documents to determine potential impacts to safety under each alternative. This assessment qualitatively analyzed WSMR mission activities and systems associated with the alternatives, which have the potential to introduce health and safety risks, and determined whether existing policies, plans, and procedures are sufficient to avoid adverse impacts. This assessment was also supplemented with input from WSMR technical staff with responsibility for frequency management. Existing regulations and policies pertaining to safety management are presented in Section 3.9.2 of this EIS.

These regulations are also further implemented at WSMR through local procedures and mission-specific reviews and operating conditions, which further seek to reduce potential health and safety risks, and ensure compliance with applicable laws, regulations, and agreements.

If the potential for adverse impacts exists from the Proposed Action and Alternatives, consideration was then given to whether or not avoidance mechanisms could be implemented to reduce significance of impacts (Section 4.9.5).

4.9.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to safety resulting from the No Action Alternative, Alternative 1, or Alternative 2 include the following:

- Exposure of military and civilian personnel to safety risks from active range use, including ballistic, explosive, or blast overpressure hazards, which do not comply with applicable regulations, policies, agreements and action-specific safety reviews.
- Exposure of military and civilian personnel to explosive safety risks from UXO (through increased access to existing UXO-contaminated areas and/or creation of new UXO hazard areas) which do not comply with applicable regulations, policies, agreements and action-specific safety reviews.
- Exposure of military and civilian personnel to occupational and natural hazards, including ionizing and non-ionizing radiation, that exceed established standards (e.g., OSHA Permissible Exposure Limits) or otherwise present an elevated risk of illness, accidental injury or death.

4.9.2 NO ACTION ALTERNATIVE

4.9.2.1 Range Capabilities and Use

Continuation of current test and training mission activities, even with increases in mission operations, would result in no or only minor impacts to safety. WSMR would continue to implement and enforce all applicable health and safety requirements, conduct safety reviews for all range activities, implement action-specific restrictions and operating conditions (e.g., establishment of SDZs to restrict personnel from weapon launch and impact zones), and educate all range users on potential safety risks (including UXO hazards and avoidance). Risks to Soldiers would be avoided by designating mines and caves as "Do Not Enter" zones. It is unlikely that continuation of current test and training activities would result in any new (not previously analyzed) range hazard scenarios, create additional UXO hazard areas, result in increased exposure to existing UXO hazard areas, or expose personnel to new types or increased levels of occupational and natural hazards.

4.9.2.2 Main Post and Population Effects

The continued arrival of the EN BN and construction of buildings within their designated complex to support its logistical and administrative needs would not typically result in any adverse health and safety impacts. Under the No Action Alternative, the EN BN would conduct their major weapons and maneuver training on Fort Bliss, and therefore no adverse impacts are expected at WSMR.

Under the No Action Alternative, WSMR plans to complete several hundred thousands of s.f. of military construction, demolition, and renovation projects on the Main Post and Range. The construction, demolition, and/or renovation of these facilities could result in low impacts from occupational hazards for those personnel directly involved in these activities. Potential occupational hazards would include heavy equipment/vehicle accidents, high noise levels, electrical hazards from wiring and energized equipment, falls from ladders or elevated work surfaces, exposure to hazardous materials (e.g., fuel, paints, solvents), crushing or blunt trauma injuries from movement of materials and equipment, and injuries associated with flying debris or hazardous dust particles.

WSMR would require all personnel involved in construction activities to adhere to established safety requirements (e.g., OSHA standards and USACE Engineer Manual 385-1-1), utilize all required personal protective equipment and equipment controls, immediately report any potentially unsafe situation to their supervisor, and cease operations until safety hazards are addressed. Construction activities would not be expected to result in any greater exposure to natural hazards above those experienced by WSMR staff in their daily activities.

Construction activities would not be expected to result in any additional impacts from active range hazards, nor result in the creation of any additional UXO hazard areas. While it is theoretically possible to encounter buried UXO hazards on nearly any area of WSMR, efforts such as project siting, pre-construction screening, worker education, and diligent monitoring of construction sites should eliminate the prospect of UXO-related accidents to construction staff. Therefore, construction activities would not result in any range safety or UXO impacts.

4.9.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Impacts to safety from Alternative 1 would differ from the No Action Alternative. Alternative 1 impacts associated with the adoption of the proposed changes in land use classifications, changes in activity categories and levels of use, and proposed infrastructure are described in the following sections.

4.9.3.1 Range Capabilities and Use

4.9.3.1.1 Range Land Use

The change of land use classifications by itself would not result in adverse impacts beyond those associated with the No Action Alternative.

From a safety perspective, the most notable aspect of the proposed land use changes would be the conversion of approximately 1,618,000 acres of land from that meeting the definition of “Primary Test Zone” designation to “Augmented Test Zone.” This change in land use designation would allow for increased wheeled and tracked vehicle use in areas previously reserved primarily for hazardous test missions. WSMR would continue to establish SDZs and similar restrictions during active test events to restrict vehicular and personnel to hazardous areas, and therefore no additional impacts related to active range use would be anticipated. While much of the area opened up to vehicle access could have previously unknown UXO hazards present, WSMR would also continue to enforce rigorous UXO screening, personnel training, and clearance programs, making the likelihood of UXO-related accidents unlikely.

WSMR is also considering converting 2,000 acres of land meeting the definition of “Primary Test Zone” land to an “Impact Area” designation, which allows for the detonation of high-explosive warheads and live-fire activities. This change in designation may cause minor impacts in terms of active range safety hazards and the creation of new UXO hazards.

Similarly, changes in land use classifications by themselves would not result in any occupational and natural hazard risks beyond those associated with the No Action Alternative.

4.9.3.1.2 Range Activities and Levels of Use

Section 2.3.1 of this EIS describes several new capabilities, which are expected to come online at WSMR as part of Alternative 1. These capabilities range in specificity from broad trends and concepts for future testing to specific programs planned for the near term. A number represent continuation of current capabilities, but may involve different combinations of activities or locations on the installation.

Nearly all new capabilities and test mission activities on WSMR may have hazardous aspects to them, including the launch of live warheads from mobile platforms, increased use of lasers and equipment generating potentially hazardous electromagnetic fields, and vehicle maneuvering in areas that may contain UXO hazards. It would be unlikely, however, that these evolving activities would present hazard categories which WSMR has not effectively managed in the past using existing procedures and protocols. Existing programs and users would continue to conduct the same types of training activities as described in the No Action Alternative, although they may be conducted in geographic areas not possible under the No Action Alternative. Thus, the geographic extent of safety hazards may differ from those in the No Action Alternative, and WSMR would have to adjust the corresponding risk management tools (e.g., SDZs, airspace restrictions) to align with new hazard scenarios.

4.9.3.1.2.1 Ground Operations

Under Alternative 1, off-road vehicle use would be permitted throughout most of the installation. Extended off-road maneuvers occurring across large, remote areas on WSMR for extended periods of time would increase the likelihood of personnel exposure to natural hazards such as: weather elements (heat exhaustion, heat stroke, sun burn, wind burn, frost bite, hypothermia, lightning strikes); insect and animal bites and diseases (including exposure to hanta virus); and contact with poisonous plants (rashes). These maneuvers, field operations, and dismounted operations would also increase the possibility of vehicle-related accidents, trips and falls, over-exertion (muscle and joint injuries), cuts and bruises, and dehydration. In general, increased ground operations may increase the possibility of UXO related accidents. These impacts would be minor to none when operations follow standard Army safety protocols.

The use of heavier, tracked vehicles may cause an increase in dust generation during maneuvers. In high winds, drifting dust could diminish visibility along US 70, causing safety hazards. Similarly, increases in use of countermeasures could produce smoke or dust that may obscure visibility. Limiting these activities, based on their location relative to frequently traveled roads, residential areas, and other mission activities (taking into account wind direction and wind speed) would reduce potential safety hazards.

4.9.3.1.2.2 Hazardous Operations

Under Alternative 1, the levels of use of several activity categories would increase under Alternative 1, particularly hot missions by 25 percent. Section 2.3.1.2 of this EIS describes the anticipated increases in levels of use, and Table 2.3-3 provides quantitative estimates of these changes. This represents a substantial increase in missions with hazardous aspects to them, as well as associated risk management actions (e.g., evacuations, road closures, and SDZ designations). WSMR would, however, continue to implement and enforce all applicable health and safety requirements, conduct safety reviews for all range activities, implement action-specific restrictions and operating conditions, and educate all range users on potential safety risks (including UXO hazards and avoidance).

Considering the introduction of new test activities, the increases in the level of range use, and the continued compliance with safety requirements and application of risk management measures, potential safety impacts (active range risks, UXO hazards, and occupational and natural hazards) from Alternative 1 would be minor.

4.9.3.1.2.3 Air Operations

Increased air operations and airspace restrictions, in concert with Alternative 1 and Holloman AFB operations, would make scheduling difficult and lead to more road closures and offsite evacuations.

4.9.3.1.3 Range Infrastructure

The proposed North-South Tank Trails and connector trails south of the Main Post would accommodate military vehicles traveling to and from testing and training sites, so that there would be minimal traffic conflicts with military convoys with other vehicles along those routes. These trails would enhance traffic safety.

4.9.3.1.4 Specialized Areas

The six proposed Specialized Areas discussed in this section would include facilities for both testing and training operations. Potential hazards for these Specialized Areas would be minor and would be managed under existing safety programs and protocols.

4.9.3.1.4.1 Environmental Laboratory Complex

The proposed Specialized Area to support a new Environmental Lab Complex would be located on 1,600 acres along Nike Road. The laboratory complex would support both non-hazardous and hazardous testing of missiles and components subjected to extreme conditions. Each building would have a 1,500 foot radius safety zone where other inhabited buildings would not be allowed. Potential hazards to personnel working at the Complex would be those typical to any laboratory setting, and could include contact with hazardous materials (solvents, acids, petroleum products), exposure to x-rays, physical hazards of working with machinery and high voltage components, exposure to noise sources, and typical workplace accidents such as slipping/falling. WSMR has an experienced safety program to address and minimize these workplace hazards. While workplace safety would be adequately managed under existing programs for this Complex, the requirement for 1,500-foot safety zones would be a key consideration for siting the buildings and environmental review for this proposed Specialized Area.

4.9.3.1.4.2 Joint Land Attack Cruise Missile Defense Extended Netted Sensor

JLENS would use radars and emit radar radiation similar to programs already existing and properly managed on WSMR. There would be no special safety issues associated with JLENS, although airspace coordination would be necessary to avoid aviation accidents between UASs, the JLENS aerostats and other potential airspace users (see Section 4.3, Airspace). Therefore, safety would not be a key consideration during the siting and environmental review for the Specialized Area for JLENS.

4.9.3.1.4.3 Joint Urban Research, Development, Training and Evaluation Environment

The proposed Specialized Area for a Joint Urban RDT&E Environment would support the testing of communication systems in mock urban environments that simulate real world reconnaissance and battle conditions. There would be no special safety considerations for these tests and no potential impact on surrounding land users, although a buffer may be desired between this area and other built-up areas to reduce noise and annoyance to WSMR employees, customers and families. Therefore, safety would not be a key consideration during the siting and environmental review for the Specialized Area for the Joint Urban RDT&E Environment.

4.9.3.1.4.4 Electro-Optical .50 Caliber Range

The proposed Specialized Area to support a new Electro-Optical .50 caliber range would be used for test purposes rather than for arms qualification training and therefore used infrequently. The firing range would have a safety buffer in accordance with Army regulations. Army safety protocols would be followed for testing events, which would minimize the incidence of injuries. These protocols would include use of hearing protection, use of exclusion zones, and other standard Army firing range safety measures. The location of the firing range would need to include sufficient land area for the typical safety buffers and the direction of firing should avoid buildings, roads and other populated areas. The proximity of work centers and housing should also be considered to avoid noise-related impacts. Safety would be a key consideration during the siting and environmental review for the Specialized Area for the Electro-Optical .50 Caliber Range.

4.9.3.1.4.5 Individual Combat Skills Course

Military units, including the EN BN, would use Fort Bliss training ranges and maneuver areas for their primary training needs, although minor training, such as Individual Combat Skills Course training, could occur near the Main Post. This training involves various courses and training chambers, such as physical fitness, obstacle courses, bayonet course and a gas chamber exercise building. These activities would inherently test the physical stamina and fitness of individuals, which could result in injuries but overall these activities are meant to simulate battlefield conditions and assess readiness, which is the mission of the Army and the conditions for which the Army regularly trains for. Therefore, safety would not be a key consideration during the siting and environmental review for the Specialized Area for the Individual Combat Skills Course.

4.9.3.1.4.6 Local Training Area

The Local Training Area would encompass activities such as bridge-gapping training and off-road vehicle use. Impacts to safety would be similar to those discussed in Section 4.9.3.1.2.1, Ground Operations, and would be minor to none when operations follow standard Army safety protocols. Personnel within the Local Training Area may need to be evacuated during hazardous operations (such as missile firings).

4.9.3.2 Main Post and Population Effects

No construction would occur within the Main Post beyond what was described under the No Action Alternative. Minor increases in personnel that would occur under Alternative 1 would not be expected to affect the rate of accidents nor increase safety hazards.

4.9.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.9.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.9.4.1.1 Construction

Under Alternative 2, WSMR would require additional infrastructure to accommodate a HBCT (or comparable unit), as well as to support future test capabilities. The resultant construction activities could result in low impacts in regard to occupational hazards, but would not likely result in any additional impacts regarding range hazards or UXO beyond those noted under the No Action Alternative.

4.9.4.1.2 Main Post and Population Effects

The arrival of a HBCT (or comparable unit) in FY 2013 would come with approximately 900 tactical wheeled vehicles, approximately 360 tracked vehicles (e.g., M1 tanks), 165 generator sets, and other equipment. Some M1 tanks include armor that contains encased depleted uranium in the turret. Studies conducted of exposure to radiation from depleted uranium in tanks, showed that exposures were well below the occupational limit. The depleted uranium in these tanks would not be exposed to the environment, nor would it be during any maintenance activity. Thus, the risk of exposure to radiation from the M1 tank armor would be extremely low and no significant environmental or health impacts would be expected to occur (Ref# 037).

Current and future activities under Alternative 1 would cause an increase to road closures both internal and external to WSMR. Off-site evacuations would remain the same or increase slightly.

4.9.4.2 Training within the Southeast Multi-Use Area

As the HBCT (or comparable unit) would not conduct any live-fire or small arms qualification training on WSMR (these would be conducted at Fort Bliss), and would be restricted from training on land under a SDZ or quantity-distance restriction from test activities, impacts associated with active range hazards would not differ from Alternative 1. Similarly, HBCT-type training activities would not create any additional UXO hazard areas.

Field training activities (which could include mounted and dismounted maneuvering) would occur in areas that have a high risk of existing UXO hazards. Off-road activities would only be performed in areas surface cleared of UXO. However, after clearance there would still be potential for encountering UXO because subsurface UXO could still be present and resurface. Safety hazards could range from minor injuries to fatalities. Despite best attempts to clear UXO, the safety impact of high intensity ground operations in this area could be significant.

Similarly, the level of impacts associated with encountering occupational and natural hazards would range from none to low, depending upon the number and type of exercises conducted. Dismounted activities such as bivouacking and dismounted maneuvering are more likely to encounter natural hazards, while activities such as heavy equipment operation, vehicle maintenance, and earth moving are more likely to encounter occupational hazards.

The minor infrastructure changes associated with Alternative 2 (e.g., tank trails and hardened crossings) would not result in any additional adverse impacts. The use of designated tank trails (the proposed 100 miles of tank trails) within the Southeast Multi-Use Area would focus off-road activity and reduce the possibility of encountering UXO during training events.

Maneuver operations would also result in dust off-range. Potential for blowing dust under certain wind conditions (speed and direction) may require new protocols to maintain safe visibility for motorists on public highways.

4.9.5 MEASURES FOR REDUCING IMPACTS

4.9.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

In addition to existing detailed siting considerations outlined in Army regulations and design guides relating to safety, the following general potential siting considerations should be followed:

- Locate programs or facilities that would generate high noise levels or air pollutants (including dust) away from sensitive receptor locations, such as housing, day care facilities, and medical facilities.
- Ensure that programs or facilities with hazardous aspects, such as radiation sources, or firing ranges/impact areas, adhere to Army facility guidelines for buffer zones and are located at safe distances from population centers both on and off the installation.
- Site field operations, dismounted operations and off-road vehicle use in areas cleared of UXO.

Management practices for safety would apply to all four Activity Classes (Infrastructure, Ground Operations, Hazardous Operations, and Air Operations). There are numerous Army and WSMR-specific regulations and policies in place that govern safety across all these Activity Classes. Instead of listing all these requirements, below are some general existing and potential practices relevant to the Proposed Action and alternatives that should be followed.

- Ensure all residents, employees, and visitors requiring access to WSMR areas outside the Main Post receive UXO awareness training and information.
- Ensure residents, employees and visitors adhere to posted off-limits signs.
- Ensure project-specific safety plans are submitted by all construction contractors.
- Apply dust suppressants in unpaved areas where vehicle use is concentrated, to the extent practicable.
- Use the lowest speed possible on unpaved roads and off-road areas by vehicle operators, within the parameters of their mission.
- Modify training missions during high-wind periods to minimize dust generation, to the extent possible.
- Ensure testing and training operators maintain radio communication during active operations to maintain contact with the Range Scheduling Office and report medical emergencies.

4.9.5.2 Recommended Management Actions

Based on the actions proposed under Alternatives 1 and 2, WSMR should undertake the following management actions:

- Develop plans to expand UXO screening within the Southeast Multi-Use Area.
- Update the Range Users Manual to address safety aspects of high-intensity military training exercises.

4.9.5.3 Mitigation Measures

4.9.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

WSMR would develop new SOPs and directives to address safety components of off-road activities. In particular, an SOP would be needed to address potential adverse impacts to visibility on public and military roads from dust created from tactical vehicles conducting off-road maneuvers. This SOP would also help fulfill WSMR's goal to reduce particulate matter emissions in accordance with the Natural Events Action Plan for High Wind Events, described in Section 4.4.5.1. WSMR would continue to examine the risks associated with specific test and training activities, tailor operating conditions accordingly, implement evacuations and impose access restrictions as necessary, and cease any operations that would pose an imminent danger to human health and safety.

4.9.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would implement the same mitigation measures described for Alternative 1. WSMR would also request additional resources (funding and manpower) to amend its SOPs to address increased levels of ground maneuvers in the Southeast Multi-Use Area under Alternative 2.

4.10 Noise

This section evaluates the impacts of Noise by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.10.1 IMPACT METHODOLOGY

Impacts to noise were assessed by comparing existing noise levels in regions exposed to elevated noise with either quantitative levels or qualitative estimates of changes in noise exposure resulting from implementation of the proposal. The resulting impacts can range from beneficial to significant.

4.10.1.1 Region of Influence

The ROI for noise includes the land and airspace comprising, and immediately proximate to WSMR. Although not within this ROI, activities associated with Fort Bliss, just to the south of WSMR, are also considered due to their potential interaction with WSMR activities.

4.10.1.2 Technical Approach

Data were obtained from reference documents to determine potential impacts to noise under each alternative.

Comprehensive quantitative data were not available for either existing conditions or the Proposed Action. Therefore, the assessments are based on qualitative assessments projected from available quantitative data documented in assessments for discreet, analogous operations. This data was discussed and described in Section 3.10, and addressed both A- and C-weighted noise levels associated with ongoing activities at WSMR. As noted, there are some testing activities (e.g., missile launchings) that have the potential to create hazardous (high) noise levels in the immediate vicinity of the launch site. However, there are numerous other activities (e.g., ground maneuvers) that generate only minimal noise, which is generally confined to the exercise area.

4.10.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to noise resulting from the No Action Alternative, Alternative 1, or Alternative 2 include the following:

- If a noise-generating activity is projected to cease, thus reducing noise in the vicinity, the impact would be assessed as beneficial.
- If a noise-generating activity in a specific area is projected to slightly increase, but the increase is so minimal that little measurable changes in noise level would result, the impact would be assessed as none.
- If a noise-generating activity in a specific area is initiated which creates measurable increases in noise levels, it would be considered an impact. If the activity occurs for only a short term, however, and the resultant noise levels do not create a health hazard, the impact would be assessed as minor.

- If a long-term noise-generating activity in a specific area is initiated, and results in a measurable increase in noise levels, which do not exceed established thresholds, the impact would be assessed as moderate.
- If a long-term noise-generating activity in a specific noise sensitive area is initiated, and results in measurable increases in noise levels which exceed established thresholds (e.g., changing a land area from Noise Zone I to Noise Zones II or III, or a Noise Zone II land area to Noise Zone III), it would be assessed as significant. Note that if a significant impact can be mitigated, the impact would be redesignated, as applicable to "significant impact mitigable to less than significant" (see Section 4.1.1).

4.10.2 NO ACTION ALTERNATIVE

4.10.2.1 Range Capabilities and Use

This alternative results in a continuation of activities currently supported by WSMR, as well as projected future activities, which have been previously assessed.

A continuation of current test and training operations would not be expected to create noise impacts. The acoustic environment of WSMR would continue to be dominated by aircraft overflight, sonic booms resulting from aircraft from Holloman AFB and WSMR missiles. Other activities such as live-fire and ground maneuver training and exercises resulting in noise created by personnel and vehicles would continue to contribute to noise on the installation.

4.10.2.2 Main Post and Population Effects

Stationing of the EN BN at WSMR would not create a measurable noise impact. While the increase of population and additional vehicle traffic create noise, it would be relatively localized and similar to any community environment. Additionally, it should be noted that all of the unit's major live-fire training and maneuver exercises would be conducted at Fort Bliss.

This alternative includes requirements for facility construction. No described projects indicate that extraordinary processes or techniques would be required during the project. The primary noise sources during construction would be from the operation of heavy equipment. Although noise is loud at the source, it diminishes away from the source due to spherical spreading, atmospheric attenuation, and ground attenuation. Under this alternative, construction activity would occur on the Main Post. Some may be in proximity to dormitories and family housing; however, noise from construction would be localized to the site-area and would be temporary since it would cease at the project completion. Furthermore, no construction activity would be expected to occur at night. Considering the site's location, and possible proximity to other land uses and facilities, noise impacts would be described as none to minor.

4.10.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.10.3.1 Range Capabilities and Use

Implementation of Alternative 1 could result in increased noise generation. Expansion and modification of missions requiring ground and air assets, the reconfiguration of these assets, construction, and additional personnel stationed at WSMR would create noise having varying degrees of intensity. The expansion of built-up areas on the Main Post, authorization of off-road vehicle use throughout the range, and expansion of impact areas would necessitate land use changes. These changes would facilitate implementation of proposed increases in activity levels and expanded missions. Detailed analyses of these missions, and selective siting for projects would address land use compatibility and opportunities and constraints associated with specific projects. These processes would minimize the potential for elevated noise exposure to inhabited areas both on and off the installation. Centralized scheduling of construction and ground and air operations would help manage anticipated noise exposure during specific time periods. Application of these principles would minimize the risk of excessive noise exposure.

4.10.3.1.1 Range Land Use

With implementation of this alternative, changes to the amount of land assigned in certain land use classifications would occur. These changes would be driven, however, by modified mission requirements. In certain cases, these modified mission requirements could result in slightly changed noise levels in certain areas. Nevertheless, there is nothing to suggest that noise levels would necessitate any changes.

4.10.3.1.2 Range Activities and Levels of Use

With full implementation of this alternative, activities on WSMR would be modified. These modifications would support expanded operations and WSMR's capability to provide its full potential support to ground, air, and space programs. It should be noted that these proposals are analogous to currently supported activities. With these expanded missions, and the number of personnel required to support them, the level of use in certain areas would increase. These changes have the potential to increase noise levels in certain areas

4.10.3.1.2.1 Ground Operations

Increased ground operations on WSMR would result in localized increases in noise level while activities are under way. Specific locations have yet to be selected for many of the proposed ground operations. However, most of the areas under consideration are relatively remote from developed areas and noise impacts would be minimal. Vibrations from tracked or other heavy vehicles may be felt by persons outside of the range. However, heavy vehicle maneuvers would be accomplished primarily in areas that are relatively distant from range boundaries or receptors and these vibrations would be expected to be negligible.

4.10.3.1.2.2 Hazardous Operations

Expanded hazardous operations would increase noise in their immediate areas while operations are underway. The additional operations would be expected to generate noise with the same general characteristics as current operations.

4.10.3.1.2.3 Air Operations

WSMR sponsored air operations proposed under Alternative 1 would be primarily in the form of UAS flights associated with test and training events. These small aircraft would not be expected to result in an increase in A-weighted time-averaged noise levels. The exact extent of the increase would be determined by the specific aircraft and flight profiles used.

4.10.3.1.3 Range Infrastructure

The proposed North-South Tank Trail would follow the path of existing range roads along remote areas of WSMR (except where it would attempt to avoid the White Sands National Monument along Range Road 7), where there would be little to no adverse impact on potential off-site receptors. Expansion of range centers would also occur in remote areas where there would be little to no adverse impacts on potential off-site receptors.

4.10.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. The Environmental Laboratory Complex and JLENS would have minimal noise aspects that could affect adjacent receptors, while the Individual Combat Skills Course would not be expected to have any noise impacts. The Electro-Optical .50 Caliber Range, the Joint Urban RDT&E Environment, and the Local Training Area would conduct outdoor activities where noise levels could potentially cause adverse effects depending on their location and operating hours. Therefore, noise would be a key consideration for the siting and environmental review of these three Specialized Areas.

4.10.3.2 Main Post and Population Effects

No construction or other potential stationary noise sources would be introduced within the Main Post beyond what was described under the No Action Alternative. Minor increases in personnel that would occur under Alternative 1 would pose minor noise impacts associated with additional traffic.

4.10.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.10.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.10.4.1.1 Construction

This alternative includes requirements for infrastructure upgrades and facility construction. No described projects indicate that extraordinary processes or techniques would be required during the project. The primary noise sources during construction would be from the operation of heavy equipment. Although noise is loud at the source, it diminishes away from the source due to spherical spreading, atmospheric attenuation, and ground attenuation. Noise from construction would be localized and temporary since it would cease at the project's completion. Considering the site's location and possible proximity to noise-sensitive land uses (e.g., housing), noise impacts would be none to minor.

4.10.4.1.2 Main Post and Population Effects

Operations of a HBCT (or comparable unit) at WSMR would not create a measurable noise impact. While the increase of population and additional vehicle traffic would create noise, it would be relatively localized and similar to any community environment. Construction of additional tank trails would not be expected to cause noise impacts, as there are few occupied buildings and no residents in the general area where the trails would be located.

4.10.4.2 Training within the Southeast Multi-Use Area

This new specialized area would support intensive off-road training for track and wheeled vehicles, as well as other ground activities associated with HBCT (or comparable unit) training. This area would also support testing activities.

Vehicular noise and noise from maneuver activities would be the primary noise sources associated with training. No live-fire training would be conducted in this area. The Southeast Multi-Use Area would be subdivided into specific areas designed to support designated activities. Noise from operations in an area would be localized and transitory. Elevated noise levels would not be expected to propagate far from the boundary of the area in use, if at all. Development of the area would necessitate construction and result in short-term elevated noise levels during normal construction hours (daytime). However, based on the distance of this area from the Main Post and other receptors, no noise impacts would be anticipated.

It is possible that portions of this area may be available for other training and testing activities. These would require WSMR approval. Noise resulting from these activities would depend on the type of operation involved, and would be considered as part of the WSMR approval process.

This area could be well defined, or training may be accomplished in areas along existing roads or in accessible previously disturbed areas. Up to 100 miles of tank trails could be located in and around the Southeast Multi-Use Area. This would concentrate noise along those trails, but overall, noise impacts would be minimal given the distance of this area from the Main Post or other populated areas.

4.10.5 MEASURES FOR REDUCING IMPACTS

4.10.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

The planning of new facilities at WSMR follows Army and WSMR safety regulations, which include provisions for minimizing noise impacts on workers and residents. Overall, potential noise-related impacts to residents and other sensitive receptors on- and off-WSMR locations should be considered when siting new facilities or mission operations.

Management practices for noise would generally apply to infrastructure and ground operations, although project-specific BMPs could be warranted where possible for hazardous operations and air operations. Hazardous operations and air operations are at times inherently noise-generating, and their noise levels may be difficult to avoid or minimize (as in the case with missile testing), and would usually be short term in duration.

Elevated noise levels have the potential to cause human annoyance, and even physical harm. Federal OSHA standards, ARs, and WSMR Regulations and Plans identify noise level thresholds, which provide land use compatibility guidelines and health and safety standards. Instead of listing all these requirements, below are some general existing and potential BMPs relevant to the Proposed Action and alternatives that should be followed.

Infrastructure

- Operate construction machinery with mufflers, where applicable, to minimize noise.
- Perform construction activities during daytime hours and weekdays to minimize impacts to residents on WSMR.
- Design new buildings to shield internal noise sources from work areas.

Ground Operations

- Limit travel by tanks and other heavy military vehicles needing to travel near Main Post buildings to daytime hours where possible.
- Operate vehicles with mufflers, where applicable, to minimize noise.

4.10.5.2 Recommended Management Actions

No recommended management actions would be necessary for noise.

4.10.5.3 Mitigation Measures

No mitigation measures would be warranted under either action alternative.

4.11 Hazardous Materials and Hazardous Waste

This section evaluates the impacts to Hazardous Materials and Hazardous Wastes by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.11.1 IMPACT METHODOLOGY

Impacts to hazardous materials and hazardous wastes were assessed by reviewing WSMR environmental compliance plans, interviewing various WSMR personnel, and reviewing Federal and State laws and regulations. This review covered topics of pesticide and herbicide use; existence of PCBs; asbestos and other regulated building materials; petroleum, oil, and lubricant storage and management; solid waste management and recycling; treatment, storage, and disposal of hazardous waste; and sources of radiation, both ionizing and non-ionizing, at WSMR.

4.11.1.1 Region of Influence

The ROI for hazardous materials and hazardous wastes includes all areas on WSMR potentially exposed to an accidental release of hazardous material, which includes areas of described exercises, areas where the regular maintenance of vehicles is performed, and any facilities that may utilize hazardous materials and/or generate waste (e.g., test facilities and facilities in the Main Post). Additionally, on- and off-WSMR waste disposal facilities that may receive wastes are included.

4.11.1.2 Technical Approach

Data was obtained from the most current WSMR environmental compliance plans and WSMR personnel interviews. In addition, the proposed changes in land use, existing and proposed programs, and testing and training requirements described in Chapter 2, were reviewed to determine which activities have the potential to cause an increase in hazardous materials and hazardous waste. Factors for determining significance of potential impacts are further discussed in Section 4.11.1.3.

Activities that use hazardous materials or have the potential to produce hazardous waste were analyzed to determine if existing policies, plans, procedures, or restrictions are in place to protect human safety, infrastructure, cultural, and biological resources, and mission activities from potential impacts resulting from the Proposed Action and alternatives. Existing policies, plans, procedures, and restrictions at WSMR relating to hazardous materials that were evaluated include:

- WSMR Regulation No. 200-1, Hazardous Waste/Material Management, addresses mandatory requirements for the management of hazardous waste at WSMR. It provides guidelines for safe handling and environmentally acceptable management of hazardous waste from point of generation to ultimate disposition.
- WSMR Environmental Compliance Handbook, address the mandatory requirements governing the management of hazardous material/waste at WSMR (Ref# 145).
- The 2002 WSMR INRMP, which provides management guidance and use restrictions for WSMR testing and training to reduce impacts to natural resources (Ref# 074).
- Federal and DoD regulations (see Section 3.11, Hazardous Materials and Hazardous Wastes).

4.11.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to hazardous materials and hazardous wastes resulting from the No Action Alternative, Alternative 1, or Alternative 2 includes the extent or degree to which its implementation would result in the following:

- Cause a spill or release of a hazardous substance.
- Expose the environment or public to any hazardous or harmful substance through release or disposal.
- Increase the risk of accident or release from existing or proposed vehicles, equipment, procedures or training practices.
- Impact the existing capacity of a landfill.
- Increase amounts of stored hazardous materials/wastes to the point of noncompliance with Federal, State, or local environmental regulations.
- Cause the amount of hazardous materials/waste to exceed the capacity of satellite accumulation points or other authorized repositories.
- Subject personnel or members of the public to unsafe levels of radiation.
- Result in noncompliance with established radiation exposure limits.
- Cause a release of pesticides or potentially expose military personnel or the public to pesticides.
- Expose military personnel or the public to PCBs.
- Cause a spill or release of petroleum-based products.

4.11.2 NO ACTION ALTERNATIVE

Impacts to hazardous materials and hazardous wastes from the No Action Alternative would include no impact to moderate impacts. Under the No Action Alternative, use of hazardous materials and the generation of hazardous waste from current ongoing mission activities would continue; however, any future impacts from mission activities that have undergone environmental review, but have not been completed prior to this EIS, could alter current baseline conditions.

4.11.2.1 Range Capabilities and Use

Under the No Action Alternative, ongoing test and training operations would continue at approximately the current level of magnitude, although a number of new programs would be implemented which have already undergone environmental review. The collection, accumulation, and packaging of hazardous wastes would be performed in accordance with WSMR Regulation 200-1, "Hazardous Waste/Material Management," during testing and training activities. POLs are the most common wastes likely to be encountered by personnel during project activities. Tactical vehicles, construction equipment, generators, and fuel storage units would employ a spill containment system (e.g., drip pans) in accordance with the WSMR Spill Prevention Plan and other regulations.

WSMR has the capability to manage the types and amounts of hazardous wastes generated by ongoing test and training operations. Regulated materials are stored in areas that are far removed from the public. Waste having potentially hazardous or toxic substances are segregated and stored in approved containers for eventual disposal in a designated area. This function is facilitated through a system of closely monitored satellite accumulation points, which are distributed throughout WSMR.

Fuel storage capacity at WSMR is inadequate to meet the needs of the EN BN. The EN BN would add a 20,000-gallon storage tank for their immediate needs. The additional fuel tank would most likely be an above ground storage tank as all below ground storage tanks have been removed at WSMR. There would also be the potential for impacts from the transportation of fuel, as the potential for spills would increase. Spill containment systems would be required in accordance with the WSMR Spill Prevention Plan, and therefore, only minor impacts from accidental spills would occur.

WSMR scheduling and utilization data account for approximately 3,500 to 4,300 test events annually, in recent years. “Hot” missions on WSMR are potentially hazardous events that require evacuation of personnel and all participants during the period of the event. Non-hot missions in 2008 accounted for approximately 85 percent of the scheduled missions on the range. Hot missions, including bomb drops, explosions and gun-fire could increase the amount of waste produced. Depending on the mission in question, this may or may not be considered hazardous waste or waste at all, according to the Military Munitions Rule. Debris recovery would be conducted in accordance with WSMR regulation 70-8, Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range. The increase in these missions would have a minor impact on hazardous waste and materials.

The No Action Alternative includes several actions that have already been evaluated for environmental impact and are in various stages of implementation. Recently approved projects and programs would produce the following impacts:

- POL waste would increase.
- Hazardous materials use and hazardous waste generation would increase during construction of facilities.
- Missile debris requiring recovery would increase.
- Materials use with hazardous components would increase for test missions, for example, missiles or targets with lithium or silver-zinc batteries.
- Construction projects would increase the potential for workers to come into contact with asbestos containing material and lead-based paint.
- Solid waste disposal would increase (largely due to increases in on-post personnel).
- Increased use of sources of non-ionizing radiation.
- Increased use of solid state lasers, chemical lasers, and free-electron lasers.

WSMR would continue to manage these materials and wastes in accordance with existing SOPs, BMPs and regulations.

4.11.2.2 Main Post and Population Effects

During the expansion of Main Post facilities to accommodate the EN BN, there could be an increase in exposure of construction workers to asbestos containing material, and increase in its disposal. For example, 66 three-bedroom units would undergo renovation for single Soldier housing; therefore, the potential for exposure to asbestos containing materials may exist. Asbestos abatement procedures would continue, and regulated asbestos containing material would be disposed of in an approved off-post asbestos disposal facility. In addition to asbestos, there are other hazardous building materials that workers could be exposed to during such renovations. These include lead-based paint, paint containing lead, components containing lead, mercury containing devices, and ozone depleting substances in air conditioning and fire suppression equipment. The removal of asbestos and other potentially harmful materials would be a beneficial impact. Demolition and removal of these materials is governed by regulations enacted to protect workers, the environment, and the public against health hazards and no adverse health related impacts are anticipated from its removal.

The addition of 710 new EN BN Soldiers and 960 Family members would cause an increase in the generation of solid waste. EPA has established an average value of waste generation per person per day of 4.6 pounds (Ref# 013). This would increase the solid waste per day disposal by 3.8 tons. Army policy states that installations should use external sources for solid waste disposal, and as such, domestic solid waste from the Main Post is collected and transported off installation for disposal. The Otero-Lincoln County Landfill near Alamogordo is currently used for domestic solid waste disposal (Ref# 013). This landfill accepted a total of 71,086 tons of waste in 2008. The additional 1.9 percent of waste per year (1,387 tpy) from the EN BN would reduce the lifespan of the landfill by 0.9 years; therefore, the addition of 1,387 tpy would have only a minor impact on the landfill capacity (Ref# 144).

Under the No Action Alternative, a total of 1,063,000 s.f. of new construction and 74 acres of new pavement would be created and various facilities would be expanded. Based on average waste generation rates for the construction of non-residential buildings, construction waste would be approximately 2,070 tons, of which a large portion could be recycled (Ref# 223). An active and effective recycling program is yet to be established at WSMR due to its remote location, lack of a sufficient market, and low disposal costs of landfills in the region. However, an increase in recyclable materials due to this construction increase under the No Action Alternative may overcome these obstacles so that a recycling program could become economically feasible. The remaining waste could be disposed of at one or both of the existing construction and demolition landfills at WSMR, or in a local commercial landfill such as Otero-Lincoln County Regional Landfill. The Otero-Lincoln County Regional Landfill accepted a total of 71,086 tons in 2008, and the addition of 2,070 tons would have a minor impact on the landfill capacity.

With the construction of facilities in the Main Post Area, there would be the potential for an increase in herbicide/pesticide use. Herbicides are currently used in the maintenance of landscaped areas on the Main Post to keep unwanted vegetation under control; the increase in such areas would require an increase in herbicide usage. Other chemical pesticides are used, as necessary, to control a variety of common household pests (e.g., cockroaches, ants, and mice), turf insects, termites, etc. The current storage and use of herbicides/pesticides and associated certification and management plans, such as the WSMR Integrated Pest Management Plan would continue. Therefore, the increased use of hazardous herbicides/pesticides would result in no impact.

4.11.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Impacts to hazardous materials and hazardous wastes from Alternative 1 would be similar to the No Action Alternative, however, also included are those impacts associated with changes in land use to expand testing capabilities to support new and evolving test requirements throughout WSMR.

4.11.3.1 Range Capabilities and Use

WSMR has identified several capabilities to support future test missions based on the needs of current installation users, requests from outside users, and the consideration of faster fielding of equipment and technology to Soldiers in combat. The primary change in capability would allow more off-road activity, using a variety of wheeled and tracked vehicles and equipment.

4.11.3.1.1 Range Land Use

The conversion of land use classifications (see Table 2.3-1) would cause increases in the frequency and areas allowed for testing and training activities, increasing the potential for adverse impacts. As discussed in Section 2.3.1.2, all activities at WSMR would be anticipated to increase.

Under Alternative 1, there would be an increase in the number of specialized areas, facilities, and test beds at WSMR, which could increase the use, storage, and transportation of hazardous materials and could increase the quantity of hazardous waste storage and disposal. The expansion of HELSTF could cause such impacts. In addition, new High Energy Laser Facilities are proposed to be constructed within HELSTF that could also cause these impacts. The Hazardous Material Management Policy has requirements for issuing, controlling, storing, and disposing of hazardous material. HELSTF occasionally evaluates the existing industrial processes and system to reduce the existing hazardous materials, which are used in an effort to avoid, reduce, mitigate, or eliminate the use of hazardous materials and the generation of solid or hazardous waste (Ref# 154).

4.11.3.1.2 Range Activities and Levels of Use

The increase in mission activities would increase the rates of hazardous material use, hazardous waste generation, and solid waste generation as discussed below.

4.11.3.1.2.1 Ground Operations

Off-road vehicle use would increase under Alternative 1, on an annual basis there would be a total of 98 days of events in which a combination of tracked and wheeled vehicles would be used. Expected hazardous materials used in the course of operation and regular maintenance of these vehicles include POLs, batteries, and other solvents. Although the potential for direct contact with POLs and other hazardous materials exists, health and safety risks would be avoided by following appropriate Army SOPs. As these materials are already in use at WSMR, it would be unlikely that any new procedure or protocol would be needed. Vehicles, generators, and test equipment containing POLs would utilize spill containment systems in accordance with the WSMR Spill Prevention Plan. The WSMR Site-Specific Spill Plan addresses actions to be taken by employees to respond effectively to a spill of petroleum products or hazardous substances/materials. Vehicles, construction equipment, generators, and fuel storage units would employ a spill containment system (e.g., drip pans) in accordance with the WSMR Spill Prevention Plan and other regulations.

4.11.3.1.2.2 Hazardous Operations

There could be an increase in the number of recovery missions due to the establishment of a Sub-Surface Target Complex, the Single-Use Impact Site, dismounted operations, field operations, and airborne weapons/munitions releases programs. Under Alternative 1, it is estimated that there would be a possible 400 percent increase in directed energy missions from FY 2010 to FY 2013. Other hot mission events and hours across all other categories would increase by up to 25 percent over 2007 levels during this same period. In addition, non-hot missions would also increase as much as fourfold from No Action between FY 2010 and FY 2013 under Alternative 1. Debris recovery would be conducted in accordance with WSMR Regulation 70-8, Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range. The increase in recovery missions would have a minor impact.

4.11.3.1.2.3 Air Operations

Increases in air operations as a result of Alternative 1 would increase the amount of POL required to services these aircraft. New fuel storage facilities would be required as discussed in Section 4.11.3.1.2.

4.11.3.1.3 Range Infrastructure

All additional petroleum or diesel fuel required under Alternative 1 would likely be stored in above ground storage tanks, which would be managed using New Mexico regulations as guidance for managing petroleum above-ground tanks.

4.11.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. Most of the operations proposed would not result in significant generation of solid or hazardous wastes, nor require large amounts of hazardous materials.

The primary exception would be the Environmental Laboratory Complex, which could use a variety of hazardous chemicals to conduct environmental testing. The Complex would include x-ray use, which would require operating permits. Although the types and quantities of materials and wastes are not known at this point, material use and waste generation would be a key consideration for the environmental review for this Specialized Area.

Another Specialized Area of concern with respect to waste generation would be the Electro-Optical .50 Caliber Range. While this range would be used infrequently for test operations, test debris (spent cartridges and bullets) would be expended that would require recovery and disposal. Debris recovery would be conducted in accordance with WSMR Regulation 70-8, Security, Recovery, and Disposition of Classified and Unclassified Test Material Impacting On-Range and Off-Range, and impacts would be minor.

4.11.3.2 Main Post and Population Effects

Under Alternative 1, there would be an increase of up to 480 civilian and contractor personnel to support the increased testing and training capabilities at WSMR. Assuming a waste generation rate of 4.6 pounds/person/day, these personnel would generate an additional 403 tons of waste a year over the No Action baseline. At this increased waste generation, the Otero-Lincoln County Regional Landfill would reach capacity one month earlier than currently anticipated, resulting in a minor impact to the landfill.

4.11.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.11.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

The primary changes on the Main Post under Alternative 2 would occur as a result of developing infrastructure to support a HBCT (or comparable unit).

4.11.4.1.1 Construction

The USACE established a program for standard facilities, which are needed to support the garrison operations and Families of the Army's modular BCTs. Critical facilities required by a HBCT (or comparable unit) would include office space for brigade, battalion, and company Headquarters units, barracks space for single enlisted Soldiers, family housing, dining facilities, maintenance shops, parking for vehicles, and storage space. Estimated new construction under Alternative 2 would total 3,764,000 s.f. with an additional 210 acres of new pavement. Based on average waste generation rates for the construction of non-residential buildings, approximately 7,320 tons could be produced, of which a large portion could be recycled (Ref# 223). An active and effective recycling program is yet to be established at WSMR due to its remote location, lack of a sufficient market, and low disposal costs of landfills in the region. However, an increase in recyclable materials due to the construction increase under Alternative 2 may overcome these obstacles so that a recycling program could become economically feasible. The remaining waste could be disposed of at local commercial landfill such as Otero-Lincoln County Regional Landfill. The Otero-Lincoln County Regional Landfill accepted a total of 71,086 tons in 2008, so the addition of approximately 7,320 tons would have a minor impact on the landfill capacity, as this would be a onetime spike in disposal rates at this landfill.

Fuel storage capacity at WSMR is inadequate to meet the needs of a HBCT (or comparable unit). Proposed infrastructure under Alternative 2 would include a 3,600 s.f. oil storage building and a 3,660 s.f. HAZMAT storage facility to meet the needs of a HBCT (or comparable unit). Additional fuel storage tanks would be needed to meet the needs of a HBCT (or comparable unit), a total of 375,900 gallons of fuel is considered a critical requirement. The largest fuel storage tank at WSMR is 25,000 gallons; to accommodate a HBCT (or comparable unit), an additional 15 fuel storage tanks would be required. Currently WSMR has 14 fuel storage tanks so the addition of these new tanks would more than double what exists at WSMR today. Additional fuel tanks would most likely be above ground storage tanks as all below ground storage tanks have been removed at WSMR. Spill containment systems would be required in accordance with the WSMR Spill Prevention Plan, and therefore, impacts would be minor. There would also be the potential for impacts from the transportation of fuel, such as increased potential for spills. The WSMR Environmental Compliance Handbook provides guidelines for safe handling and environmentally acceptable management of hazardous material/waste from its initial use to its ultimate disposition. WSMR Regulation 200-1 provides guidelines for the handling and management of hazardous waste and facilitates compliance with all Federal, State, and local laws regulating generation, handling, treatment, storage, and disposal of hazardous wastes. Impacts, therefore, would be minor.

There could be an increase in exposure to and disposal of asbestos containing material during the expansion of Main Post facilities to accommodate a HBCT (or comparable unit). For example, the Army and Air Force exchange service shopping center would be renovated and thus there would be the potential to encounter asbestos containing materials. Asbestos abatement procedures would continue, and regulated asbestos containing material would be disposed of in an approved off-post asbestos disposal facility. In addition to asbestos, there are other regulated building materials which workers could be exposed to during such renovations, these include lead-based paint, paint containing lead, components containing lead, mercury containing devices, and ozone depleting substances in air conditioning and fire suppression equipment. Demolition and removal of these materials is governed by regulations to protect workers, the environment, and the public against health hazards, and therefore, no impact would be expected to occur.

4.11.4.1.2 Main Post and Population Effects

The stationing of new military personnel and Family members would cause an increase in the generation of solid waste at an assumed rate of 4.6 pounds/person/day (Ref# 013). Table 4.11.1 details estimated solid waste quantities at WSMR from 2008 through 2014.

Table 4.11-1. Estimated Domestic Waste Quantities at WSMR (2008-2014)

Year	Tpy[2]
2008	7,043
2009	7,195
2010	7,606
2011	7,715
2012	8,160
2013	17,596
2014	17,596

1. Ref# 013.
2. Values have been rounded to the nearest whole number.

Domestic solid waste from the Main Post is currently collected and transported off-installation for disposal at the Otero-Lincoln County Regional Landfill. The Otero-Lincoln County Regional Landfill accepted total 71,086 tons in 2008 (Ref# 144). By 2013, waste would increase at WSMR by 1.5 times under Alternative 2 when compared to 2008 levels. At 2013 levels, this waste generation increases the annual amount disposed of at the Otero-Lincoln County Landfill by 15 percent (compared to 2008 levels). Assuming a recycling program would not be implemented to reduce waste generation and assuming the 2013 waste generation rate would continue in perpetuity, the remaining lifespan of the county landfill could be reduced by three years (two years earlier than the No Action Alternative). This would be a moderate impact on the Otero-Lincoln County Landfill. If WSMR uses multiple landfills, this distribution would reduce the impact on any single landfill.

There would be an increase in medical and biohazardous waste generated under Alternative 2 due to the construction of a new Solider Family Care Medical/Dental complex and the uprange MedEvac facility. Waste collection, storage, and disposal processes would remain the same. The generation of medical and biohazardous wastes would not cause adverse impacts.

With construction of facilities on the Main Post and the golf course expansion, herbicide/pesticide usage would increase. Herbicides are used in the maintenance of the golf course and in landscaped areas at the Main Post facilities to keep unwanted vegetation under control, the increase in such areas would require an increase in herbicide usage. Other chemical pesticides are used, as necessary, to control a variety of common household pests (e.g., cockroaches, ants, and mice), turf insects, termites, etc. The current storage and use of herbicides/pesticides and associated certification and management plans, such as the WSMR IPM Plan would continue. The use of herbicides/pesticides would not result in adverse impacts when proper application and storage processes are followed.

The arrival of a HBCT (or comparable unit) in FY 2013 would come with approximately 900 tactical wheeled vehicles, approximately 360 tracked vehicles (e.g., M1 tanks), 165 generator sets, and other equipment. Some M1 tanks include armor that contains encased depleted uranium in the turret. Studies conducted of exposure to radiation from depleted uranium in tanks, showed that exposures were well below the occupational limit. The depleted uranium in these tanks would not be exposed to the environment, nor would it be during any maintenance activity. Thus, the risk of exposure to radiation from the M1 tank armor would be extremely low and no significant environmental or health impacts would be expected to occur (Ref# 037).

4.11.4.2 Training within the Southeast Multi-Use Area

Potential fuel spills (e.g., from the refueling of vehicles in the field) could increase under Alternative 2. Additional construction and operation of tank trails would also create other opportunities for fuel spills as well as increase solid waste generation during construction. However, existing BMPs discussed in Section 4.11.5.1 would continue to be implemented, reducing the risk of fuel spills so that impacts would be minor.

4.11.5 MEASURES FOR REDUCING IMPACTS

4.11.5.1 Potential Management Practices

Potential management practices for hazardous materials and hazardous waste would generally apply to infrastructure and ground operations, although project-specific BMPs could be warranted for hazardous operations and air operations. WSMR has a robust hazardous material and waste management program, where a number of BMPs are followed by WSMR employees for day-to-day activities. BMPs provided here are not meant to be all inclusive of all BMPs regularly followed by WSMR (as outlined in WSMR's existing regulations, plans, policies and SOPs). The BMPs listed below are those that most directly relate to the actions proposed under Alternatives 1 and 2. Potential management practices for hazardous materials and hazardous wastes could include the following:

Infrastructure

- Ensure equipment is available to respond to spills in the field.
- Salvage and store fill created during road construction for other construction activities at WSMR.
- Use biodegradable water-based solvents where practicable, use nonhazardous surfactants for equipment cleaning, and reuse spent solvents.
- Use less-toxic, less-volatile paints.
- Reduce packaging wastes by purchasing supplies in bulk; purchase recycled or recyclable goods; and reuse waste paper and Styrofoam™ as packaging materials and fillers.
- Use environmentally preferable products such as recovered materials and bio-based products (products made from renewable biological resources). Purchase materials and equipment designated as long life, energy efficient, and sustainable if they are reasonably cost-effective and available.
- Consider using used building materials where possible. Most used building materials can be installed provided they do not act as structural components or otherwise compromise safety.
- Educate construction crews and subcontractors about the WSMR Pollution Prevention Plan and ISO 14001 certification.
- Optimize building dimensions to correspond to standard lumber dimensions when possible.
- Evaluate whether salvaging used lumber is possible during construction or remodeling.

Ground Operations

- Ensure that equipment is available to respond to spills in the field.

4.11.5.2 Recommended Management Actions

WSMR should continue to review and revise its existing material and waste management plans and processes over time to reflect the new materials and waste streams generated by new activities. WSMR should also continue to investigate the feasibility of and implement to the extent possible a comprehensive recycling program to reduce solid waste disposal.

4.11.5.3 Mitigation Measures

4.11.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

No mitigation measures would be warranted.

4.11.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

Based on the anticipated solid waste increase under Alternative 2 from the projected increase in personnel, impacts to the Otero-Lincoln County Landfill could be moderate (reaching capacity two years earlier than currently anticipated under the No Action Alternative) if no other landfills are utilized. WSMR would investigate the feasibility of a comprehensive recycling program to reduce landfill waste. This investigation would include: discussions with recycling vendors in the region regarding the salability of materials and unit prices; evaluating the ability to staff a recycling program with military personnel to reduce operation costs; and reviewing Army funding programs for new infrastructure and equipment to facilitate recycling.

4.12 Facilities and Infrastructure

This section evaluates the impacts to Facilities and Infrastructure by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

Utilities discussed in this section include potable water, wastewater, stormwater, and communication systems. Impacts to transportation-related infrastructure are discussed in Section 4.13 (Transportation), and gas and electric utility impacts are discussed in Section 4.16 (Energy). Impacts to housing and other community service-related infrastructure on WSMR are discussed in Section 4.14 (Socioeconomics).

4.12.1 IMPACT METHODOLOGY

Impacts to facilities and infrastructure were primarily assessed by comparing anticipated population and development changes at WSMR to the capacity of utility systems to service them.

4.12.1.1 Region of Influence

The ROI for facilities and infrastructure includes service areas for wastewater, potable water, telecommunication, and stormwater utility systems at WSMR. Because most of the potential impacts on utilities would result from increased population and development of proposed buildings. The analysis mainly focuses on utility systems at the Main Post as the greatest concentration of increased population levels would occur in this area.

4.12.1.2 Technical Approach

Data was obtained from WSMR staff and reference documents to determine potential impacts to facilities and infrastructure under each alternative. The approach used to analyze impacts to existing utility systems was to evaluate the following for each alternative:

- Projected population levels, amount of change in usage rates (i.e., change in rate of potable water consumption and wastewater generation), and capacity levels for potable and wastewater systems;
- Projected population levels and qualitatively evaluated capacity level impacts for communication systems; and
- Determined amount of new development (i.e., additional impervious area) that would contribute to additional stormwater runoff and qualitatively evaluated impacts from incremental increases of runoff.

Two infrastructure reports – the 2007 “WSMR Infrastructure Capacity Analysis” (Ref# 152) and the 2008 “WSMR Demand and Infrastructure Report” (Ref# 013) – provided insight to potential impacts on the Main Post’s potable water, wastewater, and stormwater systems associated with the expansion of military activities at WSMR related to “Global Defense Posture Realignment” initiatives and the required infrastructure to support the EN BN, a HBCT, and other mission expansions. Additionally, to supplement these reports, a series of draft reports were completed in April 2009 for WSMR’s infrastructure systems, including the potable water, wastewater, and stormwater systems. The following section outlines the methodology used to estimate future water and wastewater system demands based on projected population levels at the Main Post area.

4.12.1.2.1 Potable Water System

Future resident and non-resident population levels at WSMR were determined using projected population levels as presented in Chapter 2 and Section 4.14 (Socioeconomics) of this EIS. Additionally, water demand from transient personnel, Warrior Transition Course students, and other civilians (e.g., associated Family members and miscellaneous support), are captured in this analysis. The following assumptions and inputs were used to estimate potable water demand and impacts to the Main Post water system:

- "Residents" are assumed to be personnel and Family members that live at the Main Post or generally remain on the installation for more than a full work day (i.e., more than eight hours per day). "Nonresidents" are generally assumed to be those that work on the installation, but commute off-post for residency. Civilian families are not included in this analysis as it is assumed that this population would remain off-post the majority of the time. Resident numbers are estimated based on available on-post housing within a given year. Under Alternative 1, construction personnel would increase nonresident populations between 2010 and 2013, increasing water demand and wastewater generation. During these timeframes, water use and wastewater generation may be slightly higher (approximately five percent) than the values indicated for 2013.
- The following potable water consumption rates were based on Army guidance, "Water Supply Sources and General Considerations (TM 5-813-1)" (e.g.,150 gallons/person/day for residents and 50 gallons/person/day for nonresidents).
- Projected water demand was based on the "Design Population," which was calculated by multiplying a "Capacity Factor" by the "Effective Population". Effective Population includes residents plus a weighted-population value for nonresidents based on assumed consumption rates. For example, because the nonresident consumption rate is one-third of the resident rate, the Effective Population is the number of residents plus one-third the number of nonresidents. The Capacity Factors are taken from Army guidance (Ref# 013) and provide allowances for reasonable population increase, variations in water demand, uncertainties as to actual water requirements, and for unusual peak demands whose magnitude could not be accurately estimated in advance.
- Average daily population water demand was obtained by multiplying the Design Population by the Capacity Factor and the consumption rate 150 gallons/person/day. This rate may be conservative as the consumption rate was estimated to be 100.5 gallons/person/day in 2007 (Ref# 013).
- Demand from Special Uses was based on irrigation usage at the golf course and the water usage from down range at the LC 38 Range Complex and Orogrande. These values were taken from the April 2009 Draft Potable Water System Analyses Report (Ref# 252).
- For this analysis, irrigation water was not accounted for as it was assumed that this water would be limited and that harvested rainwater and/or treated wastewater (as appropriate) would be reused for landscape irrigation.

4.12.1.2.2 Wastewater System

The same population projections as used in the potable water analysis were used for the wastewater analysis. Additionally, the following assumptions and inputs were used to estimate wastewater flow and impacts to the Main Post wastewater system:

- Average daily population wastewater generation rates were obtained by multiplying the Design Population by the wastewater generation rate of 100 gallons/person/day and the Capacity Factor.
- Industrial wastewater flows as estimated in the 2008 Demand and Infrastructure Report were used for this analysis. Typical industrial discharges considered in the report included wastewater from maintenance facilities, vehicle wash areas, and a fire fighting facility.
- The total average daily wastewater flow is the combined population-based wastewater and industrial wastewater flows.

4.12.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to facilities and infrastructure resulting from the No Action Alternative, Alternative 1, or Alternative 2 includes the extent or degree to which its implementation would use up a utility system's servicing capacity and/or potentially require service beyond the capacity limit of a utility system.

4.12.2 NO ACTION ALTERNATIVE

To provide a baseline for determining impacts from Alternative 1 and Alternative 2 actions, the No Action Alternative considers continuation of on-going test activities at WSMR and previously analyzed activities for the stationing of an EN BN. As discussed in Section 2.2, baseline conditions under the No Action Alternative may differ from existing conditions identified in Chapter 3 as this alternative includes actions that have been evaluated and recently approved but have not been fully implemented, or undergoing environmental review that will be completed before completion of this EIS. As a result, impacts from these incomplete actions may alter current baseline conditions.

As indicated above in Section 4.12.1.1, evaluating the impacts to existing utility systems depends largely on determining population levels and the characteristics of new facilities (e.g., size of building, types of activities conducted in the facility, and utilities needed to support that facility). Recent decisions included under the No Action Alternative that would impact the demand on utilities include the arrival of the EN BN on WSMR (with major training at Fort Bliss) and construction of new facilities at and the expansion of the Main Post to support the EN BN, garrison, and test functions.

4.12.2.1 Range Capabilities and Use

In general, existing test capabilities would occur with current levels of operation and activities under the No Action Alternative represent minor changes and, thus, minor impacts to existing conditions as described in Section 3.12 are expected. The following lists impacts that would occur as a result of typical actions associated with ongoing testing and training activities at WSMR:

- Field operations at WSMR would result in slightly higher rates of potable water usage and wastewater generation that would cause minor decreases in serving capacities of and increase maintenance of the facilities treating these resources. Bivouacking would require water tanks and portable latrines during training. Potable water and treatment of portable latrines would be serviced from either Main Post or Stallion Range Center systems. Section 4.12.2.2 discusses impacts to the Main Post's potable water and wastewater systems from increased population levels (including the EN BN);

- Construction and development of facilities and infrastructure to support WSMR missions could temporarily disrupt service of existing utility systems;
- Construction and development of facilities and infrastructure to support WSMR missions would increase stormwater runoff and associated erosion due to disturbed land and increased impervious areas, which would cause minor impacts to serving capacities of stormwater systems; and
- Continued off-road vehicle use and field operations includes the risks of damaging underground utility lines as vehicles and digging may rupture utility encasements or sever utility lines.

Utility impacts from most of these activities would occur at the Range Centers and Built-Up Areas (e.g., Main Post) as these facilities service the greatest concentration of population and most of WSMR's new construction would occur in this area. Minor impacts would occur from Soldiers training at the Stallion Range Center as the existing potable water and portable latrines onsite would have the capacities to handle the additional training activities (Ref# 205). Development of the proposed training ranges at WSMR would generally result in minor impacts to utilities. Utility impacts during field operations and off-road vehicle use would generally occur in land uses designated for such activities, mainly in the Primary Test Zone, Range Centers and Built-Up Areas, and Augmented Test Zone. See Table 2.2-3 which identifies the Activity Categories that occur in each Land Use Classification. As discussed in Section 1.10.2, to minimize adverse impacts, the WSMR Environmental Division coordinates with the ITAM Program to identify requirements and BMPs for range activities.

4.12.2.2 Main Post and Population Effects

The following subsections describe the potential impacts for each utility system that would be expected from increased population levels at the Main Post (including the EN BN and associated support staff and Family members).

4.12.2.2.1 Potable Water Supply

Potable water consumption is directly related to the number of personnel and military Family members at WSMR and types of facilities at the installation. Historically, the WSMR population has fluctuated greatly over time. As discussed in Section 3.12, the Main Post potable water supply system was evaluated in 1986 and 2007. The 2007 analysis concluded that the current average daily consumption rate, 100.5 gallons/person, is lower than those estimated in 1986, at 153 gallons/person (Ref# 013, 152).

Under the No Action Alternative, the projected water demand is a reflection of both anticipated increases to population from the EN BN and planned projects. It is anticipated that by FY 2013 the Effective Population would increase to approximately 4,700 under this alternative (i.e., Design Population would reach approximately 7,100), requiring an additional 0.2 mgd of potable water for domestic use, which represents a 18 percent increase from the current water demand of 0.9 mgd. By 2013, it is expected that the total combined average daily usage would increase to 1.72 mgd (includes demand for irrigation and LC 38/Orogrande), which represents an eight percent increase from recent combined water demands (1.65 mgd) and 38 percent of the existing production capacity (4.5 mgd). Table 4.12-1 shows the projected average daily water demands based on the methodology described in Section 4.12.1.2.1.

A summary of the impacts to the Main Post potable water supply system under the No Action Alternative is listed below:

- Existing Production Capacity: 4.5 mgd
- Historical Demand: 1.2 mgd (or 26.7 percent of existing production capacity)
- Current Domestic Average Daily Demand: 0.9 mgd (or 20 percent of existing production capacity)
- Projected Domestic Daily Demand in 2013: 1.06 mgd (or 24 percent of existing production capacity)
- Current Combined Total Daily Demand: 1.6 mgd (or 36 percent of existing production capacity)
- Projected Combined Total Average Daily Water Demand in 2013: 1.72 mgd (or 38 percent of existing production capacity)

Table 4.12-1. WSMR Projected Average Daily Water Demand, 2008-2013 for the No Action Alternative

Year	Resident[1]	Non-Resident[1]	Effective Population[2]	Capacity Factor[3]	Design Population[4]	Population-Based Water Demand[5] (mgd)	Special Uses Water Demand[6] (mgd)	Total Daily Water Demand (mgd)
2008	1939	5600	3806	1.50	5709	0.86	0.644	1.50
2009	2500	5680	4393	1.50	6590	0.99	0.658	1.65
2010	2800	5740	4713	1.50	7070	1.06	0.658	1.72
2011	2800	5770	4723	1.50	7085	1.06	0.658	1.72
2012	2800	5770	4723	1.50	7085	1.06	0.658	1.72
2013	2800	5770	4723	1.50	7085	1.06	0.658	1.72

1. Resident population numbers for 2008 and 2009 were taken from 2009 Potable Water System Analyses Report (Ref# 252); after 2009, it was assumed that all on-post housing units would be occupied at a rate of four persons per unit. Non-resident populations include the government and contract civilians listed in Table 2.2-9.
2. Effective Population = Residents + 1/3 x (Nonresidents).
3. Capacity Factor accounts for variations and uncertainties of levels of water use (Ref# 013).
4. Design Population = Effective Population x Capacity Factor.
5. Population-based water demand = Design Population x 150 gal/person/day.
6. Special Uses includes the combined peak usage rates for golf irrigation and LC 38/Orogrande. These values are taken from the Draft 2009 Potable Water System Analyses Report (Ref# 252).

By 2013, the estimated water demand would remain below the treatment capacity of the water facility, thus, impacts to the Main Post's potable water infrastructure as a result of the EN BN and planned projects is expected to be moderate, as upgrades to the water system would be required to accommodate the arrival of the EN BN. Water connections to the new facilities would be required and potentially new upgrades to the Main Post water system may be needed. Due to the age of the water storage tanks, the water tanks would need to be inspected and may require rehabilitation as necessary to ensure continued operation of the high pressure distribution system (Ref# 152). Because of the large water demand by the golf course irrigation system, an additional water supply well may need to be installed at WSMR to provide water directly to the golf course irrigation system without treatment (Ref# 152).

4.12.2.2.2 Wastewater

Similar to potable water supply, the generation of wastewater is largely influenced by the population level and types of facilities. In 1986 and 2007, the Main Post's wastewater treatment facility, was evaluated in two separate reports. The 2007 report stated that the current overall wastewater flows at the Main Post are less than those in the 1986 analysis, but that because wastewater treatment capacity is based on the original 1958 design capacity, it could not be confirmed if the existing facility, as is, would still be able to meet the 1.0 mgd design capacity or future demand.

As shown in Table 4.12-2, wastewater flow projections were calculated for the No Action Alternative based on the methodology discussed in Section 4.12.1.2.2. By FY 2013, the domestic wastewater flow would increase to 0.71 mgd, which is 71 percent of the existing capacity (1.0 mgd [Ref# 153]) and 1.1 times the permitted wastewater discharge limit (0.63 mgd [Ref# 153]). The combined total wastewater generation rate in 2013 is estimated to be 0.83 mgd, which represents a 3-fold increase from recent wastewater discharge levels (0.2 mgd [Ref# 253]). This rate is 83 percent of the existing capacity and 1.3 times the permitted discharge amount.

Table 4.12-2. WSMR Projected Average Daily Wastewater Flow, 2008-2014 for the No Action Alternative

Year	Resident[1]	Non-Resident[1]	Effective Population[2]	Capacity Factor[3]	Design Population[4]	Population-Based Flow[5] (mgd)	Industrial-Based Flow[6] (mgd)	Total Daily Wastewater Flow (mgd)
2008	1939	5600	3806	1.50	5709	0.57	0.02	0.59
2009	2500	5680	4393	1.50	6590	0.66	0.02	0.68
2010	2800	5740	4713	1.50	7070	0.71	0.02	0.73
2011	2800	5770	4723	1.50	7085	0.71	0.02	0.73
2012	2800	5770	4723	1.50	7085	0.71	0.02	0.73
2013	2800	5770	4723	1.50	7085	0.71	0.12	0.83

1. Resident population numbers for 2008 and 2009 were taken from 2009 Potable Water Study (Ref# 252); after 2009, it was assumed that all on-post housing units would be occupied at a rate of four persons per unit. Non-resident populations include the government and contract civilians listed in Table 2.2-9.
2. Effective Population = Residents + 1/3 x (Nonresidents).
3. Capacity Factor accounts for variations and uncertainties of levels of water use. Source (Ref# 013).
4. Design Population = Effective Population x Capacity Factor.
5. Population-based flow = Design Population x Capacity Factor x 100 gal/person/day.
6. Industrial-based water demand – taken from 2008 Demand and Infrastructure Report (Ref# 013).

A summary of the wastewater impacts under the No Action Alternative is listed below:

- Daily Design Capacity: 1.0 mgd
- Allowable maximum discharge (i.e., permitted): 0.63 mgd
- Current Total Average Daily Load: 0.2 mgd (20 percent of existing design capacity) (Ref# 253)
- Projected Combined Average Daily Wastewater Flow in 2013: 0.83 mgd (or 83 percent of the design capacity and 1.3 times the permitted wastewater discharge limit)

By 2009, the projected combined average daily wastewater demands would be over the permitted discharge limit and, by 2013, would be near the design capacity of the wastewater plant. Impacts to the Main Post's wastewater infrastructure would be mitigated to moderate impacts through modernization of the ageing system and modification to the existing permit. Connections of new pipelines to the proposed EN BN facilities and application for permit changes would be required and the existing Main Post wastewater facility would require major upgrades. The projected industrial flows do not reflect re-use and recycling measures, thus, wastewater flows could be reduced if such water conservation measures are in place.

4.12.2.2.3 Stormwater

As mentioned earlier, although the desert climate sees sparse annual rainfall, the regional climate is dominated by a pronounced summer monsoonal season in July with occasional heavy rains and significant runoff from the Organ Mountains. The arroyos can become unpredictable with dangerous floodways. Therefore, a major issue for WSMR is stormwater control, specifically the ability to divert flood waters from the mountains in this lower lying and relatively flat landscape. Another primary concern on WSMR is habitat degradation resulting from human activities that accelerate soil erosion. Movement of stormwater can contribute significantly to soil erosion, arroyo side-bank and channel cutting, and downstream sediment loading. Arroyo cutting tends to lower the local water table and alter the site specific flora and fauna by widening and deepening the original channel. Changes in arroyo channel geometry upstream can produce adverse effects on arroyo stability and downstream habitats. This loading has the potential to smother flora and small soil fauna downstream.

To support the EN BN and garrison and test functions under the No Action Alternative, construction activities for expansion of and new facilities at the Main Post and throughout WSMR would occur. Any new development at the installation would increase impervious area, runoff, and erosion, and thus, would potentially result in minor to moderate impacts as discussed above. Development of facilities at the Main Post would increase the area's impervious cover by approximately 40 acres (or six percent of existing impervious area) and increased runoff flow and concentration would occur in the southeastern portion of the Main Post area. Appropriate BMPs would be implemented during and after construction to minimize and control increases in runoff, prevent runoff pollutants, and minimize erosion to the extent practicable.

With the addition of the EN BN, upgrades to the storm drainage system in the vicinity of the proposed EN BN complex, located east of the existing Main Post area, were recommended based on past drainage studies (Ref# 013). As discussed in Section 3.12.4, a levee is located along the western edge of the Main Post area to divert drainage from the Organ Mountains into two major arroyos, a northern and southern arroyo. Because the majority of the stormwater from the southern drainage area currently flows through the planned location of the battalion complex, major improvements to the drainage system in this area were considered necessary. A preliminary stormwater drainage study was conducted in April 2009, which included hydrological and hydraulic analyses based on new developments, including facilities for the EN BN (Ref# 254).

4.12.2.2.4 Communications

The only notable impact to communication resources that could occur would be peak usage of and potential overloading of communication systems as a result of increased population levels at WSMR. To accommodate current and future tenants, including the EN BN, the installation is planning to construct a modern telephone services facility (Ref# 224). This project is expected to increase WSMR's ability to provide additional copper and fiber optic cabling to newly developed areas at the Main Post, allowing for enhanced bandwidth and telecommunications services. WSMR is also planning to construct a state-of-the-art network services facility to also support Grow the Force initiatives (Ref# 225). This project is expected to provide adequate and reliable communications for the WSMR mission in testing activities. These projects are expected to minimize overloading of communication systems and maintain minor impacts.

4.12.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.12.3.1 Range Capabilities and Use

As discussed in Section 2.3, under Alternative 1, land use changes at WSMR would occur and testing and training capabilities would be expanded to support new and evolving test requirements throughout the installation, including providing field training capability for military units including the EN BN.

4.12.3.1.1 Range Land Use

Under Alternative 1, changes in Land Use Classifications that would have impacts on utilities include the expansion of the Range Centers and Built-Up Areas (Land Use Classification B) and expansion of the Augmented Test Zone (Land Use Classification C).

Approximately 7,000 acres would be designated for built-up areas (Land Use Classification B) that would be developed over time. Expansion of the built-up areas, including the Main Post, Stallion Range Center, and one or two other range centers, such as Oscura, would allow future development for the EN BN and other projects to support increased personnel and activities on the installation. Potential utility impacts would mainly occur at the Main Post area and would be similar in nature to those as described under the No Action Alternative. The Master Planning review process for non-range lands would apply to these expanded areas. Siting of facilities at the Main Post would follow the Army's recommended guidelines in Army Regulation AR 210-20, Real Property Master Planning for Army Installations. Impacts to utilities at the Main Post are discussed in greater detail in Section 4.12.3.2.

Under Alternative 1, over 1.6 million acres of Primary Test Zone (Land Use Classification A) would be converted to Augmented Test Zone (Land Use Classification C). Expansion of the Augmented Test Zone would expand the overall range of activities to include off-road uses, though restrictions and conditions would apply based on management priorities and constraints. The BCT Modernization program would be the primary user for this capability in the near term, though other users and programs would have similar needs in the future. Vehicular and other types of off-road maneuvers in this zone could cause minor to moderate impacts by potentially damaging buried utility structures, such as gas pipelines. Uses would be coordinated with the WSMR Environmental Division to identify any general or specific measures required to reduce potential adverse impacts, in accordance with WSMR plans, permits, and regulations.

4.12.3.1.2 Range Activities and Levels of Use

This section describes typical impacts to utilities that could be expected during ground operations, hazardous operations and air operation activities and from levels of use under each activity category. Section 4.12.5 discusses measures to minimize impacts and avoid the potential for significant impacts to occur.

4.12.3.1.2.1 Ground Operations

Off-road vehicle use would include vehicles that weigh greater than 1,500 pounds. The Army BCT Modernization and other programs would perform off-road operations using a variety of test and test support vehicles, including wheeled and tracked types. As many as 32 vehicles may operate in areas between 5,000 acres to 60,000 acres in size. Increase in off-road vehicles traversing over utility lines would increase risk of damaging underground utility lines, such as gas pipelines, but the potential for damage would be minor as vehicles are routed in designated areas and gas pipelines are either well demarcated or provided with a hardened crossing at intersections.

Field operations include test and military training that may involve digging of trenches, bivouacking, setting up temporary camps with as many as 500 Soldiers for 24-hour periods, and performing operations and maintenance projects for WSMR. Increases in digging for placing sensors and foxholes would result in increased risk of damaging underground utility lines, but this potential for damage would be minor as existing utility lines would be located and demarcated prior to such activities. Increased potable water demand and wastewater generation resulting from the temporary camps are expected to mainly contribute to impacts on the Main Post water and wastewater facilities as it is assumed that filling of water canteens and treatment of wastewater from portable latrines would be serviced from these facilities. Impacts to Main Post's water and wastewater systems are discussed in Section 4.12.3.2.

Additional personnel and facilities at the training ranges would increase the use of utilities at the training areas and are expected to have minor to moderate impacts to existing utilities in these areas. Analyses would be performed to determine what upgrades would be necessary to ensure adequate service of existing utilities or if new facilities would be required to service increased demand on a utility system.

4.12.3.1.2.2 Hazardous Operations

Generally, hazardous operations would not disturb land or infrastructure outside designated impact areas. The increase in missions may require additional utilities and are expected to be minor as potential impacts would be limited to temporary disruptions to existing services during connection to existing infrastructure.

4.12.3.1.2.3 Air Operations

Air operations would only impact utilities discussed in this section to the extent that personnel would add to the demand of these resources; however, such impacts are expected to be minor as the associated population would be relatively small.

4.12.3.1.3 Range Infrastructure

As discussed in Section 2.3.1.3, under Alternative 1, fiber optics systems, additional instrumentation, and new field support nodes at range centers, including Stallion Range Center, are proposed to expand current support facilities on the installation. In order to continue testing at WSMR, the BCT Modernization program would need to construct several facilities, including a motor pool with fiber optics and other necessary utilities and communication systems to provide storage and maintenance space for new vehicles. In addition, the program would need to construct an Urban Test Facility to provide a realistic urban environment for testing. The BCT Modernization program would also need mobile and temporary facilities on the installation during testing, pre-fabricated structures, such as classrooms, laboratories, fabrication and maintenance shops, and UAS hangers at Condron Field.

Approximately 150 miles of new tank trail corridors parallel to existing installation roads (except where it would attempt to avoid the White Sands National Monument along Range Road 7) would facilitate movement of test vehicles throughout the installation for joint battlefield operations. Minor to moderate impacts could occur to utilities from the damage and possible disruption of a utility service as heavy vehicles traverse over buried utility lines. Section 2.3.1.3 provides a preliminary list of infrastructure improvements that could serve multiple users and streamline installation operations. These improvements would provide better access, field support, infrastructure, and instrumentation throughout the installation. The majority of these projects are not programmed and have no proposed sites. Therefore, they are only addressed programmatically in this EIS and will require further review and analysis when they are better defined. The following projects listed in Section 2.3.1.3 could potentially impact existing water, wastewater, stormwater, and telecommunication utilities:

- Expanded Range Center facilities for dining, billeting and maintenance for major test missions.
- North-South Tank Trail corridor (approximately 150 miles connecting south to north range, parallel to Range Road 7).
- Southern Connector Tank Trails (approximately 20 miles south of US 70 for connecting to Fort Bliss tank trails).
- Development of specialized areas and mission support facilities.
- Hardened tank crossings (over selected installation roads and US 70).
- Additional instrumentation sites (one-acre sites throughout the installation as needed).
- Expanded communication networks (300 miles of buried cable).
- New buried fiber optics cable and utilizes (up to 300 miles of trenching).
- Oscura Range Center expansion (10 acres disturbed).
- Stallion Range Center expansion (up to 50 acres disturbed).

4.12.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. All these areas would likely be located south of US 70 near the Main Post, where it is likely that new facilities located near the Main Post would utilize existing potable water sources and tie into existing sanitary sewer systems. However, where facilities would be located at impractical distances to use existing utilities, new water wells and septic systems could be required. Therefore, where tie-ins to existing utility systems cannot be readily achieved, new facilities would be a key consideration during the siting process and environmental review of the Specialized Area.

4.12.3.2 Main Post and Population Effects

4.12.3.2.1 Potable Water Supply

Under Alternative 1, the projected water demand has a slight increase when compared to the No Action Alternative, or baseline and, therefore, impacts to the potable water system would be minor. It is anticipated that by FY 2013, an increase of 480 to the non-residents (civilians) would occur on-post under this alternative, requiring an additional (in comparison to the No Action Alternative) 0.04 mgd of potable water from the Main Post water supply. This represents a four percent increase in domestic water usage from the No Action Alternative. It is assumed that demand for irrigation and LC 38/Orogrande would remain the same as No Action estimates. By 2013, the combined total average water demand is expected to increase to 1.76 mgd, which represents 39 percent of the existing production capacity (4.5 mgd).

4.12.3.2.2 Wastewater

Under Alternative 1, the projected wastewater generation rate has a slight increase when compared to the No Action Alternative, or baseline and, therefore, impacts to the wastewater system are similar between the two alternatives. It is anticipated that by FY 2013 an increase of 480 to the non-residents (civilians) would occur on-post under this alternative, generating an additional 0.04 mgd of domestic wastewater discharge to the Main Post WWTP (in comparison to the No Action Alternative). This represents a three percent increase in domestic wastewater discharge from the No Action Alternative. Similar to the No

Action Alternative, the combined total wastewater discharge is estimated to be 0.68 mgd by 2009 and would exceed the permitted wastewater discharge limit (0.63 mgd). By 2013, the combined total wastewater discharge is expected to increase to 0.85 mgd, which would be 85 percent of the existing production capacity (1.0 mgd).

4.12.3.2.3 Stormwater

The types of impacts that would occur on the stormwater system from infrastructure projects related to the expansion of the Main Post area would be similar to those as described under the No Action Alternative (e.g., increased sediment and erosion); however, the extent of impact would increase slightly due to some increased construction under Alternative 1. Such impacts would be minor and would be minimized through implementation of appropriate BMPs during and after construction. The additional civilian population that would occur under Alternative 1 would use existing buildings at WSMR and, therefore, would not increase stormwater levels or result in any additional impacts to the stormwater system.

4.12.3.2.4 Communications

The additional civilian population that would result under Alternative 1 would use existing facilities at WSMR. Therefore, impacts to communication resources would not differ from those discussed under the No Action Alternative.

4.12.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.12.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.12.4.1.1 Construction

The Future Development Area would be located on the southeastern edge of the Main Post area, just east of the EN BN complex. would be implemented during construction. Stormwater management strategies per EPA guidance under the NPDES regulatory compliance guidance (Ref# 111) and appropriate BMPs would be implemented during and after construction to minimize and control increases in runoff, prevent runoff pollutants, and minimize erosion to the extent practicable. These impacts are considered minor to moderate so long as stormwater management controls are implemented.

During construction of the facilities, water consumption and wastewater generation, mainly from construction personnel, would impact the Main Post systems. The levels of usage from construction workers are accounted for in the following water and wastewater analyses as the population projections include this population group. During construction there could be intermittent disruptions to utility services, although these would be temporary and infrequent.

4.12.4.1.2 Main Post and Population Effects

Under Alternative 2, the projected water demand is a reflection of both anticipated increases to population from the HBCT (or comparable unit) and planned projects. It is anticipated that by FY2013, the new population would result in a domestic water demand of 1.56 mgd, which represents an additional 0.5 mgd of potable water when compared to the No Action Alternative. This represents a 47 percent increase in domestic water usage from the No Action Alternative estimates. It is assumed that demand for irrigation and LC 38/Orogrande under Alternative 2 would remain the same for as the No Action Alternative. By 2013, the combined total water demand is expected to increase to 2.21 mgd, which is 49 percent of the current plant capacity (4.5 mgd). Table 4.12-3 shows the projected daily water demands for Alternative 2 based on the methodology described in Section 4.12.1.2.1.

New potable water lines and potentially new wells would need to be added to accommodate the EN BN and HBCT (or comparable unit) by 2013. Impacts to the Main Post's potable water system are considered significant but mitigable to less than significant as the significant increase in water demand would require new pipelines and connections and major upgrades to the existing Main Post water system and the possibility of saline intrusion would pose a risk to the potable water supply. The 2008 infrastructure demand report evaluated project water demand as a function of building type, which accounted for fire flows. Based on fire flow projections, the report indicated that proposed facilities might require a demand of 1,500 gallons/minute and a potential quantity exceeding existing storage capacity. Thus a separate on-site pond or tank may be required (Ref# 013).

Table 4.12-3. WSMR Projected Average Daily Water Demand, 2008-2013 for Alternative 2

Year	Resident[1]	Non-Resident[1]	Effective Population[2]	Capacity Factor[3]	Design Population[4]	Population-Based Water Demand[5] (mgd)	Special Uses Water Demand[6] (mgd)	Total Daily Water Demand (mgd)
2008	2498	5510	3806	1.50	5709	0.86	0.644	1.50
2009	1939	5600	4393	1.50	6590	0.99	0.658	1.65
2010	2500	5680	4723	1.50	7085	1.06	0.658	1.72
2011	2800	5770	4733	1.50	7100	1.07	0.658	1.72
2012	2800	5800	4877	1.50	7315	1.10	0.658	1.76
2013	2800	6230	6917	1.50	10375	1.56	0.658	2.21

1. Resident population numbers for 2008 and 2009 were taken from Ref# 252; after 2009, it was assumed that all on-post housing units would be occupied at a rate of four persons per unit. Non-resident populations include the government and contract civilians listed in Table 2.4-5.
2. Effective Population = Residents + 1/3 x (Nonresidents).
3. Capacity Factor accounts for variations and uncertainties of levels of water use.
4. Design Population = Effective Population x Capacity Factor.
5. Population-based water demand = Design Population x 150 gal/person/day.
6. Special Uses includes the combined peak usage rates for golf irrigation and LC 38/Orogrande. These values are taken from Ref# 252.

Since potable water is an especially valued resource in the arid southwest US and on the installation, water conservation and water use efficiency is critical and WSMR would implement a water management plan that identifies opportunities for WSMR to reuse and conserve water (Ref# 226). If water conservation measures are implemented (e.g., target an 85-gallon/person/day personal consumption rate as a goal), water demand could be significantly reduced. Water conservation and other water mitigation measures are discussed in Section 4.12.5.

A Draft Potable Water Resources Report was completed in April 2009 indicated that current water system wells capacity and pumping would adequately serve the Main Post and would provide enough capacity for the future development of a HBCT complex and future funded projects (Ref# 252). However, existing wells would approach their pumping capacities and some replacement and/or rehabilitation would most likely be required. Also, pumping rates would increase the probability of brackish water intrusion into the fresh water aquifer, additional monitoring wells and annual monitoring were recommended. Increased pumping would require additional storage tanks in the amount of 1.3 million gallons. Because the proposed Future Development Area would be in the lower pressure zone due to its lower elevation, deficiencies of the system would occur in ground and elevated storage capacities for the increased demand of a HBCT (or comparable unit). Lower elevations off-post cause high pressures and necessitate pressure reducing valves. Therefore, it was recommended that additional control valves and feeder distribution water mains be provided to provide circulation and supply to the Future Development Area.

Additionally, a consideration of non-potable water usage (using treated wastewater from the Main Post's WWTF) could replace the current practice of using potable water to irrigate the golf course, which uses about 16 percent of the current water demand.

Table 4.12-4, shows wastewater flow projections for Alternative 2 based on the methodology discussed in Section 4.12.1.2.2. By FY 2013, the new on-post population would generate an additional 0.33 mgd of domestic wastewater (when compared to the No Action Alternative). This represents a 46 percent increase in domestic wastewater discharge from the No Action Alternative. Similar to the No Action Alternative, the combined total wastewater discharge is estimated to be 0.68 mgd by 2009 and would exceed the permitted wastewater discharge limit (0.63 mgd). By 2013, the combined total wastewater flow is expected to increase to 1.16 mgd, which is 1.2 times the existing capacity (1.0 mgd)..

Table 4.12-4. WSMR Projected Average Daily Wastewater Flow, 2008-2013 for Alternative 2

Year	Resident[1]	Non-Resident[1]	Effective Population[2]	Capacity Factor[3]	Design Population[4]	Population-Based Flow[5] (mgd)	Industrial-Based Flow[6] (mgd)	Total Daily Wastewater Flow (mgd)
2008	2498	5510	3806	1.50	5709	0.57	0.02	0.59
2009	1939	5600	4393	1.50	6590	0.66	0.02	0.68
2010	2500	5680	4723	1.50	7085	0.71	0.02	0.73
2011	2800	5770	4733	1.50	7100	0.71	0.02	0.73
2012	2800	5800	4877	1.50	7315	0.73	0.02	0.75
2013	2800	6230	6917	1.41	10375	1.04	0.12	1.16

1. Resident population numbers for 2008 and 2009 were taken from Ref# 252; after 2009, it was assumed that all on-post housing units would be occupied at a rate of four persons per unit. Non-resident populations include the government and contract civilians listed in Table 2.2-9.
2. Effective Population = Residents + 1/3 x (Nonresidents).
3. Capacity Factor accounts for variations and uncertainties of levels of water use (Ref# 013).
4. Design Population = Effective Population x Capacity Factor.
5. Population-based flow = Design Population x Capacity Factor x 100 gal/person/day.
6. Industrial-based water demand – taken from Ref# 013.

As discussed under the No Action Alternative, the projected average daily wastewater demands resulting from the EN BN and planned projects would already approach the design capacity of the wastewater plant by FY 2009 and, by 2013, future demands, including those resulting from a HBCT (or comparable unit), would result in an exceedance under Alternative 2. Thus, impacts to the Main Post's wastewater infrastructure is expected to be significant but mitigable to less than significant with major modernization of the ageing system and possibly the addition of a new wastewater facility. Upgrades to the existing wastewater plant's capacity (or a new wastewater treatment plant) and the addition of connection lines to the Future Development Area would be required. Allowable maximum discharges would need State approvals. A draft wastewater study was completed in April 2009 (Ref# 253) and recommended that a third parallel treatment train (consisting of a primary clarifier, trickling filter, secondary clarifier, and additional UV disinfection) be provided to serve future flows. Another recommendation provided by the study, which would also serve to mitigate impacts of future potable water demand, is the consideration of treated wastewater effluent for irrigation purposes, such as water for the golf course, parks, and/or street landscaping.

It is estimated that HBCT facilities would add approximately 80 acres (or 13 percent) of new impervious surface area to the Main Post. Potential impacts are expected to be moderate and include increased potential for soil erosion and flood hazards. As discussed under the No Action Alternative, a stormwater drainage analysis was conducted in April 2009 (Ref# 254). The study indicated that in order to handle flows up to the 50-year storm event, the proposed Future Development Area would require the construction of two open channels with two concrete box culverts crossing the proposed access road.

During a 100-year storm, this system would result in water overtopping the road for less than 30 minutes, with the water depth not exceeding 2.5 inches.

Because results of the study demonstrated that the existing drainage is inadequate to provide the desired flood protection of the cantonment area and the new Future Development Area (potential HBCT complex), the following engineering and non-structural recommendations were developed to address minimizing stormwater impacts:

- Improve the conveyance of the channel-levee system by deepening and widening the existing channel;
- Provide additional flood protection of the cantonment area by extending the south levee;
- Increase the hydraulic capacity of the two existing major crossings – Headquarters Drive on the south and Owens Road on the north;
- Build a bridge to cross the new Future Development Area access road;
- Line the channel to prevent erosion damage;
- Increase size of pipes whose capacity is limited, an estimated total length of approximately 12,000 feet;
- Clean or repair approximately 4,300 feet of lined ditches;
- Improve the conveyance capacity of approximately 10,000 feet of unlined ditches;
- Education of post personnel and its residents regarding the climatic conditions and flood hazards on post;
- Provide for additional warning and advisory signage at roadway crossing that are subject to flooding during heavy rainfall events;
- Consider the addition of warning beacons at particularly hazardous locations; and
- Adopt an operational policy that could help protect the safety and welfare of post personnel and residents during times of inclement weather, with specific procedures that would be implemented at locations of flood hazard.

As funding becomes available for projects to improve roadways on the installation, consideration would be given to prioritize roadways that provide principal access to and from the main cantonment area. Personnel should assess whether there are other viable routes of access for egress and exit other than Owen Road or Headquarters Avenue that are less susceptible to flooding. For proposed and future projects, installation management staff may consider a risk assessment that would involve adoption of design criteria, which may vary from other published standards in order to achieve the mission objectives of WSMR.

With respect to telecommunication systems, WSMR is planning several projects under the No Action Alternative to improve the installation's communications network to support future growth. A new network services facility is planned to upgrade and increase the capacity of the current system, which would include state-of-the-art networking equipment. Upgrade and augmentation of existing fiber optic and copper cable infrastructure to support stationing of the EN BN is also planned. These upgrades include expansion and addition of maintenance holes, installation of new ducts, installation of fiber optic and copper cabling, and installation of new cable vaults. Additionally, a new telephone services facility is planned to provide modern and adequate telephone services to meet future Army initiatives while meeting test mission requirements for current and future customers. These new infrastructure projects would support the increased population levels and activities at WSMR, including the arrival of a HBCT (or comparable unit).

4.12.4.2 Training within the Southeast Multi-Use Area

Under Alternative 2 a newly designated area, the Southeast Multi-Use Area, would be created to provide the capability for a HBCT (or comparable unit) to conduct off-road vehicle maneuvering. This area would comprise of approximately 120,000 acres for multiple uses to support both test and training maneuvers. Up to 100 miles of new tank trails within and adjacent to the Southeast Multi-Use area for training would be developed under this alternative. Minor to moderate impacts could occur to utilities from the damage and possible disruption of a utility service as heavy vehicles traverse over buried utility lines during training exercises. Hardened crossings would be constructed over existing gas pipelines that traverse this new training area to minimize the risk of damage.

The degree of impacts to potable water and wastewater systems would be slightly greater as training would occur at WSMR and military personnel would likely cause usage rates of these systems to increase. Water for Soldiers undergoing training would require filling of water canteens on a daily basis to support large bivouacking exercises and possibly filling water tank trucks for dust suppression on off-road trails. Portable latrines would also be used during training exercises and would be treated at wastewater treatment facilities at WSMR. These impacts are expected to add to the significant, but mitigable to less than significant, impacts on the Main Post water and wastewater treatment facilities.

4.12.5 MEASURES FOR REDUCING IMPACTS

4.12.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Management practices for facilities and infrastructure would generally apply to the Activity Classes “Infrastructure” and “Ground Operations,” and include the following:

- Plan siting of all facilities in a manner that maximizes the use of existing utility infrastructure to the maximum extent practicable.
- Utilize the siting process to determine location of underground lines to prevent damage and disruption to existing utility services.
- Encourage sustainable building and development practices (e.g., implementation of the Leadership in Energy and Environmental Design rating system as a guide for projects).
- Encourage efficient landscaping and promote the capture of rainwater for lawn irrigation.
- Limit amount and/or time of lawn irrigation as a water conservation measure.
- Incorporate re-use and recycling of water to extent possible for new facilities, such as vehicle wash facilities. Use of a closed-loop wash rack for fleet maintenance would reduce water consumption by recycling and reuse of the wash water. Also, recycled gray water (i.e., non-industrial wastewater generated from domestic processes) could be used for landscape irrigation.
- Reduce overall water consumption by rainwater capture and reuse. Stormwater flows that are captured could receive an appropriate level of treatment for the desired reuse such as vehicle washing and landscape irrigation.

- Use parking area to conceal a large water reservoir underneath the lot. Some flood flows could be captured for reuse; however, detailed studies as to the downstream effects would need to be conducted.
- Incorporate the use of low-flow fixtures in buildings. Barracks could reduce sewage volumes by specifying low-flow water closets or dry fixtures such as composting toilets. These fixtures not only reduce wastewater volumes but also reduce potable water volumes used.
- Implement natural measures to treat wastewater on-site, such as wetlands.
- Closely monitor wastewater discharges from commercial users to ensure that pollutants do not impede the facility's treatment process and develop additional capacity to the existing system.
- Incorporate more permeable materials (i.e., grassy areas) in the development of parking lots, plazas, and walkways to decrease amount of runoff.
- Coordinate with other construction managers of new projects and notify users and operators of existing utilities prior to new construction if an existing utility system needs to be temporarily out of service during construction activities.
- Limit the shut-off of existing utilities to off-peak usage periods during construction.
- Increase depth of new utility lines during planning.

4.12.5.2 Recommended Management Actions

Based on the actions proposed under Alternatives 1 and 2, WSMR should undertake the following management actions:

- Develop an installation-wide comprehensive water conservation plan.
- Develop a water use schedule for commercial and residential users to prevent surges in water use.
- Adopt an installation-wide infrastructure plan to be reviewed and updated on a regular schedule.
- Develop a comprehensive map of utilities at WSMR for use during training operations.
- Revise the digging permit process to encompass digging associated with field activities on the range.

4.12.5.3 Mitigation Measures

4.12.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

To protect existing buried utilities, WSMR would request funding for and construct hardened crossings over existing gas lines in areas designated for off-road maneuver.

4.12.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.12.4.1.2, the increase in population under Alternative 2 would result in significant but mitigable to less than significant impacts to the installation's potable water and wastewater systems. WSMR would request Military Construction funding and possibly operations and maintenance funding to upgrade or construct and operate a new wastewater system to accommodate the anticipated population. WMSR would finalize the Draft Potable Water Resources and Potable Water System reports and implement necessary infrastructure projects or upgrades to existing components to increase their capacity. WSMR would also develop a comprehensive water conservation plan with an initial step of establishing water conservation goals and the education of installation personnel. The plan would be a living document/program that would be implemented and regularly evaluated against actual water use.

WSMR would also request funding for and finalize the study of the stormwater runoff conditions for the Future Development Area. WSMR would also study the levee drainage system, including capacities of the levee, drainage ditches, arroyos and major culverts, and design and implement appropriate modifications to the system. WSMR would also construct a telephone service facility to address the increase in base population and expansion of the Main Post for a HBCT (or comparable unit). To protect existing buried utilities, WSMR would construct hardened crossings over existing gas lines in areas designated for off-road maneuver.

4.13 Transportation

This section evaluates the impacts to Transportation by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.13.1 IMPACT METHODOLOGY

Impacts to transportation were primarily assessed by reviewing anticipated concentrated population increases and determining how and to what extent capacities of existing transportation facilities (e.g., intersections and access gates) would be impacted.

4.13.1.1 Region of Influence

The ROI for transportation is described in terms of the existing public roadways in the vicinity of and within WSMR and the rail lines that provide service in the project region (primarily in Doña Ana, Otero, and El Paso Counties).

With respect to public roadways, discussions of traffic impacts were limited to the major roadways that provide direct access to WSMR (i.e., US 70, 54, and 380). With respect to WSMR's internal road network, traffic impact discussions were mostly limited to the primary installation roads and major roadways serving the Main Post area.

The primary rail lines that serve the WSMR region and the south-central portion of New Mexico are the Union Pacific/South Pacific, Burlington Northern, and Santa Fe railroad lines.

4.13.1.2 Technical Approach

Changes in population are a major indicator of potential traffic impacts both within and outside of WSMR. Impacts to vehicular traffic were analyzed based on comparing existing and projected population levels, which would result from implementation of the alternatives. General observations on existing traffic and road conditions at the installation were obtained from WSMR staff and reference documents to determine potential impacts to transportation under each alternative. The majority of the transportation impacts analysis was based on two recent infrastructure reports – the 2007 "WSMR Infrastructure Capacity Analysis" (Ref# 152) and the 2008 "WSMR Demand and Infrastructure Report" (Ref# 013). Both of these studies projected new demand on WSMR roadways and access gates associated with the expansion of military activities at WSMR related to Grow the Force initiatives and the required infrastructure to support the EN BN, a HBCT, and other mission expansions. A draft traffic study was also completed in April 2009 (Ref# 255), which analyzed potential impacts at key intersections from increased population volumes related to the EN BN and a HBCT in FY 2012. Results and recommendations from this study are also discussed in this section.

The 2008 Demand and Infrastructure Report evaluated the impacts of projected population levels and daily maximum levels of traffic on WSMR roadways and access points. In the study, population projections were divided into on-post residents versus rotational and transient civilian workforce and contractors. Further categorizations included peak periods of day and expected travel patterns based on day of week and time of year. In addition, travel demands on-post considered military Family as well as military and DoD civilian school-age children travel generation points. Various data resources were used to estimate maximum daily counts of vehicles entering the installation at the Access Control Points as well as maximum load of vehicles per hour entering at the access control points. For a more detailed discussion on projected population levels, see Section 4.14, Socioeconomic Resources.

Other impacts to transportation resources include the frequency and duration of roadblocks and potential conflicts with local and regional transportation plans. The license that WSMR has with the New Mexico DOT was reviewed to identify roadblock procedures and estimated amount of road closings expected on public roads. A review of the New Mexico DOT's "Statewide Transportation Improvement Program FY 2008 – FY 2011" was reviewed and did not identify any potential conflicts with transportation projects on public highways. Section 3.13.2 and the cumulative impacts section discuss regional transportation projects that would improve the flow of traffic around the WSMR area.

4.13.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to transportation resulting from the No Action Alternative, Alternative 1, and Alternative 2 include the extent or degree to which its implementation would result in the following:

- Cause inadequate movement of traffic volumes.
- Increase traffic delays and cause significant congestion on roadways and access gates.
- Cause increased maintenance and repair costs.
- Cause lane closures or impediments that would disrupt or alter local circulation patterns.
- Cause an increase in traffic safety hazards.
- Conflict with local or regional transportation plans.

4.13.2 NO ACTION ALTERNATIVE

Recent decisions included under the No Action Alternative that would increase the population level, and therefore, impact transportation resources, include:

- Arrival of an EN BN on WSMR (with major live fire and maneuver training at Fort Bliss), which would result in over 710 new EN BN Soldiers and 960 Family members.
- Expansion of the Main Post and construction of new facilities for an EN BN.
- Construction in and around the Main Post to support garrison and test functions.

Under the No Action Alternative, employment of military personnel (e.g., EN BN Soldiers) and civilians (e.g., DoD civilian personnel and contractors) and associated Family members would result in higher population levels. Thus, a commensurate increase of POV use would be experienced at WSMR, especially at roads within and immediately surrounding the Main Post area where additional population levels would occur in higher concentrations (traffic impacts at the Main Post are discussed in Section 4.13.2.2).

4.13.2.1 Range Capabilities and Use

Under the No Action Alternative, WSMR would continue to use its land resources as it currently does and existing test capabilities would occur with current levels of operation and activities. Transportation resources would be greatest felt at the Range Centers and Built-Up Areas, as this area, especially the Main Post area and its main access gates, experiences the highest concentration of vehicles at the installation.

Public roadways that traverse, or are adjacent the Primary Test Zone and Augmented Test Zone areas (e.g., US 70, US 380, and US 54), would continue to experience mission-related, temporary road closures. Under the No Action Alternative, highway closures are expected to continue at the current level and occur approximately 30 times a year (during FY 2007, 22 roadblocks occurred on US 70 and 10 on US 380). An increase in missions-related testing could cause an increase in roadblocks, but is not expected to be significantly higher than current testing levels. The procedures and permitted duration of the closures would remain as stated in the established agreement with the New Mexico DOT (Ref# 161). The agreement allows for road closures up to an hour in length on US 54 and US 70 – and no longer than 80 minutes in an emergency – and up to 2 hours on US 380.

As discussed in Section 3.13, selected public roadways under the agreement include US 54, US 70, and US 380. The majority of roadblocks would occur on US 70. Closures along US 70 would be set at various points between White Sands National Monument and San Augustin Pass. Closures along US 380 would be set east of the Rio Grande and west of Carrizozo. Closures on US 54 are set south of Orogrande, New Mexico, and north of the New Mexico-Texas State line. Impacts from the roadblocks are largely related to inconveniences to travelers on these highways resulting from traffic delays. These roadblocks are considered unavoidable precautions, designed to protect motorists from the unlikely event of missile and target debris falling on public highways during a test mission. Current procedures require WSMR to provide 48 hours notice prior to the appropriate highway department district engineer prior to setting up roadblocks. Thus, impacts to transportation from these closures are considered temporary and minor.

With respect to the development of proposed maneuver training ranges at WSMR, this development is expected to result in increases in traffic that would result in minor impacts to traffic volumes on the range roads and access gates (outside the immediate area of the Main Post). Increased traffic would occur at the Stallion Range Center from the increased numbers of Soldiers training; however, any potential congestion would be experienced in a fairly isolated area and is not expected to cause significant impacts to surrounding areas. Use of off-road vehicles may cause traffic delays to installation roads during crossings of such roads, but would be temporary and is expected to occur infrequently during high peak usage hours (e.g., early morning commuting hours).

Off-road vehicles weighing 1,500 pounds or less would be allowed in land use classification areas A, B, C, E, and J. Speeds of these ultra lightweight vehicles would be limited to a maximum of 25 miles per hour. Off-road vehicles weighing more than 1,500 pounds would be limited to land use classified as C and potentially have speeds over 25 miles per hour. Potential impacts from these vehicles include increased traffic delays to commuters on range roads during off-road vehicle crossing and increased need for road maintenance.

As discussed in Section 2.2, the No Action Alternative includes all test and training operations that have been approved but not yet implemented at WSMR. Of the actions that have already been evaluated, it is estimated that there would be minor increases of personnel, and thus, minor increases in traffic volume on range roads throughout WSMR. The proposed tank trail that would traverse WSMR in a north-south direction and adjacent to range roads (except where it would attempt to avoid the White Sands National Monument along Range Road 7) would minimize or eliminate conflicts between training and operations vehicles with POVs traveling on the range roads. New testing and training activities have been subject to review and approvals, procedures, and conditions, which are found in WSMR regulations, permits, SOPs, mitigation measures defined in environmental documentation, and test plans. Therefore, transportation impacts from these new operations under the No Action Alternative would likely be minor through incorporation of identified mitigation controls. Furthermore, new activities that have undergone environmental review did not identify any significant impacts to transportation.

4.13.2.2 Main Post and Population Effects

New military personnel and associated Family members living on-post and additional support personnel commuting to WSMR would increase the volume of POVs traveling in and around the Main Post. Commuters would add to the number of vehicles passing the Main Post's two access points. It is anticipated that the increase in population from the EN BN would cause significant but mitigable to less than significant impacts to existing traffic conditions at the Main Post area and access gates as major upgrades to existing roads and the gates are expected to increase road capacity and ease traffic flow. Under the No Action Alternative, the following areas would experience the greatest traffic impacts: the southeast portion of the Main Post; US 70 (especially between the Main Post and Las Cruces), Range Road 1 (especially between US 70 and the Main Post); and access gates to the Main Post – the Las Cruces and El Paso Gates.

The access gates to the Main Post currently experience moderate congestion during the morning peak periods (observed to be from 06:30 to 08:15 a.m.) (Ref# 013). According to DD 1391 PN 69343 (June 26, 2008), to support "Grow the Force" initiatives, improvements to the Las Cruces and El Paso Gates are proposed to control vehicular and pedestrian access to the installation to accommodate a maximum of 750 to 1,000 vehicles per hour (Ref# 227). The upgrades include a visitors' control center, guard booths with overhead canopy, gatehouse, search area building, search canopy, overwatch position, entry lanes, turn around lanes, active and passive vehicle barriers, communications, lighting, and traffic control devices. Findings from an environmental analysis and Record of Environmental Consideration indicated that no adverse environmental effects could be expected from the proposed improvements. The access gates project would be coordinated with the installation physical security plan and all physical security measures. This project would be staffed with the Physical Security and Force Protection Offices of the garrison to ensure compliance with all applicable Unified Facilities criteria, as well as other pertinent Army Regulatory guidance currently in existence. Project construction is estimated to begin March 2015 with a completion estimate in March 2016 (Ref# 227).

Based on the 2008 Demand and Infrastructure Report, it is estimated that the total number of vehicles entering the Las Cruces Gate during the morning peak hour (between 06:45 and 07:45 a.m.) in 2008 is 3,630 and by 2010 it is expected to increase to 4,010. Both of these volumes would exceed the gate's capacity even after current reconstruction plans. For the El Paso Gate, morning peak hour demand is estimated to be 1,300 vehicles in 2008 and projected to increase to 1,552 by 2010, which also indicate inadequate capacity. These numbers stress the current lack of adequate lanes to accommodate the flow of traffic at both gates, as well as the shortfall of future improvement plans (Ref# 013). To facilitate vehicle demand entering the Main Post, the 2008 infrastructure study identified ways of mitigating traffic demand impacts, including establishing new Park and Ride facilities and encouraging use of such services. Priority of new Park and Ride routes could be based on residential areas (outside of the installation) with high concentrations of WSMR personnel (e.g., Las Cruces and El Paso). Other mitigation measures identified for the main access gates include construction of new parking lots at the Main Post access control gates with shuttle service provided; circular shuttles on the Main Post to facilitate movement of personnel; and improved pedestrian facilities..

Though there is currently no clearly defined "rush hour" experienced at the Main Post (except at the Main Post Access Control Points during the peak morning period), traffic congestion is expected at WSMR because population projections suggest rapid changes to the WSMR transportation network. Congestion is anticipated to occur on War Road, Martin Luther King Ave, Hughes Street, and Nike Avenue as a result of future population increases (including the EN BN).

According to the 2008 infrastructure study, from 2007 to 2008 the number of weekday vehicle trips on the Main Post increased by 29 percent, which the current transportation network is able to absorb. However, the magnitude of difference progressively grows from year to year: 57 percent increase 2008-2009; 1 percent increase 2010-2011; 59 percent increase 2011-2012; 66 percent increase 2012-2013. The traffic capacity of a single road-lane with an average traveling speed of 25 mph (average speed limit at the Main Post) is 1,000 vehicles per hour. In 2008, the Main Post roadways maintained the ability to absorb a 78 percent increase. By 2009, the traffic would exceed the roadway capacity by two-fold. By the year 2013, traffic would increase significantly, exceeding the capacity of the transportation network at the Main Post.

The major increases in vehicle trips indicates that WSMR's ability to accommodate future transportation demand at the Main Post would be infeasible within the timeframe of the expected increases in new personnel and associated Family members. Thus, impacts to the Main Post roadway network are expected to be significant but mitigable to less than significant. To alleviate roadway capacity at the Main Post the 2008 study recommended that new shuttle buses, pedestrian facilities, bicycle lanes, and car pool options be implemented.

The immediate roadways into WSMR include US 70, with four lanes, and US 54, predominately two lanes. These highways, at 45-plus mph, have a capacity of approximately 1,000 vehicles per hour (Ref# 013). Based on an evaluation of demographics and driving habits of new WSMR personnel and Family members (e.g., typical number of miles traveled based on gender and age) and traffic flow and speed, the 2008 study found that surrounding State highways would be able to absorb the influx of daily miles traveled in 2008. However, by the year 2012, the population growth at WSMR would exceed the capacity of US 70 and US 54. Therefore, impacts to nearby State highways are considered significant but mitigable to less than significant. Use of car-pooling should be encouraged and development of additional Park and Ride facilities should be considered to reduce the volume of POVs traveling to and from the Main Post. Additionally, to minimize traffic impacts, notification and consultation with the following agencies should be conducted: New Mexico DOT; Metropolitan Planning Organization in El Paso, Texas; Metropolitan Planning Organization in Las Cruces, New Mexico; and the U.S. Federal Highways Administration.

4.13.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.13.3.1 Range Capabilities and Use

Land use changes under Alternative 1 would occur and testing and training capabilities would be expanded to support new and evolving test requirements throughout the installation, including providing field training capability for military units including the EN BN.

4.13.3.1.1 Range Land Use

Expansion of the Augmented Test Zone would expand the overall range of activities to include on-road and off-road vehicle uses. Off-road vehicle use may cause minor traffic delays to commuters from crossings of range roads during training exercises. Daily or intermittent travel on established roads by wheeled and tracked vehicles within design limitations of roadways would be allowed within this zone. On-road maneuvers by tracked vehicles in this zone could cause minor to moderate impacts to roads by damaging asphalt covering or erosion control structures on roads. Approval of these on- and off-road activities would undergo a review process, which includes review through the Range Master Planning Office, Flight Safety Office, Environmental Division, Radiation Protection, and range scheduling office to ensure compatibility with existing operations, infrastructure and facilities and would minimize such impacts.

4.13.3.1.2 Range Activities and Levels of Use

This section describes typical impacts to transportation resources that could be expected during Ground Operations, Hazardous Operations, and Air Operations activities and from levels of use under each activity category. Under Alternative 1, WSMR anticipates that between FY 2008 and FY 2013 non-hot missions could increase by fourfold, which would also mean an increase of off-road and on-road vehicles within WSMR. Increased levels of testing would also mean increased number of road closures. Section 4.13.5 discusses measures to minimize impacts and avoid the potential for significant transportation-related impacts to occur.

4.13.3.1.2.1 Ground Operations

Increase in on-road vehicles from additional personnel traveling throughout the installation from transporting Soldiers and equipment between Fort Bliss and WSMR training ranges and maneuver space would lead to minor impacts from potentially increasing traffic delays on roads and access points, traffic safety hazards, and the need for road maintenance. The proposed tank road that would traverse the installation in a north-south direction would reduce conflicts with POVs traveling on adjacent range roads

Off-road vehicles weighing 1,500 or less would travel at speeds of 25 miles per hour or less and may cause traffic delays and increased hazards to commuters when crossing range roads. Off-road vehicle use would also involve vehicles that weigh greater than 1,500 pounds. The BCT Modernization and other programs would perform off-road operations using a variety of test and test support vehicles, including wheeled and tracked types. As many as 32 vehicles may operate in areas between 5,000 acres to 60,000 acres in size. Generally, increase in off-road vehicles may cause minor traffic delays during crossings of installation roads and an increase in needed road maintenance.

4.13.3.1.2.2 Hazardous Operations

Overall increase in test-related ground and airspace operations would result in an estimated 44 roadblocks per year on US 70 and 25 on US 380. The frequency and duration of roadblocks and public notification of closures would be outlined in the agreement with the New Mexico DOT. Highway closures would pose additional delays and inconveniences to motorists on these highways, but would provide public safety from hazards of testing debris.

4.13.3.1.2.3 Air Operations

Air operations would not be expected to affect ground transportation and traffic.

4.13.3.1.3 Range Infrastructure

Approximately 170 miles of new connector tank trail corridors parallel to existing installation roads (except where it would attempt to avoid the White Sands National Monument along Range Road 7) would facilitate movement of test vehicles throughout the installation for join battlefield operations. Minor impacts are expected to nearby roadways from increases in traffic delays and hazards during construction of these trails. Once constructed, these tank trails would require frequent maintenance, but would generally provide beneficial impacts overall as the potential for tank trails to make on-road maneuvers on range roads would decrease, and thus, would minimize the potential for traffic delays, accidents, and damage to these roads. Siting consideration of the tank trails and other new roads would include location of existing utility lines and ROWs. Where high-pressure gas lines or water conduits exist, hardened crossings would be needed at intersections with trails.

Proposed infrastructure and facilities throughout WSMR would result in construction activities that may disrupt local traffic, and thus, cause increased congestion and traffic delays to local users. These impacts would be temporary and localized (i.e., limited to area of the construction site). POVs may be re-routed to designated detour routes to minimize congestion and traffic hazards.

Section 2.3.1.3 provides a preliminary list of infrastructure improvements that could serve multiple users and streamline installation operations. To mitigate potential adverse impacts to existing utilities, these projects would undergo siting reviews to avoid operational conflicts with other users and program activities. Also, BMPs identified in Section 4.13.5 could further reduce adverse impacts. Projects included on the preliminary list that would provide beneficial impacts to transportation-related infrastructure include:

- North-South Tank Trail corridor (approximately 150 miles connecting south to north range, parallel to Range Road 7)
- Southern Connector Tank Trails (approximately 20 miles south of US 70 for connecting to Fort bliss tank trails)
- Hardened tank crossings (over selected installation roads and US 70)
- Range road improvements and upgrades
- Maintain/improve roads throughout the installation (minimal work outside existing roadbeds)

4.13.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. All of these areas would likely be located south of US 70 near the Main Post, where construction activities and a minor increase in personnel traveling to these areas would cause minor traffic delays and congestion.

4.13.3.2 Main Post and Population Effects

The types of traffic impacts related to increased populations under Alternative 1 would be similar to those discussed under the No Action Alternative, or baseline; however, the level of impacts would be considered minor compared to baseline conditions as the population increase would be greater under Alternative 1. It is anticipated that the daytime, on-post population would increase by an additional 480 personnel in 2013, which represents a five percent increase from baseline conditions (for conservatism, assumed all new personnel would commute to work in POVs). As discussed under the No Action Alternative, the traffic volumes at the Las Cruces and El Paso Gates would exceed the capacity of the gates by 2009, even after considering reconstruction plans. Similarly, under baseline conditions the existing capacity of the transportation system at the Main Post and nearby public highways surrounding the post (i.e., US 70 and US 54) is expected to be exceeded in 2009 and 2012, respectively, during peak commuting hours. Thus, the additional post personnel under Alternative 1 would exacerbate the capacity issues already identified under the No Action Alternative.

4.13.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.13.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.13.4.1.1 Construction

To support HBCT (or comparable unit) stationing, construction activities for expansion of and new facilities at the Main Post would occur. Project-generated traffic volumes during construction would mainly be produced by workers commuting and the delivery of construction equipment and materials to and from a construction site at the Main Post. Increased construction vehicles and truck inspections may exacerbate gate entry delays during the morning commuting hour (between 06:00 a.m. and 08:30 a.m.). There may also be temporary interior road closures or detours during construction. The degree and extent of impacts to traffic resources depends on the size of a project, number of construction workers needed, volume of truck deliveries of equipment and material, and duration of the construction. Generally, potential transportation impacts from construction activities are considered minor to moderate, temporary, and infrequent. To mitigate traffic impacts, WSMR would provide advance notification of any road closures and detours to workers and residents. Impacts to traffic could also be minimized by designating specific routes for construction deliveries and implementing car-pooling for construction workers.

4.13.4.1.2 Main Post and Population Effects

In anticipation of the increased on-post personnel and Family members from a HBCT and other funded projects, a draft transportation study was completed in April 2009 (Ref# 255). It is anticipated that under Alternative 2, the on-post population would increase by an additional 6,580 personnel by 2013, which represents a 71 percent increase from baseline conditions (for conservatism, assumed all new personnel would commute to work in POVs). As discussed under the No Action Alternative, the traffic volumes at the Las Cruces and El Paso Gates would exceed the capacity of the gates by 2009, even after considering reconstruction plans. Similarly, under baseline conditions, the existing capacity of the transportation system at the Main Post and nearby public highways surrounding the post (i.e., US 70 and US 54) is expected to be exceeded in 2009 and 2012, respectively during peak commuting hours. Thus, the additional post personnel under Alternative 2 would exacerbate the capacity issues already identified under the No Action Alternative.

The 2009 draft traffic study included modeling of traffic impacts during peak a.m. and p.m. hours at key intersections for the year 2012. The study also modeled traffic conditions in 2016, which includes funded projects, increased population from a HBCT (assumed to arrive in 2013) and from miscellaneous troops. The traffic modeling for both of these scenarios incorporated two infrastructure options:

- Base Minimum Infrastructure – Under this option, Watertown Avenue would provide primary access to the Future Development Area (potential HBCT complex). Direct connections from Nike Road and War Road were not considered under this option.
- Development and Infrastructure Development with Recommended Functionality – Under this option, a direct connection from War Road to the southeast corner of the Future Development Area (potential HBCT complex) would be provided in addition to Watertown Avenue.

Based on the modeling results for 2012, it was recommended that the two-way stop signs at Watertown Road and Hughes Avenue should be used for the north-south movement allowing the east-west traffic to flow freely (stop signs are currently used for the east-west movement and allow the north-south traffic to flow freely). The modeling results for the year 2016 indicated that certain intersections in their existing configuration would not operate at acceptable LOSs under either infrastructure options. In general, the study recommended (in addition to previous recommendations) that improvements be made at certain key intersections by the addition of turn lanes, by expanding Watertown Avenue to a four-lane roadway from Headquarters Avenue to the proposed Future Development Area, and by adding signals along Headquarters Avenue at the intersections with Picatinny Avenue, Rock Island Avenue, Aberdeen Avenue, and Watertown Road. Furthermore, the study recommended that the Las Cruces Access Control Point should be expanded to five lanes in each direction and the El Paso Access Control Point should be expanded to two lanes in each direction. (Note, the study did not consider the expansion of approach roadways for both Access Control Points. If the approach roadways are widened in the future, these recommendations for the Access Control Points may not be valid.)

4.13.4.2 Training with the Southeast Multi-Use Area

Up to 100 miles of new tank trails within and adjacent to the Southeast Multi-Use Area for training would be developed under this alternative. Generally, impacts from increased off-road vehicle usage would be limited to the southeast region of the installation (see Figure 2.4-2) and cause increases in traffic delays, and needed road maintenance. Siting considerations of new roadways would involve the identification of existing buried utility lines and ROWs. Hardened crossings may be required on tank trails that intersect underground utility lines.

4.13.5 MEASURES FOR REDUCING IMPACTS

4.13.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Management practices relating to transportation would generally apply to infrastructure and ground operations as follows:

- In general, plan siting of all facilities in a manner that maximizes the use of existing roads to the extent practicable to prevent increased traffic safety hazards and concentrated traffic volumes that could cause excessive road congestion. Conduct traffic analyses to identify traffic improvements if concentrated traffic volumes are expected, which may include devising conceptual traffic patterns and access points, signage and signaling.
- Site tank trails to provide for direct access points, while minimizing crossings with primary, secondary, or tertiary roads.
- Provide traffic detours around construction sites or designate routes specifically for construction traffic to avoid main roadways and peak hours.
- Ensure construction contractors obtain written permission of a contracting officer prior to any disturbance or closing of any thoroughfare on the installation. Provide advance notification and signage for road closures internal to the installation.
- Schedule deliveries to construction sites outside of peak morning and evening hours on roadways and at access gates.
- Pave all tank crossings with roadway systems with concrete to support the weight of vehicles and clearly mark with signage.

- Locate training areas to avoid or minimize having to cross range roads to prevent potential damage to road surfaces.
- Maintain operations so that vehicles stay on existing roads or trails to the extent practicable.
- Maintain on-road vehicle use that does not cause traffic impedance or cause excessive road surface wear or degradation.
- Avoid highway crossings of operational vehicles (e.g., use established underpass on US 70).
- Maintain off-road vehicle use within existing disturbed areas or where soil conditions are such that excessive rutting would not occur.
- Maintain off-road vehicle use in areas along routes pre-approved by the WSMR Environmental Division.
- Ensure non-operational improvements include upgrading existing unpaved trails to provide connectivity and installing new concrete tank trails to connect the Future Development Area (potential HBCT complex) to deployment and training routes. Ensure these route are hard surfaced within developed areas, with concrete of a thickness to withstand the weight of armored vehicles in order to reduce dust pollution.
- Ensure tactical vehicles maintain lowest vehicle speed possible on unpaved roads and off-road areas without hindering their mission.
- Apply dust suppressants in unpaved areas where off-road vehicle use is concentrated to extent possible.
- Use GPS tracking devices to ensure vehicle operators avoid sensitive environmental areas.
- Do not exceed the time duration of road closures outlined in the license with New Mexico DOT.

4.13.5.2 Recommended Management Actions

Adopt a range-wide transportation improvement plan and support regional road-widening projects.

4.13.5.3 Mitigation Measures

4.13.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

No mitigation measures would be warranted.

4.13.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As discussed in Section 4.13.4.1.2, traffic impacts at the gates would exceed the capacity of the gates even after their planned reconstruction. Therefore, WSMR would finalize the draft transportation study and implement mitigation measures that could include: alterations to key intersections supporting the Future Development Area within WSMR, expanding Access Control Points, expanding its existing car-pooling incentives and use of Park and Ride services; implementing methods to stagger personnel work hours; and/or implementing telecommuting where feasible. WSMR would also consult the New Mexico DOT with regard to mitigation measures that may be needed to alleviate any rush hour traffic problems encountered on highways adjacent to WSMR's gates.

4.14 Socioeconomic Resources

This section evaluates the impacts to Socioeconomic Resources by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.14.1 IMPACT METHODOLOGY

Impacts to socioeconomic resources were assessed by comparing estimated conditions, such as changes in population and employment levels, caused by implementation of the alternatives, with the baseline conditions described in Section 3.14.

4.14.1.1 Region of Influence

The ROI for socioeconomic resources includes:

- The three-county region of Doña Ana and Otero Counties, New Mexico, and El Paso County, Texas for population and economic development;
- Portions of Doña Ana County within reasonable driving range for housing of military personnel, and the three-county region for housing civilian personnel and their families;
- Las Cruces Public School District for schools;
- Doña Ana County for law enforcement, fire protection, and medical services; and
- Doña Ana County for quality of life.

4.14.1.2 Technical Approach

Data was obtained from the U.S. Census Bureau and local planning documents to determine population and employment trends within the ROI. Changes in population and employment are the drivers for affecting public and private resources and infrastructure such as housing, schools, community services, and quality of life.

Proposed annual changes to WSMR employment and population for the No Action Alternative, Alternative 1 and Alternative 2 are shown in Tables 2.2-9, 2.3-7 and 2.4-5, respectively.

4.14.1.2.1 Population

Increases in ROI population as a result of the alternatives are a sum of the direct population increases of Soldiers and their Family members, WSMR civilians and their families, and indirect population increases in the ROI caused by increased economic activity. The assumption used in determining indirect population increases in the WSMR ROI is found in the analysis of the *Fort Bliss Supplemental PEIS* No Action Alternative, which concluded that for a direct population increase of 11,850, there would be an indirect population increase of 11,400 (Ref# 037). This yields an indirect population multiplier of 96 percent of the direct population increase (Ref# 037). This WSMR EIS adopts this multiplier, assuming the indirect increase in ROI population would equal 96 percent of the direct WSMR population increase. This ratio is reasonable to use for WSMR because it is for the same three-county region as the *Fort Bliss Supplemental PEIS*. The assumption is also reasonable because the Fort Bliss No Action Alternative was for the placement of a HBCT at Fort Bliss, with 3,800 military, 700 civilians and 6,300 military Family members and the economic sectors being changed are the same in both EISs. The Fort Bliss proposed changes are similar to the WSMR population and employment changes for Alternative 1, as shown in Table 2.3-7.

4.14.1.2.2 Economic Development

The increased number of jobs in the ROI as a result of implementation of the alternatives is the sum of the increased military and civilian jobs at WSMR added to the number of jobs indirectly caused by increased WSMR employment. The number of direct jobs for each alternative is found in Chapter 2 of this EIS.

The development of the number of indirect jobs caused by increased WSMR employment is based on analyses in the *Fort Bliss Supplemental PEIS* No Action Alternative (Ref# 037). As noted in Section 4.14.1.2.1, this information from the *Fort Bliss PEIS* is reasonable for application in this EIS because it is for the same three-county region as the *Fort Bliss Supplemental PEIS* and the economic sectors being changed are the same in both EISs. Also, the percent changes of employment in the economic sectors are similar. The increase of civilian employees for the Fort Bliss analysis was approximately 15 percent of the total increase in employment. Civilian employment increases for the No Action and Alternative 1 scenarios are approximately 27 percent and 46 percent, respectively, of the total increase in WSMR employment. HBCT (or comparable unit) stationing would increase civilian employment by approximately 40 percent under Alternative 2. In each case, the balance of the employment increases is military personnel.

In the *Fort Bliss Supplemental PEIS*, for an increase of 4,600 jobs at Fort Bliss there are a total of 11,036 jobs created in the three-county ROI (Ref# 037). This shows an employment multiplier of 2.4. This means that for each new WSMR direct job, there would be 2.4 jobs created, including the direct job. An indirect increase of 1.4 jobs would occur as a result of one new WSMR job.

This analysis first determines the total changes in population and employment for each alternative and then allocates those changes among Doña Ana, Otero, and El Paso counties. The new population and employment levels (baseline plus change) are compared with each county's population and employment baselines (see Section 3.14) to determine the magnitude of any changes caused by implementing the alternatives. The rationale for determining the allocation impacts between counties is found in the 2002 University of Texas at El Paso Institute for Policy and Economic Development economic impact study (Ref# 172) and the WSMR Housing Market Analysis (Ref# 173), as discussed in the following.

The 2002 economic impact study estimated that the economic impacts of WSMR activities were distributed 65 percent to Doña Ana County, 20 percent to El Paso County, 12 percent to Otero County, and three percent to Socorro County and other areas (Ref# 172). The study noted that the employment distribution at WSMR in 2002 was 92 percent civilians, including both government civilian and contractor employees. Only eight percent of WSMR employees were military.

Employment changes for the alternatives in this EIS would be a different mix, approximately 85 percent military employment, including 800 unaccompanied students. In addition, an assumption is made, consistent with the housing market study that new WSMR-assigned Soldiers, and their accompanying Family members, would reside within a reasonable driving distance, which is defined as within Doña Ana County (see Section 3.14.3).

As a result of the increased military employment in Doña Ana County, it is concluded that a greater percentage of the impacts of the alternatives would fall within Doña Ana County than was determined in the 2002 study (Ref# 172). For purposes of the analysis, it is assumed that population changes for Soldiers and their Family members fall completely in Doña Ana County. Civilians have greater latitude in how far away from WSMR they can reside, however, and are not limited to the same distance and time constraints. Therefore, the analysis assumes population changes for WSMR civilians (and their families) and indirect population changes would follow the historical pattern of 65, 20, and 12 percent for Doña Ana, El Paso, and Otero counties, respectively.

For employment changes in the ROI, a similar assumption is made. That is, direct employment changes at WSMR, the sum of military and civilian jobs, would by definition be counted by place of work, i.e., in Doña Ana County. Indirect increases in employment, however, are assumed to be distributed through the ROI in accordance with the historical patterns of economic impacts for Doña Ana, El Paso, and Otero counties, except that the percentage for each county is increased by one percent to 66, 21, and 13 percent, respectively.

Increases in personal income are determined by multiplying increased staffing for military and civilian employees by $42,570 and $81,180 (2008 dollars), respectively.

Sales taxes returned to local governments are 1.9 percent of taxable purchases. Increases in sales tax collections returned to local governments under the alternatives are made by multiplying increased staffing for military and civilian employees by $248 and $445 (2008 dollars) (Ref# 172).

4.14.1.2.3 Housing

The technical approach for analyzing housing impacts on the ROI uses the results of the Niehaus Housing Analysis (Ref# 173) that was prepared to analyze the availability of housing should there be an increase in military personnel of 4,409 by 2013.

The housing impact analyses in this EIS focuses first on the increase in military Families and their demand for housing measured against the availability of acceptable housing on the market and the supply of on-post housing. Second, the analysis examines the impact on housing due to the increase in civilian Families. Because students and unaccompanied enlisted personnel (E-5, Sergeant and below) would live in barracks on-post, they are not considered in detail in this analysis, as the alternatives include construction of new barracks spaces to accommodate these unaccompanied enlisted personnel and students.

The July 2008 Housing Market analysis is shown in Table 4.14-1.

Table 4.14-1. Housing Market Analysis 2008 – 2013

	CY2008[1]	CY2009	CY2010	CY2011	CY2012	CY2013
Total Permanent-Party Personnel at WSMR	447	861	861	861	869	4,856
Total Military Families	291	505	505	505	509	2,460
Post Occupancy in 2008; Floor Requirement in 2013	133	129	125	121	117	113
Community Housing Shortfall	19	94	83	81	85	951
Community Housing Availability[2]	139	282	297	303	307	1,396
Military Family Housing Requirement	152	223	208	202	202	1,064
Military Family Housing Inventory[3]	551	551	551	551	551	551
Deficit (Surplus) of Military Family Housing	(399)	(328)	(343)	(349)	(349)	513

1. Calendar Year (CY) 2008.
2. Community Housing Availability = Total Military Families minus (Post Occupancy plus Community Housing Shortfall).
3. The study assumed that housing inventory would be reduced by 346 to 205. This reduction has since been cancelled; the inventory is left constant at 551.

Source: Ref# 173

The analysis showed that, while all military family housing demand caused by an increase of 4,409 Soldiers cannot be met through the market (Community Housing Shortfall), the availability of on-post housing shows a surplus in housing supply until 2013, at which time there would be a deficit of 513 family housing units. The results shown in this table are applied to changes in Total Permanent Party Personnel for the No Action Alternative and Alternative 1.

4.14.1.2.4 Schools

The approach to assessing impacts on schools is to identify the number of new school-aged dependents that would locate in Doña Ana County as a result of the alternatives and to compare the number of new students with current school capacity and future plans of the Las Cruces Public School District.

4.14.1.2.5 Community Services

Impacts to law enforcement and fire services are addressed through examination of projected Doña Ana population changes to determine how many additional staff would be required to maintain current levels of staff for every 1,000 persons in the population.

Impacts to medical services are analyzed by calculating the number of additional beds in general purpose hospitals in order to maintain current beds per person ratios in Doña Ana County. The current number of beds at general purpose hospitals (448) and population (194,000 in 2006) provide a ratio of one bed per 432 residents of Doña Ana County. This ratio is used to develop the number of additional hospital beds that would be required in Doña Ana County general purpose hospitals caused by projected population increases in the absence of any changes at WSMR and caused by implementation of staffing increases under the No Action Alternative, Alternative 1, and Alternative 2.

4.14.1.2.6 Quality of Life

Impacts to quality of life are addressed through examination of population increases on the factors discussed in Section 3.14.6, public parks, libraries, and institutions that provide an opportunity for higher education.

4.14.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to socioeconomic resources resulting from the No Action Alternative, Alternative 1, or Alternative 2 includes the percentage increase in population within the ROI caused by implementation of the alternatives, and how those increases would impact each Socioeconomic area.

4.14.2 NO ACTION ALTERNATIVE

4.14.2.1 Range Capabilities and Use

Under the No Action Alternative, the socioeconomic effects of ongoing and authorized range activities and test programs would be minor, as these activities would not bring substantial amounts of new workers or visitors at the installation. The arrival of the EN BN to the Main Post would have socioeconomic effects that are described in Section 4.14.2.2.

4.14.2.2 Main Post and Population Effects

Under the No Action Alternative, military employment at WSMR would increase with the arrival of an EN BN, which would move 585 Soldiers in 2008 and 124 Soldiers in 2010. Under the No Action Alternative, civilian employment, including DoD civilians and DoD contractors, would increase by 262 during the FY 2008-2011 period. These increases, and an increase in military Family members of 956 (including an increase in school age dependents of 545), are shown in Table 2.2-9. Increases in civilian dependents are assumed to be 1.4 dependents per civilian employee (Ref# 037) and total 367, spread over the period FY 2008-2011.

Impacts to socioeconomic resources from the No Action Alternative would include minor impacts to population, housing, schools, community services and quality of life and minor beneficial impacts to employment and sales and income revenues.

4.14.2.2.1 Population

Increases in ROI population as a result of the No Action Alternative are a sum of the direct population increases and the indirect population increases caused by increased economic activity.

Direct and indirect population changes (96 percent of the direct population changes) in the ROI are shown in Table 4.14-2. Total ROI population totals, by year, are also shown in Table 4.14-2.

Table 4.14-2. Population Changes by Year for the No Action Alternative

Population Changes	FY2008[1]	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Permanent Party Military Employees[1]	585	0	124	0	0	0	**709**
Civilian Employees[2]	97	75	65	25	0	0	**262**
Military Family Members[2]	789	0	167	0	0	0	**956**
Civilian Dependents[3]	136	105	91	35	0	0	**367**
Total Change in WSMR Direct Population	**1,607**	**180**	**447**	**60**	**0**	**0**	**2,294**
Indirect Population Change[4]	1,542	173	429	58	0	0	**2,202**
Total Population Increases	**3,149**	**353**	**876**	**118**	**0**	**0**	**4,496**

1. For this section, some data was provided in fiscal years (FY) and some data was provided in Calendar Years (CY). For consistency, all fiscal year data and analysis are considered equivalent to calendar year data and analysis. Thus, for analysis purposes, FY2008 is equivalent to CY2008. Totals may not be exact due to rounding.
2. Table 2.2-9.
3. Ref# 037 Assumed at a rate of 1.4 Family members for each civilian employee.
4. Ref# 037 Assumed at a rate of 96 percent of direct population.

Military students (see Tables 2.2-9 and 2.3-7) are not included in the socioeconomic analyses of population and employment under implementation of either alternative. These students rotate to WSMR for a period of four weeks and then leave. They are unaccompanied, live in barracks on-post, and due to the intensive nature of their training would have little opportunity to affect the regional economy. The impact of these students was evaluated in the *Environmental Assessment for Proposed Training Ranges White Sands Missile Range, New Mexico* (Ref# 205). That EA concluded that "the Proposed Action would not result in a sizeable positive or negative impact on the regional socioeconomic setting at WSMR."

The population increases in Table 4.14-3 are apportioned to counties in accordance with the assumptions made in Section 4.14.1.2.2. County population increases and percentage changes are shown in Table 4.14-3.

Table 4.14-3. Population Changes by County and Year for the No Action Alternative

Population Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Doña Ana – Permanent Party Military with Family Members	1,374	0	291	0	0	0	**1,665**
Doña Ana – 65 Percent of Non-Military[1]	1,154	229	380	76	0	0	**1,840**
Total Doña Ana Population Change	**2,527**	**229**	**672**	**76**	**0**	**0**	**3,505**
El Paso – 20 Percent of Non-Military[1]	355	71	117	24	0	0	**566**
Otero – 12 Percent of Non-Military[1]	213	42	70	14	0	0	**340**
Other areas – Three Percent of Non-Military[1]	53	11	18	4	0	0	**85**
Total ROI Population Changes	**3,149**	**353**	**876**	**118**	**0**	**0**	**4,495**
Percent Change in Population from Projected County Baselines							
Doña Ana County	1.23	0.11	0.31	0.03	0.00	0.00	- -
El Paso County	0.05	0.01	0.01	0.00	0.00	0.00	- -
Otero County	0.33	0.06	0.10	0.02	0.00	0.00	- -
ROI	**0.30**	**0.03**	**0.08**	**0.01**	**0.00**	**0.00**	**- -**

1. Non-military is the sum of civilians, civilian dependents, and indirect population increase. Totals may not be exact due to rounding.
Source: Table 4.14-2

The largest percentage change occurs in FY 2008, when increases in Doña Ana County would be 1.23 percent above the baseline (Table 4.14-4). In no other year do population changes exceed one percent for the No Action Alternative for any counties in the ROI.

Table 4.14-4. Employment Changes by Year for the No Action Alternative

Employment Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Military[1]	585	0	124	0	0	0	**709**
Civilian[1]	97	75	65	25	0	0	**262**
Total WSMR Employment	682	75	189	25	0	0	**971**
Indirect Employment	955	105	265	35	0	0	**1,360**
Total ROI Employment	**1,637**	**180**	**454**	**60**	**0**	**0**	**2,331**

1. Ref# 037. Assumed at a rate of 1.4 jobs for each new WSMR job.
Source: Table 2.2-9

4.14.2.2.2 Economic Development

This section discusses impacts of the Alternative 1 on employment, personal income and collections of sales taxes.

4.14.2.2.2.1 Employment

Employment changes in the ROI as a result of implementation of the No Action Alternative are shown in Table 4.14-4. These employment changes provide a small beneficial impact.

The following employment increases are apportioned to counties in accordance with the assumptions made in Section 4.14.1.2.2. County employment increases and percentage changes are shown in Table 4.14-5.

Table 4.14-5. Employment Changes by County and Year for the No Action Alternative

No Action Alternative	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Doña Ana - Direct Military and Civilians[1]	682	75	189	25	0	0	**971**
Doña Ana - 66 Percent of Total Indirect Increases in Employment	630	69	175	23	0	0	**897**
Total Doña Ana Employment Change	**1,312**	**144**	**364**	**48**	**0**	**0**	**1,868**
El Paso - 21 Percent of Total Indirect Increases in Employment	201	22	56	7	0	0	**285**
Otero - 13 percent of Total Indirect Increases in Employment	124	14	34	5	0	0	**177**
Total ROI Population Changes	**1,637**	**180**	**454**	**60**	**0**	**0**	**2,330**
Percentage Change in Employment from Projected County Baselines							
Doña Ana County	1.38	0.15	0.36	0.05	0.00	0.00	- -
El Paso County	0.05	0.01	0.01	0.00	0.00	0.00	- -
Otero County	0.42	0.05	0.11	0.01	0.00	0.00	- -
ROI	**0.33**	**0.04**	**0.09**	**0.01**	**0.00**	**0.00**	**- -**

1. Source: Table 4.14-4

The largest increase in terms of percentage change occurs in FY 2008, when employment increases in Doña Ana County would be 1.38 percent above the employment baseline (see Table 3.14-5). In no other year do population changes exceed one percent for the No Action Alternative for any counties in the ROI.

4.14.2.2.2.2 Personal Income and sales taxes

As shown in Table 4.14-4, permanent party military employment would increase by 709 by 2010 and civilian employment would increase by 262 by that same year. Given an average family income of $42,572 for military and $81,180 for civilians, increased direct personal income in Doña Ana County would increase by a total of $51.4 million (2008 dollars) in 2010 and following years. This would be an increase of 7.7 percent over total WSMR-related personal income identified in the 2002 study (Ref# 172), approximately one percent of the 2006 total personal income in Doña Ana County.

Sales taxes returned to local governments would be approximately $292,000. Of this, $175,000 would be from military employees and their families, and $117,000 would be from civilian employees and their families (Ref# 172). This would have a beneficial impact on tax revenue for local governments. In addition, there would be an increase in State income tax revenue associated with WSMR employed civilians and civilians employed indirectly as a result of the No Action Alternative. These increased collections would have a small, beneficial impact on the State's tax revenue.

4.14.2.2.3 Housing

In 2010, when all personnel in the EN BN have been located to WSMR, there would be a total permanent-party of 1,142 Soldiers and 662 Families. Under the No Action Alternative, the demand for family housing would increase in 2008 and again in 2010.

Available on-post housing would consist of 551 family housing units (Table 4.14-1). The combination of available housing on the market with the availability of on-post housing ensures there would be a sufficient supply of housing units for military Families.

Civilian population increases for Doña Ana, Otero, and El Paso counties under the No Action Alternative are shown in Table 4.14-3. Assuming 2.85 persons per household (Ref# 228), the number of households are shown in Table 4.14-6.

Table 4.14-6. Change in Civilian Households for the No Action Alternative

Change in Households	CY2008	CY2009	CY2010	CY2011	CY2012	CY2013	Total Increase, FY 2008 to FY2013
Doña Ana County	405	80	133	27	0	0	**645**
Otero County	75	15	25	5	0	0	**120**
El Paso County	125	25	41	8	0	0	**199**
ROI Total	**605**	**120**	**199**	**40**	**0**	**0**	**964**

Source: Table 4.14-3 (values for civilian population divided by 2.85)

Assuming that each household represents the demand for a housing unit, then by 2011 there would be an increased demand for 964 housing units in the ROI to accommodate increased population in the civilian sector. This is less than one percent of the total number of housing units in the ROI, and three percent of the projected increase of 32,794 in housing units between 2006 and 2011 (see Section 3.14.3). There is sufficient housing to accommodate the WSMR-related increases in housing demand. Any impacts would be minor and transitional.

4.14.2.2.4 Schools

Under the No Action Alternative, employment changes would lead to 545 additional school aged dependents (see Section 2.2.3), 2.3 percent of the 2007 enrollment (Ref# 022) in the Las Cruces Public School District. The largest influxes are expected in 2008 and 2009, totaling 449 (see Table 2.2-9). While the distribution among grades is uncertain, current enrollment patterns indicate that 75 percent would be K-8 students and 25 percent high school aged. The current K-8 on-post school, with a historical capacity of 700 and current enrollment of 300, should be able to accommodate the initial increased enrollment during the 2008-2009 period. The increased number of high school students during that period would further strain high schools that are already over capacity. However, the Las Cruces Public School District has scheduled an expansion of its schools, to include an elementary school in 2009, a middle school in 2010; and a new high school in 2011 (Ref# 176). These additional schools should alleviate any strains on the School District caused by the 2008-2009 influx and the additional 95 students expected in 2012.

4.14.2.2.5 Community Services

The following discusses the impacts of the No Action Alternative on law enforcement, fire services, and medical services.

4.14.2.2.5.1 Law Enforcement

The Doña Ana County Sheriff's Department currently has a shortage of sworn officers (0.72 per 1,000 residents) relative to its target of two officers for every 1,000 persons residing in Doña Ana County. In 2007, the number of sworn officers needed to be fully staffed was 397, a shortage of 254 officers. Under the No Action Alternative, County population is expected to increase by 34,749 by 2013; 31,244 as a result of baseline increases and 3,505 as a result of implementation of the alternative. To maintain the current staffing at 0.72 sworn officers per 1,000 residents would require hiring an additional 25 officers. Of these, three would be as a result of WSMR indirect population growth (Table 4.14-2) and 22 would be to cover the projected baseline population growth (see Table 3.14-4). These increases in population would further strain the Sheriff's Departments resources for Doña Ana County.

Overall, county and local law enforcement services for the three counties have a total of 483 employees, including 323 sworn officers, 1.6 sworn officers per 1,000 persons. To maintain that ratio of sworn officers, local governments would have to hire 59 sworn officers under the No Action Alternative. Of those, six would be as a result of the WSMR-related population growth (Table 4.14-3) and 53 would be to cover the projected baseline population growth (see Table 3.14-4). The increase in the number of sworn officers as a result of WSMR-related population increases would be 1.8 percent of the current level of 323.

At WSMR, the ratio of police officers to post employees and population would decrease. A representative of Directorate of Emergency Services stated that there would need to be increased staffing of officers (Ref# 177).

4.14.2.2.5.2 Fire Services

Fire service employment in Doña Ana County consists of a mixture of paid, full-time and part-time firefighters and volunteers, totaling 500 persons, or 2.5 firefighters per 1,000 residents.

Population increases in Doña Ana County as a result of baseline projected increases and WSMR implementation of the No Action Alternative would require hiring 87 additional fire fighters in order to maintain current ratios of fire fighters to residents. Of those, nine would be as a result of the WSMR-indirect population growth (Table 4.14-2) and 78 would be to cover the projected baseline population growth for the County (see Table 3.14-4).

Under the No Action Alternative, the ratio of firefighters to Post employees and population would decrease. A branch fire station is planned to alleviate this change.

4.14.2.2.5.3 Medical Services

As discussed in Section 3.14.5.3.2, there are two general purpose hospitals in Doña Ana County, with a total of 448 beds. This represented, for a 2007 population of 198,791, one bed for every 444 persons.

The projected baseline population for Doña Ana County in 2013 is 230,000 (see Table 3.14-4). To maintain the current ratio of 444 beds per person for that baseline population, there would need to be 518 beds in general purpose hospitals in 2013, an increase of 70 beds.

For the No Action Alternative, the population increase in Doña Ana County caused by increased WSMR staffing would total 3,505. Divided by 444 beds per person, this indicates that Doña Ana County hospitals would require an additional eight beds as a result of WSMR increases. The total number of hospital beds required under the No Action Alternative for Doña Ana County would be 526. By themselves, these eight beds would be a minor impact, but together with the current status of Doña Ana County as an underserved area for medical care, additional population could accentuate current shortcomings.

4.14.2.2.6 Quality of Life

Section 3.14.6.1 discussed the parks and recreation facilities on WSMR and in Las Cruces and Doña Ana County. Increases in population due to baseline growth and WSMR-related growth would increase strains on the capacity of parks in the area that currently have too little space (measured in acres per 1,000 persons) to meet recommended targets. Additional parks may be needed to accommodate future population growth.

Baseline population increases in Doña Ana County are expected to increase by 15.7 percent, and No Action Alternative indirect population increases would be another 1.8 percent, a total of 17.5 percent between 2007 and 2013. These increases and WSMR-related population increases could strain recreational facilities both on- and off-post, as well as public library resources and institutes of higher education; however, any such impacts are expected to be minor.

4.14.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.14.3.1 Range Capabilities and Use

4.14.3.1.1 Range Land Use

No impacts to socioeconomics would be expected from changes in land use classifications; impacts could occur due to associated changes in activities and levels of use discussed as follows.

4.14.3.1.2 Range Activities and Levels of Use

This section describes potential impacts to population and socioeconomic conditions that could be expected from levels of use under the following Activity Classes; Ground Operations, Hazardous Operations, and Air Operations. Under Alternative 1, WSMR anticipates that between FY 2008 and FY 2013, possible increases in test missions could bring population increases, but they would be small when compared to the arrival of the EN BN.

4.14.3.1.2.1 Ground Operations

The primary changes to Activity Categories would allow off-road vehicle use throughout most of the installation, which could lead to new and varied missions on WSMR that could increase its permanent and temporary population.

4.14.3.1.2.2 Hazardous Operations

The possible increase in test missions over the next five years would also bring changes in population, estimated at an additional 160 civilian and 320 contractor employees above the No Action Alternative levels. The socioeconomic impacts associated with these population increases are discussed in Section 4.14.3.2.

4.14.3.1.2.3 Air Operations

Air operations in themselves would have no direct impact on socioeconomic factors.

4.14.3.1.3 Range Infrastructure

Additional infrastructure proposed under Alternative 1 would include additional communications (fiber optic connections), instrumentation, up to 20 miles of connector tank trails between the Main Post and Fort Bliss, and up to 150 miles of new North-South tank trail corridors to support test and training capabilities. New Mission Support Facilities would include expanded Range Centers. WSMR expects that these activities would have small impacts on population and employment as discussed in Section 4.14.3.2.

4.14.3.1.4 Specialized Areas

The six proposed Specialized Areas would consist of new built-up areas for both testing and training activities. All of the areas except JLENS would be utilized by military and civilian personnel already accounted for under Alternative 1, resulting in no changes to socioeconomic conditions. JLENS would possibly use up to 60 personnel at any one time, which would be a very small increase compared to the overall WSMR population. Therefore, no noticeable changes in socioeconomic conditions would be expected under any of the six proposed Specialized Areas, and socioeconomics would not be a key consideration during the siting process or environmental review of these areas.

4.14.3.2 Main Post and Population Effects

Under Alternative 1, military employment at WSMR would be the same as the No Action Alternative during the 2008-2013 period. Civilian employment, including both DoD civilians and DoD contractors, would increase by about 480 (8.3 percent) more than the No Action Alternative baseline in 2013. These increases are shown in Table 2.3-7.

It is assumed that all civilian and contractor personnel (and their dependents) would live outside the installation. Increases in civilian dependents are assumed to be 1.4 dependents per civilian employee (Ref# 037) with an increase by 8.3 percent over the baseline spread over the period FY 2008-2013. These additional 650 civilian dependants would arrive by the end of 2013 under Alternative 1.

Impacts to socioeconomic resources from Alternative 1 would be similar to the No Action Alternative; however, the intensity of impacts due to the increase of WSMR civilian population would be greater. Alternative 1 impacts would minor to population, housing schools, community services and quality of life and beneficial impacts to employment and sales tax and income revenues.

4.14.3.2.1.1 Population

Increases in ROI population as a result of Alternative 1 are a sum of the direct population increases and the indirect increases in population caused by increased economic activity.

Direct and indirect (96 percent of the direct population changes for Doña Ana County, 20 percent for El Paso County, and 12 percent for Otero County) population changes in the ROI would be similar to the No Action Alternative. The largest increase in projected county populations would occur in FY 2012 and 2013. Implementation of Alternative 1 would result in a Doña Ana County projected population increase by 0.7 percent (0.34 in FY 2012 and 0.33 in FY 2013) above the baseline. The ROI population would increase by 0.11 and 0.10 percent above the baseline in FY 2012 and 2012, respectively.

4.14.3.2.2 Economic Development

Impacts to economic development, which includes employment, personal income and collections of sales taxes, would be similar to the No Action Alternative.

4.14.3.2.2.1 Employment

Employment changes in the ROI as a result of implementation of Alternative 1 would be greater than the No Action Alternative during FY 2012 and 2013. These employment changes provide a small beneficial impact.

The total increase in employment for FY 2008-2013 in the ROI would increase by 744 (32 percent) above the baseline under implementation of Alternative 1. The largest employment changes to projected county baselines in the ROI by the end of 2013 would be 0.1 percent, an employment increase of 230, above the No Action Alternative.

These employment increases are apportioned to counties in accordance with the assumptions made in Section 4.14.1.2.2. Doña Ana County would have the largest population increases at 0.4 percent, an increase of 443 to the employment population in FY 2012 and an additional 0.1 percent (154) in FY 2013 above the baseline.

4.14.3.2.2.2 Personal Income and sales taxes

Permanent party military employment would be the same as the No Action Alternative. Given an average family income of $81,180 for civilians, increased direct personal income in Doña Ana County would increase by almost $39 million above the baseline resulting from the increase in the civilian population. This would be an increase of 0.07 percent over total WSMR-related personal income identified in the 2002 study (Ref# 172), and less than 0.01 percent of the 2006 total personal income in Doña Ana County above the baseline.

4.14.3.2.3 Housing

Under Alternative 1, the demand for civilian family housing would increase when compared to the baseline in 2012 and 2013.

Assuming 2.85 persons per household (Ref# 228), civilian households in the ROI would increase by 792 (41 percent) above the No Action Alternative. Doña Ana and El Paso counties would see the largest increase during FY 2012 and 2013 with 380 and 363, respectively, above the baseline.

Assuming that each household represents the demand for a housing unit, then by 2013 there would be an increased demand for 743 housing units in the ROI to accommodate increased population in the civilian sector above the baseline. This is less than one percent of the total number of housing units in the ROI. There is sufficient housing to accommodate the WSMR-related increases in housing demand. Any impacts would be minor and transitional.

4.14.3.2.4 Schools

Student enrollment would remain at almost 900 under the implementation of Alternative 1. The expansion of Las Cruces Public School including an elementary school in 2009, a middle school in 2010; and a new high school in 2011 (Ref# 176) should alleviate any strains on the School District caused by the 2008-2009 influx and the additional students expected in 2012 as described under the No Action Alternative.

4.14.3.2.5 Community Services

The following discusses the impacts of the implementation of Alternative 1 on law enforcement, fire services, and medical services.

4.14.3.2.5.1 Law Enforcement

County population is expected to increase by 845 above the baseline by 2013 as a result of implementation of the Alternative 1. To maintain the current staffing at 0.72 sworn officers per 1,000 residents would require hiring one additional officer above No Action Alternative. This additional officer would be as a result of WSMR- indirect population growth (Section 4.14.3.2). The increase in population under Alternative 1 would produce a minimal strain on the Sheriff's Departments resources for Doña Ana County when compared to the No Action Alternative.

Overall, county and local law enforcement services for the three counties have a total of 483 employees, including 323 sworn officers, 1.6 sworn officers per 1,000 persons. To maintain that ratio of sworn officers, local governments would have to hire two additional sworn officers resulting from WSMR indirect population growth that would occur under Alternative 1.

As described under the No Action Alternative, the ratio of police officers to post employees and population would decrease at WSMR. A representative of Directorate of Emergency Services stated that there would need to be increased staffing of officers (Ref# 177).

4.14.3.2.5.2 Fire Services

Population increases in Doña Ana County as a result of baseline projected increases and WSMR implementation of Alternative 1 would require hiring four additional fire fighters above the baseline in order to maintain current ratios of fire fighters to residents. These four would be as a result of the WSMR indirect population growth (Section 4.14.3.2).

As described under the No Action Alternative, the ratio of firefighters to Post employees and population would decrease under implementation of Alternative 1. A branch fire station is planned to alleviate this change.

4.14.3.2.5.3 Medical Services

Under Alternative 1, the population increase in Doña Ana County caused by increased WSMR staffing would require an additional three beds above the No Action Alternative. By themselves, these three beds would be a minor impact, but together with the current status of Doña Ana County as an underserved area for medical care, additional population could accentuate current shortcomings.

4.14.3.2.6 Quality of Life

Section 3.14.6.1 discussed the parks and recreation facilities on WSMR and in Las Cruces and Doña Ana County. Increases in population due to baseline growth and WSMR-related growth would increase strains on the capacity of parks in the area that currently have too little space (measured in acres per 1,000 persons) to meet recommended targets. Additional parks may be needed to accommodate future population growth.

Baseline population increases in Doña Ana County are expected to increase by 15.7 percent, with a 2.1 percent WSMR-related population increase above the baseline, a total of almost 18 percent between 2008 and 2013. Alternative 1 indirect population increases would remain similar to the No Action Alternative where these population increases could strain recreational facilities both on- and off-post, as well as public library resources and institutes of higher education; however, any such impacts are expected to be minor.

4.14.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.14.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.14.4.1.1 Construction

Construction of new facilities associated with Alternative 2 would require the increased employment of temporary construction contractors at WSMR. This employment increase would be expected to ramp up from 100 in 2008 to an estimated 1,500 workers by 2011. This represents five percent of the current number of construction workers in the ROI, although less than one-half of a percent of all private non-farm employment in the ROI. It would be expected that most of this increased construction workload would be met through the current workforce, although there could be a small need for importation of construction workers with specialized skills. The Bureau of Economic Analysis RIMS II multiplier for the construction sector in the ROI is 2.01 (Ref# 229), therefore, total employment in the ROI would increase as a result of construction by 3,017 workers, less than one percent of current private non-farm employment. This demand for additional, indirect workers would be met through the existing workforce.

RIMS III multipliers also allow the conversion of jobs to final demand dollars. For the ROI, there are an estimated 18 jobs created for every one million dollars (2006 dollars) of final demand. The increase in jobs of 3,017 workers indicates there would be an increase in final demand of $181 million (2008 dollars) in each year 2011-2013. This would be less than one percent of the ROI personal income (see Table 3.14-6). The increased construction would provide a small, temporary, and beneficial impact to the ROI through increased employment and local purchases of construction materials.

4.14.4.1.2 Main Post and Population Effects

Under Alternative 2, military employment at WSMR would increase above the baseline as a result of the arrival of a HBCT (or comparable unit) with 3,800 Soldiers in FY 2013. Additionally, civilian employment, including both DoD civilians and DoD contractors, would increase by 2,780 above the No Action Alternative, arriving in 2012-2013. These increases, and increases in military Family members of about 3,000 (including an increase in school age dependents of about 2,900) above the baseline, are shown in Table 2.3-7. Civilian dependents are assumed to be 1.4 dependents per civilian employee (Ref# 037) and would increase by approximately 3,900 above the No Action Alternative.

The intensity of socioeconomic impacts due to the increase of WSMR employment and population would be significant. Alternative 2 impacts to population, housing schools, community services and quality of life could be mitigated to less than significant provided measures in Section 4.14.5 are followed. Alternative 2 would result in beneficial impacts to employment and sales tax and income revenues.

4.14.4.1.2.1 Population

Increases in ROI population as a result of Alternative 2 are a sum of the direct population increases and the indirect increases in population caused by increased economic activity.

Direct and indirect (96 percent of the direct population changes) population changes (increase occurring within that year) in the ROI are shown in Table 4.14-7. Total WSMR population change (total individual year changes from FY 2008 to FY 2013), are also shown in Table 4.14-7.

Table 4.14-7. Population Changes (Year by Year) for Alternative 2

Population Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Permanent Party Military Employees	585	0	124	0	0	3,800	**4,509**
Civilian Employees [1]	90	80	90	30	430	2,320	**3,040**
Military Dependents	449	0	95	0	0	2,918	**3,463**
Civilian Dependents[1]	126	112	126	42	602	3,248	**4,256**
Total WSMR Direct Population Increase	**1,250**	**192**	**435**	**72**	**1,032**	**12,286**	**15,268**
Indirect Population Increase[2]	1,200	254	427	69	991	11,795	**14,736**
Total ROI Population Increases	**2,451**	**446**	**862**	**141**	**2,023**	**24,081**	**30,004**

1. Ref# 037 (assumed at a rate of 1.4 dependents for each civilian employee).
2. Ref# 037 (assumed at a rate of 96 percent of direct population).

Source: Table 2.3-7

These population increases are apportioned to counties in accordance with the assumptions made in Section 4.14.1.2.2. County population increases and percentage changes are shown in Table 4.14-8.

Table 4.14-8. Population Changes by County and Year for Alternative 2

Population Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Doña Ana - Direct Military with Dependents	1,034	0	219	0	0	6,718	**7,972**
Doña Ana - 65 Percent of Non-Military[1]	921	290	418	92	1,315	11,286	**14,321**
Total Doña Ana Population Change	**1,955**	**321**	**637**	**92**	**1,315**	**18,004**	**22,293**
El Paso - 20 Percent of Non-Military [1]	283	89	129	28	405	3,473	**4,406**
Otero - 12 Percent of Non-Military [1]	170	54	77	17	243	2,084	**2,644**
Other Areas - Three Percent of Non-Military [1]	42	13	19	4	61	521	**661**
Total ROI Population Changes	**2,451**	**446**	**862**	**141**	**2,023**	**24,081**	**30,004**
Percent Change in Population from Projected County Baselines							
Doña Ana County	0.95	0.14	0.29	0.04	0.58	7.83	- -
El Paso County	0.04	0.01	0.02	0.00	0.05	0.41	- -
Otero County	0.26	0.08	0.12	0.03	0.36	3.06	- -
ROI	0.24	0.04	0.08	0.01	0.18	2.11	- -

1. Non-military is the sum of civilians, civilian dependents, and indirect population increase.

Source: Table 4.14-7

The year with the greatest percentage change is 2013 in Doña Ana County with the arrival of a HBCT. In 2013, the ROI population is estimated to increase by 2.1 percent above the 2013 baseline (Table 3.14-4). The largest increases to projected county baseline populations would occur in FY 2013 with a 3.1 percent increase in Otero County and a 7.8 percent increase in Doña Ana County above the baseline.

4.14.4.1.3 Economic Development

This section discusses impacts of the Alternative 2 on employment, personal income and collections of sales taxes.

4.14.4.1.3.1 Employment

Employment changes in the ROI as a result of implementation of Alternative 2 are shown in Table 4.14-9. The increase in employment would have a beneficial economic impact to Doña Ana County and the region.

These employment increases are apportioned to counties in accordance with the assumptions made in Section 4.14.1.2.2. County employment increases and percentage changes are shown in Table 4.14-10.

The largest increase in terms of percentage change is in FY 2013, when total employment increases in Doña Ana County would be 10.6 percent above the baseline, and total increases in Otero County would be 3.5 percent above the baseline (see Table 3.14-5). Total employment in the ROI would increase 2.7 percent in 2013. Percentage increases in FY2008 in Doña Ana County would be 1.4 percent above the baseline. In no other year do population changes exceed 1 percent for Alternative 2 for any counties in the ROI.

Table 4.14-9. Employment Changes by Year for Alternative 2

Employment Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Military[1]	585	0	124	0	0	3,800	**4,509**
Civilian[1]	90	80	90	30	430	2,320	**3,040**
Total WSMR Employment	**675**	**80**	**214**	**30**	**430**	**6,120**	**7,549**
Indirect Increase in Employment [2]	945	112	300	42	602	8568	**10,569**
Total ROI Employment	**1,620**	**192**	**514**	**72**	**1,032**	**14,688**	**18,118**

1. Source: Table 2.3-7
2. Ref# 037 (assumed at a rate of 1.4 jobs for each new WSMR job)

Table 4.14-10. Employment Changes by County and Year for Alternative 2

Employment Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Doña Ana - Direct Military and Civilians	675	80	214	30	430	6,120	7,549
Doña Ana - 66 Percent of Indirect Employment	624	74	198	28	397	5655	6,975
Total Doña Ana Employment Change	**1,299**	**154**	**412**	**58**	**827**	**11,775**	**14,524**
El Paso - 21 Percent of Indirect Employment	198	24	63	9	126	1799	2,219
Otero - 13 Percent of Indirect Employment	123	15	39	5	78	1114	1,374
Total ROI Population Changes	**1,620**	**192**	**456**	**72**	**1,032**	**14,688**	**18,118**

Table 4.14-10. Employment Changes by County and Year for Alternative 2 (continued)

Employment Changes	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	Total Increase, FY 2008 to FY2013
Percent Change in Employment from Projected County Baselines							
Doña Ana County	1.36	0.16	0.41	0.06	0.77	10.61	- -
El Paso County	0.05	0.01	0.02	0.00	0.03	0.44	- -
Otero County	0.41	0.05	0.13	0.02	0.25	3.53	- -
ROI	0.33	0.05	0.10	0.01	0.19	2.66	- -

Source: Table 4.14-9

4.14.4.1.3.2 Personal Income and sales taxes

As shown in Table 4.14-9, permanent party military employment would increase by 3,800 in 2013 and civilian employment would increase by 2,780 above the baseline in that same year. Increased direct personal income in Doña Ana County would increase by $385 million (2008 dollars) in 2013 above the No Action Alternative. This would be an increase of 66 percent over total WSMR-related personal income identified in the 2002 study, over nine percent of the total personal income in Doña Ana County in 2006. Increased income would have a beneficial economic impact on the region due to increased spending and resulting economic activity.

Sales taxes returned to local governments would increase by $2.2 million above the baseline under implementation of Alternative 2, to a total of $2.5 million by the end of 2013. Of this total, $1.1 million would be from military employees and their families, and $1.4 million would be from civilian employees and their families (Ref# 172). Increased sales tax collections would provide a beneficial impact to local governments. In addition, there would be an increase in State income tax revenue associated with WSMR employed civilians and civilians employed indirectly as a result of Alternative 2. These increased collections would have a small, beneficial impact on the State’s tax revenue.

4.14.4.1.4 Housing

In 2013, when all personnel have been located to WSMR, there would be a total permanent-party increase of 3,800 personnel and 2,866 Families above the No Action Alternative. Under Alternative 2, the demand for family housing would increase in FY 2012 and 2013. By 2013, with the addition of 300 Family Housing Units, there would be a deficit of 213 on-post housing.

Prior to 2013, there would be a sufficient supply of housing units for military Families, taking into account availability on the market and on-post inventory. In 2013, with the arrival of a HBCT (or comparable unit), there could be a shortage of approximately 600 available and acceptable housing units, even with the addition of the 300 on-post housing units. It is expected that the housing market would react to this potential shortage and the long-term impact would be minor with moderate impacts over the short term; however, WSMR should work with local housing representatives to minimize any impacts. If the actual off-post housing area were larger than that included in the Housing Study’s 45 minute commute, then the potential acceptable housing stock would increase and reduce any potential shortage. A small increase in commute time could make Alamogordo and northwest sections of El Paso county viable options.

Civilian population increases for Doña Ana, Otero, and El Paso counties under Alternative 2 are shown in Table 4.14-8. Assuming 2.85 persons per household, the number of households is shown in Table 4.14-11.

Table 4.14-11. Change in Civilian Households for Alternative 2

Change in Households	CY2008	CY2009	CY2010	CY2011	CY2012	CY2013	Total Increase, CY 2008 to CY2013
Doña Ana County	323	102	147	32	461	3,960	**5,025**
Otero County	60	19	27	6	85	731	**928**
El Paso County	99	31	45	10	142	1,218	**1,546**
ROI Total	**482**	**152**	**219**	**48**	**688**	**5,909**	**7,499**

Source: Table 4.14-8 values for civilian population divided by 2.85

Assuming that each household represents the demand for a housing unit, then by 2013 there would be an increased demand for an additional 6,535 housing units, above the No Action Alternative, in the ROI to accommodate increased population in the civilian sector. This is 1.9 percent of the 2013 projected total of housing units in the ROI (see Section 3.14.3). Impacts would be minor and transitional as the market accommodates the increased demand.

4.14.4.1.5 Schools

Under Alternative 2, employment changes would lead to 3,800 additional school aged military dependents (see Section 2.3.2.3), 26 percent of the 2007 enrollment in the Las Cruces Public School District (Ref# 176). The largest influx is expected in 2013, totaling 2,900. The growth in WSMR civilian jobs could lead to an increased civilian population by 2013 of 15,900 persons; 12,200 would be in 2013 (Table 4.14-8). Approximately 20 percent (3,170) would be school aged (Ref# 022). While the distribution among grades is uncertain, current enrollment patterns indicate that 75 percent would be K-8 students and 25 percent high school aged.

An earlier influx of 450 students is expected in 2008. This initial influx of an estimated 340 K-8 students and 110 high school aged students can be accommodated in the WSMR on-post school for K-8, but there would be strains on already over-capacity high schools in the District.

The School District is scheduled to build an elementary school in 2009, a middle school in 2010; and a new high school in 2011 (Ref# 176). These additional schools could alleviate the initial influx of students associated with the EN BN but would not alleviate all the strains on the School District that would be caused by the large increases in students in 2013. Without additional schools beyond those already scheduled, there could be moderate to significant impacts on the Las Cruces Public School District. These impacts, however, would be mitigable to minor impacts through new school construction.

The school district recognizes this potential situation and has initiated planning to locate and build additional schools. The district's current planning effort discusses an additional elementary school by 2012, plus a middle school and possibly a high school in 2013 (Ref# 176). This lines up with anticipated actions under Alternative 1 to construct three new schools at WSMR, to include an elementary school, a middle school, and a high school (see Table 2.3-5). Construction of the three new schools currently scheduled for 2009-2011, plus construction in 2012-2013 of the three schools currently in the district’s early planning stages, would reduce the impacts of new students to minor.

Under Alternative 2, FY 2013 employment changes would lead to an increase of 2,918 additional school aged military dependents (see Section 2.3.2.3) above the No Action Alternative. This is about an eight percent increase above the No Action Alternative, and a total 12 percent increase of the 2007 enrollment in the Las Cruces Public School District (Ref# 176). WSMR civilian job increases under implementation of Alternative 2 could lead to an estimated increase of school aged children by 20 percent (2,432) (Ref# 022).

The School District is scheduled to build an elementary school in 2009, a middle school in 2010; and a new high school in 2011 (Ref# 176). These additional schools could alleviate the initial influx of students associated with the EN BN but would not alleviate all the strains on the School District that would be caused by the large increases in students in 2013. Without additional schools beyond those already scheduled, there could be moderate to significant impacts on the Las Cruces Public School District. These impacts, however, would be mitigable to minor impacts through new school construction.

The school district recognizes this potential situation and has initiated planning to locate and build additional schools. The district's current planning effort discusses an additional elementary school by 2012, plus a middle school and possibly a high school in 2013 (Ref# 176). This lines up with anticipated actions under Alternative 2 to construct three new schools at WSMR, to include an elementary school, a middle school, and a high school (see Table 2.3-5). Construction of the three new schools currently scheduled for 2009-2011, plus construction in 2012-2013 of the three schools currently in the district's early planning stages, would reduce the impacts of new students to minor.

4.14.4.1.6 Community Services

The following discusses the impacts of the implementation of Alternative 2 on law enforcement, fire services, and medical services.

4.14.4.1.6.1 Law Enforcement

Under Alternative 2, Doña Ana County population is expected to increase by 18,788 (54 percent) above the baseline county population increases in 2013. To maintain the current staffing at 0.72 sworn officers per 1,000 residents would require hiring an additional 14 officers as a direct result from WSMR-related population growth (Table 4.14-8). These increases in population would further strain the Sheriff's Departments resources for Doña Ana County.

To maintain the baseline ratio of sworn officers under implementation of Alternative 2, local governments would have to hire an additional 30 sworn officers above the No Action Alternative that would be a result of the WSMR-related population growth (Table 4.14-8). The increase in the number of sworn officers as a result of WSMR-related population increases would be nine percent of the 2007 levels.

At WSMR, the ratio of police officers to Post employees and population would decrease. A representative of the Directorate of Emergency Services stated that there would need to be increased staffing of officers (Ref# 177). Planned development for Alternative 2 includes development of a Central Directorate of Emergency Services facility (see Table 2.3-5).

4.14.4.1.6.2 Fire Services

Population increases in Doña Ana County under implementation of Alternative 1 would require hiring 47 additional fire fighters, above the No Action Alternative, in order to maintain current ratios of fire fighters to residents as a result of the WSMR-related population growth (Table 4.14-8).

Under Alternative 2, the ratio of firefighters to post employment and population would decrease. A branch fire station is planned to alleviate this change, as is a new fire station staffed with a company of firefighters (see Table 2.3-5).

4.14.4.1.6.3 Medical Services

There are two general purpose hospitals in Doña Ana County, with a total of 448 beds. This represented, with a population of 198,800 in 2007, one bed for every 444 persons.

Under Alternative 2, Doña Ana County hospitals would need to increase the number of available general purpose hospital beds by 42 above the No Action Alternative as a result of WSMR-related population increases (see Table 3.14-4) in order to maintain the current ratio of beds to persons. Taken with the current status of Doña Ana County as an underserved area for medical care, additional WSMR-related population increases caused by implementation of Alternative 2 would accentuate current shortcomings.

4.14.4.1.7 Quality of Life

Section 3.14.6.1 discussed the number and acreage of parks and recreation facilities on WSMR and in Las Cruces and Doña Ana County. Increases in population due to baseline growth and WSMR-related growth would increase strains on the capacity of parks in the area that currently have too little space (measured in acres per 1,000 persons) to meet recommended targets. Additional parks may be needed to accommodate future population growth.

Baseline population increases in Doña Ana County are expected to increase by 18,788 above the No Action Alternative. These increases and WSMR-related population increases could strain recreational facilities both on- and off-post, as well as public library resources and institutes of higher education; however, any such impacts are expected to be minor.

Oryx hunts bring revenues that support WSMR wildlife management programs, provide revenues to the State of New Mexico, and increase tourism related spending in the region. If the number of hunts was reduced, collected revenues would be reduced. This would have a potentially negative effect on the WSMR budget for wildlife management and on the New Mexico budget. In addition, a reduction in hunting tourism would have a negative impact on the regional economy. These impacts would be minor to moderate, depending on the size of any reductions in the number of hunts.

4.14.4.2 Training within the Southeast Multi-Use Area

Socioeconomic factors would not be affected by additional training within the Southeast Multi-Use Area.

4.14.5 MEASURES FOR REDUCING IMPACTS

4.14.5.1 Potential Management Practices

There are no potential management practices applicable to socioeconomics. However, there are recommended management actions described in Section 4.14.5.2.

4.14.5.2 Recommended Management Actions

Increases in school aged dependents as a result of Alternative 1 would cause moderate impacts to the Las Cruces Public School District. The School District would need to complete its current scheduled construction of an elementary school, middle school, and a high school by 2011 to alleviate any impacts of the EN BN. In addition, more schools would need to be constructed to alleviate the increased school-aged dependents, military and civilian, that would arrive with a HBCT (or comparable unit). The school district began early planning for this new school construction before the decision to station a HBCT at WSMR was rescinded. As discussed previously, WSMR would plan to build three schools under

Alternative 2. WSMR should coordinate closely with the School District to ensure adequate levels of education facilities are maintained.

4.14.5.3 Mitigation Measures

4.14.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

No mitigation measures would be warranted.

4.14.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

At WSMR, the planned additional facilities for the Directorate of Emergency Services and Fire Services would be constructed and staffed. These facilities include a Central Directorate of Emergency Services facility, branch fire station, and a new Fire Station. New schools are planned to be constructed both on WSMR and in Las Cruces to mitigate the increase of school-aged dependents that would arrive in 2013. The on-post schools would be constructed with Military Construction funding and additional funding would be requested for on-post teaching staff. WSMR would continue coordination with the Las Cruces School District to ensure adequate levels of education facilities are maintained. WSMR would work with local housing representatives to develop short-term housing solutions to minimize initial short-term military family housing shortfalls.

4.15 Environmental Justice

This section evaluates the impacts to Environmental Justice by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.15.1 IMPACT METHODOLOGY

Impacts to Environmental Justice were assessed by determining whether or not impacts resulting from the No Action Alternative, Alternative 1, and Alternative 2 had a disproportionately high and adverse impact to Environmental Justice Populations.

4.15.1.1 Region of Influence

The ROI for Environmental Justice includes the three-county area comprised of Doña Ana and Otero counties in New Mexico, and El Paso County in Texas. Consistent with the *Fort Bliss SEIS* (Ref# 037), this EIS defines minority populations and low-income persons and populations as follows:

- Minority populations are those found in census areas containing all persons of Hispanic origin plus Blacks; Native Americans, Eskimos, and Aleuts; and Asian or Pacific Islanders (without double-counting persons of Hispanic origin who are also contained in the latter groups), such that the number of minority persons equals or exceeds 50 percent.
- Low-income populations are those found in census areas where the percentage of persons determined by the U.S. Bureau of the Census to have incomes below the poverty level exceeds the regional average. The 2000 Census determined that in 1999 a family of four with an income of $18,104 or less was in poverty. Different income levels were established for different family sizes and structures.

4.15.1.2 Technical Approach

Data was obtained from the U.S. Census Bureau. An examination of technical resource areas analyzed in this EIS was made to determine if the impacts of the alternatives resulted in any significant impacts to social, economic, physical environmental, or health conditions within the defined ROI for each resource area. If there were any significant impacts, then the technical resource area was further examined to determine if those impacts fell on low-income or minority populations, and if so, whether the impacts would disproportionately fall on low-income or minority populations.

4.15.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to Environmental Justice resulting from the No Action Alternative, Alternative 1, or Alternative 2 include the extent or degree to which its implementation would result in the following:

- Changes to any social, economic, physical environmental, or health conditions in such a way to have a disproportionately high and adverse impact on any particular low-income or minority group; or
- Disproportionately endanger children in the ROI.

4.15.2 NO ACTION ALTERNATIVE

For each of the technical resource areas analyzed in Chapter 4, no high and adverse impacts have been found as a result of implementation of the No Action Alternative. As a result, there are no disproportionately high and adverse human health or environmental effects of the No Action Alternative on minority and low-income populations.

4.15.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

Increased employment at WSMR and resulting population increases in Las Cruces associated with Alternative 1 could cause adverse impacts to transportation (see Section 4.13, Transportation) from increased traffic. Additionally, these population increases would result in impacts to schools (see Section 4.14, Socioeconomic Resources) resulting from increased student enrollment. However, impacts would be dispersed throughout the community and would not disproportionately affect minority or low-income populations. These impacts would be mitigated as discussed in Sections 4.13.5 and 4.14.5.

4.15.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

Impacts to Environmental Justice from Alternative 2 would be similar to the No Action Alternative and Alternative 1.

4.15.5 MEASURES FOR REDUCING IMPACTS

4.15.5.1 Potential Management Practices

No potential management practices would apply for Environmental Justice under either action alternative.

4.15.5.2 Recommended Management Actions

No recommended management actions would be warranted for Environmental Justice under either action alternative.

4.15.5.3 Mitigation Measures

Mitigation measures would not be warranted for Environmental Justice, as none of the alternatives would have a disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

4.16 Energy

This section evaluates the impacts to Energy by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.16.1 IMPACT METHODOLOGY

Impacts to electrical demand were assessed based on expected population changes and estimated per person consumption rates derived from Army Technical Manual (TM) 5-811-1, "Electrical Power Supply and Distribution" (Ref# 230). Increased demand for natural gas was estimated based on the increase in s.f. of structure after proposed construction is complete. The increased consumption rates were then compared with the ability of existing supply and distribution infrastructure to accommodate those changes.

4.16.1.1 Region of Influence

The ROI for energy encompasses the service areas of each utility purveyor serving WSMR facilities (e.g. EPEC, Public Service Company of New Mexico, and other utility service purveyors). The service areas for these companies include Otero, Doña Ana, and Torrance Counties.

4.16.1.2 Technical Approach

To calculate the increase in maximum instantaneous electrical demand, the proposed increase in personnel was multiplied by a maximum per capita demand rate derived from Army TM 5-811-1. TM 5-811-1 lists standard maximum demands associated with "Development and Readiness", "Forces", and "Training and Doctrine" facilities. Because WSMR would support all three of these standard activity types, the per capita electrical usage rate was assumed to be an average of the highest and lowest of the three standard rates provided. Using this methodology, a representative average per capita maximum electrical demand of .00175 MW was selected.

Maximum peak instantaneous energy demand was compared against available energy sources. Because EPEC currently supplies a large majority of the total electricity used at WSMR (Ref# 184), its total supply capacity was used as an indicator of energy available.

Total annual energy usage was estimated using a similar method to that used for estimation of maximum instantaneous demand. Standard average annual per capita consumption rates from TM 5-811-1 were averaged using the same methodology described for maximum instantaneous per capita consumption above. Using this methodology, a representative per capita annual electrical usage of 14.8 MWh was selected.

4.16.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to energy resulting from the No Action Alternative, Alternative 1, or Alternative 2 include the extent or degree to which its implementation would result in the following:

- Disruption of a public service because of demand beyond the capacity of the provider.
- Demand on a public utility service beyond the capacity of the provider to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary.

4.16.2 NO ACTION ALTERNATIVE

4.16.2.1 Range Capabilities and Use

Test and training actions that have been approved, but not yet implemented, would include the Directed Energy Test Sites and Operations and HELSTF programs. There is potential for high energy use associated with these programs. If current facilities are determined to be inadequate, the higher power requirements for these programs could require the construction of a new substation to accommodate the increase in power demands. Certain aspects of these programs could also use generator power as an alternative to battery or commercial purveyors.

Continued use of high energy systems (such as directed energy and lasers) would contribute to higher peak load demands; however, EPEC currently maintains a total generating capacity of 1,500 MW and can purchase an additional 50 MW during off-peak and 103 MW on-peak from the Palo Verde and/or Four Corners Plant.

4.16.2.2 Main Post and Population Effects

Under the No Action Alternative, maximum peak electrical demands would be expected to increase by an estimated 1.7 MW from 14.5 MW (as observed in July 2006) to 16.2 MW. The percentage of EPEC's total power supply capacity consumed by WSMR at peak demand is estimated to remain at 1.1. The Las Cruces electrical substation currently has substantial excess capacity and could handle expected peak demands associated with implementation of the No Action Alternative. However, because power would be routed to areas of new construction, the addition of a substation or small transformers may be required.

Annual energy usage at WSMR would increase by 28,048 MWh under the No Action Alternative (from 109,000 MWh to 137,048 MWh). In accordance with New Mexico Renewable Energy Act and NMAC 17.9.572, a minimum percentage of this power would be generated from sustainable sources. If renewable energy generation facilities were to be constructed on WSMR, a greater percentage of total WSMR energy would be expected to be generated from renewable sources.

Under the No Action Alternative, total built space on the Main Post would increase by approximately 958,300 s.f. This 26 percent increase would be expected to result in a proportionate increase in maximum peak natural gas usage from 0.041 million CFH (as observed in 2006) to 0.052 million CFH. This increase in peak demand would not exceed the capacity of the existing Public Service Company of New Mexico natural gas supply lines.

4.16.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.16.3.1 Range Capabilities and Use

4.16.3.1.1 Range Land Use

Changes in land use classifications would not have a direct impact on energy resources. Built-up areas around the Range Centers could increase, requiring additional energy infrastructure.

4.16.3.1.2 Range Activities and Levels of Use

This section describes impacts on energy by Activity Class, expected to result from implementation of proposed changes to range activities and levels of use at WSMR.

4.16.3.1.2.1 Ground Operations

Increased ground operations on WSMR would not directly increase electric power use nor increase natural gas use. If ground operations were to involve frequent bivouacking within one defined area, WSMR may elect to provide electric service to camping areas to reduce the impacts relating to the use of gasoline generators. This additional electricity use would be minor compared to the overall WSMR electric consumption and would be well within the existing capacity of EPEC.

4.16.3.1.2.2 Hazardous Operations

Hot missions (other than directed energy) would be expected to increase by 25 percent over the next five years. This could result in increases to the peak energy demand during those missions and may also require expansion of energy infrastructure for the new firing points.

4.16.3.1.2.3 Air Operations

Increased air operations would not be expected to result in increases in electrical or natural gas usage on WSMR.

4.16.3.1.3 Range Infrastructure

Electrical and natural gas usage would not be expected to increase as a result of the proposed range infrastructure developments.

4.16.3.1.4 Specialized Areas

The six proposed Specialized Areas would include several new facilities that would require electric utility services. It is assumed that the proposed facilities would use propane gas for heating and other purposes, as they would not be located within the Main Post. All but JLENS would likely be located near the Main Post, where it is likely they would utilize existing electrical infrastructure to the extent practicable. However, in certain situations, electric lines may need to be extended over relatively long distances to service these facilities. Therefore, providing electric and natural gas services should be considered during the siting process and environmental review of the Specialized Areas.

4.16.3.2 Main Post and Population Effects

Under Alternative 1, daytime population at WSMR would increase by an estimated 480 persons above and beyond those increases that would occur under the No Action Alternative. This population increase would result in an estimated increase in maximum instantaneous electricity demand from 14.5 MW to 17.0 MW. Peak electrical demands would not be expected to exceed the capacity of the existing electrical substations. At peak consumption, WSMR would consume 1.1 percent of EPEC's total supply capacity. Annual energy usage would be expected to increase from 109,000 MWh to 144,152 MWh between FY 2007 and FY 2013. As described in Section 3.16, electrical utilities providers operating in New Mexico are required to acquire or generate a minimum percentage of their total electricity sold from renewable sources. In addition, WSMR is considering establishment of renewable energy generation facilities on the range. If such facilities are constructed, the percentage of total energy from renewable sources at WSMR would further increase.

Alternative 1 would not involve any additional construction within the Main Post beyond the projects described for the No Action Alternative. However, operation of buildings for the proposed Specialized Areas (Section 4.16.3.1.4) and Range Center expansions would require electricity and propane. Therefore, natural gas usage would not be expected to increase beyond levels described for the No Action Alternative.

4.16.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.16.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.16.4.1.1 Construction

While additional energy would be required during construction of infrastructure, this energy use would be minor and temporary. Additional electric distribution lines, transformers and substations would be constructed to serve the additional population associated with the stationing of a HBCT (or comparable unit).

4.16.4.1.2 Main Post and Population Effects

Under Alternative 2, daytime population at WSMR would increase substantially between FY 2007 and FY 2013. This population increase would result in an estimated increase in maximum instantaneous electricity demand from 14.5 MW to 36.7 MW. Peak electrical demands would likely exceed the capacity of the existing electrical substations, requiring further expansion of the electrical distribution system. This would present a significant but mitigable impact for energy distribution. At peak consumption, WSMR would consume an estimated 2.4 percent of EPEC's total supply capacity.

Annual energy usage could increase from 109,000 MWh to 310,208 MWh between FY 2007 and FY 2013. As described in Section 3.16, electrical utilities providers operating in New Mexico are required to acquire or generate a minimum percentage of their total electricity sold from renewable sources. In addition, WSMR is considering establishment of renewable energy generation facilities on the range. If such facilities are constructed, the percentage of total energy from renewable sources at WSMR would further increase.

Baseline total square footage of buildings in the WSMR cantonment area would be anticipated to increase by 115 percent under Alternative 2. If the same natural gas consumption per square foot recorded in FY 2007 applies to new construction, and if all new structures use natural gas rather than propane, then total natural gas consumption would also increase by 115 percent. Under this scenario, maximum annual natural gas demand would increase from 0.041 million CFH to 0.088 million CFH. This demand is less than the maximum gas supply capacity for the existing 380 pounds per square inch gauge line from Public Service Company of New Mexico (0.645 million CFH). WSMR is currently working on expanding and upgrading their natural gas utility system.

4.16.4.2 Training within the Southeast Multi-Use Area

A HBCT (or comparable unit) would train within the Southeast Multi-Use Area under Alternative 2. If frequent bivouacking occurred within that area, WSMR may elect to provide electric service to camping areas to reduce the impacts relating to the use of gasoline generators. This additional electricity use would be minor compared to the overall WSMR electric consumption and would be well within the existing capacity of EPEC.

4.16.5 MEASURES FOR REDUCING IMPACTS

4.16.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

Management practices relating to energy use would generally apply to infrastructure, although project-specific siting considerations could be warranted for ground operations, hazardous operations and air operations.

Infrastructure

- Site any new facilities in a manner that maximizes the use of existing electric and natural gas infrastructure to the extent practicable, which would help minimize the total amount of new infrastructure that would need to be developed.
- Implement any new facilities or additions and repairs with more energy efficient design standards and utility systems. For example, new buildings could use Leadership in Energy and Environmental Design elements to reduce their energy demand.
- Develop alternative energy projects (e.g., solar or wind energy) within WSMR to off-set energy purchases.
- Promote use of fluorescent bulbs for lighting or other low-voltage lighting systems.
- Design buildings to take advantage of natural light sources and passive solar heating.

4.16.5.2 Recommended Management Actions

- Promote ride sharing within WSMR for programs that typically travel long-distances between the Main Post and up-range locations to reduce fuel use.
- Encourage the purchase or lease of government vehicles with good fuel economy.

4.16.5.3 Mitigation

4.16.5.3.1 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

No mitigation measures would be warranted.

4.16.5.3.2 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

WSMR would request Military Construction funding for and construct electrical substation(s) and distribution lines as necessary to provide adequate power to new facilities proposed under Alternative 2.

4.17 Frequencies

This section evaluates the impacts to Frequencies by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.17.1 IMPACT METHODOLOGY

Impacts to frequencies were assessed by evaluation of proposed facilities development, training activities, and testing of future technologies at WSMR and the likelihood for impacts to the use of the electromagnetic frequency spectrum by military and civilian users, or to cause harmful interference to electronic equipment and systems.

4.17.1.1 Region of Influence

The ROI for frequencies includes the land and airspace within a 150-mile radius of the WSMR Headquarters Building, as well as the land and controlled airspace at remote sites in Colorado and Wyoming for launch missions. This defined area is under the jurisdiction of the WSMR AFC, and is actively monitored by WSMR for frequency interference issues, across radio frequency bands ranging from 2 MHz to 20 GHz.

4.17.1.2 Technical Approach

Data was obtained from WSMR staff and reference documents to determine potential impacts to frequencies under each alternative. This assessment qualitatively analyzed WSMR mission activities and systems associated with the Proposed Action and Alternatives, which make use of the electromagnetic spectrum and/or transmit electromagnetic radiation, and determined whether existing policies, plans, and procedures are sufficient to avoid adverse impacts (defined in Section 4.17.1.3 below). This assessment was also supplemented with input from WSMR technical staff with responsibility for frequency management. Existing regulations and policies pertaining to frequency management are described in Section 3.17.2 of this EIS.

These regulations are also further implemented at WSMR through local procedures and mission-specific reviews and operating conditions, which further seek to reduce adverse impacts associated with electromagnetic spectrum usage and frequency management and ensure compliance with applicable laws, regulations, and agreements.

If the potential for adverse impacts exists from the Proposed Action and Alternatives, consideration was then given to whether or not avoidance mechanisms (siting considerations, BMPs, or recommended management actions) could reduce significance of impacts.

4.17.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to frequencies resulting from the No Action Alternative, Alternative 1, or Alternative 2 include:

- Adversely affect or pose an irresolvable conflict with the safe and secure operation of systems and avionics within WSMR.
- Adversely affect or pose an irresolvable conflict with the safe and secure operation of military systems and avionics from neighboring military installations.
- Impair the ability of WSMR to meet its test and training mission requirements due to the unavailability of dedicated frequencies.
- Adversely affect or pose a conflict with residential, commercial or municipal electronic systems and communication systems, to include ATC systems.

4.17.2 NO ACTION ALTERNATIVE

4.17.2.1 Range Capabilities and Use

Impacts to frequencies from the No Action Alternative would include those associated with the continuation of current test and training operations and the implementation of new (but previously approved) test and training actions.

Continuation of current test and training mission activities, even with an increase in mission operations, would be expected to result in no or only minor impacts to frequency management and interference.

WSMR would deconflict and monitor the use of frequencies for communication and tracking purposes in accordance with existing procedures, and provide authorizations and restrictions on a mission-by-mission basis as needed. WSMR would continue to comply with all applicable laws, regulations, MOUs, and interagency agreements regarding the use of frequency bands, and plan all missions to ensure that harmful interference to military and civilian networks and electronic systems is avoided. Under the continuation of current activities, it is unlikely that new transmission systems or use of new frequency bands would be introduced that could not be managed under current procedures.

4.17.2.2 Main Post and Population Effects

The arrival of the EN BN, associated construction within the Main Post, and the EN BN use of Single Channel Ground and Airborne Radio Systems and other mobile radios could increase impacts to deconfliction and commercial users, with minor to moderate impacts.

4.17.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.17.3.1 Range Capabilities and Use

Under Alternative 1, the proposed increase of test and training missions would correspondingly expand the types and duration of frequency use throughout the range. Potential adverse impacts to frequencies from changes in Range capabilities and use are described in the subsections below.

4.17.3.1.1 Range Land Use

Changes of land use classifications would not result in adverse impacts beyond those associated with the No Action Alternative. These land use changes would allow for additional types (e.g., use of wheeled and tracked vehicles) and number of test and training activities in certain locations (Section 4.17.3.1.2), with the associated demand for designated communications frequencies and potential for transmission of interfering emissions. This change also allows WSMR more flexibility in the planning and geographic siting of these activities on an installation-wide basis, and potentially the ability to avoid radio frequency conflicts and interference issues.

4.17.3.1.2 Range Activities and Levels of Use

Nearly all new capabilities and test mission activities on WSMR would require the use of dedicated radio frequencies for voice communication, tracking, and data transmission purposes. In addition, many of the new capabilities would make use of systems or activities that have the potential for interfering with other electronic systems and communication networks if not properly planned and monitored.

4.17.3.1.2.1 Ground Operations

It is possible that increases in on- or off-road vehicle use, field operations, and dismounted operations could use radio frequencies that may require special coordination, although it is more probable that routine testing and training operations under these Activity Categories would use standard and established communications systems under conventional frequency bands and transmission distances.

The BCT Modernization program would be a primary customer utilizing Augmented Test Zone for ground operations. BCT Modernization events would focus on the ability to communicate between Soldiers, vehicles, and other systems and would conceivably use frequencies that would require more pre-planning than typical at WSMR. There would be greater likelihood of encountering frequency conflicts during testing of new systems, such as those for BCT Modernization. Because frequency use would be approved by the WSMR Frequency Coordinator, impacts would be no more than moderate.

4.17.3.1.2.2 Hazardous Operations

Under Alternative 1, there could be changes to hazardous activity categories that could impact frequency management, including: Directed Energy, Instrumentation and Communication Sites, Munitions Release, and Air Vehicle Operations.

Radio frequency deconfliction would be required to ensure that proper communications capability is maintained for the duration of the mission. The addition of new activities, as well as more active test and training schedules, would create additional demand for WSMR’s existing allocated frequency bands, requiring additional time for planning and deconfliction, and requiring greater flexibility in the scheduling (i.e., using non-peak hours such as 0200 – 0400 hours) and geographic siting of activities.

In addition to new or restructured capabilities, the levels of use of several activity categories would increase under Alternative 1, most notable is an increase in hot missions by 25 percent. Section 2.3.1.2 of this EIS describes the anticipated increases in levels of use, and Table 2.3-3 provides quantitative estimates of these changes. This represents a substantial increase in missions which may require access to dedicated communication frequencies, as well as activities with the potential to interfere with other electronic equipment and communication systems (more likely to affect on-installation versus off-installation).

Considering both the addition of new capabilities and the increase in level of use in multiple activity categories, potential impacts to frequency would be as follows:

- Adversely affect or pose an irresolvable conflict with the safe and secure operation of systems and avionics within WSMR – None to Minor.
- Adversely affect or pose an irresolvable conflict with the safe and secure operation of military systems and avionics from neighboring military installations – None to Minor.
- Impair the ability of WSMR to meet its test and training mission requirements due to the unavailability of dedicated frequencies – Minor to Moderate.
- Adversely affect or pose a conflict with residential, commercial or municipal electronic systems and communication systems, to include ATC systems - None to Minor.

4.17.3.1.2.3 Air Operations

An increase in electronic warfare/jamming activities could cause moderate impacts in terms of potential conflicts with WSMR systems and avionics. Increases in air operations could conflict with civilian systems and avionics, as well as those at other installations, causing minor impacts. The majority of new activities have the potential to cause minor impacts in terms of conflicts with other test and training mission communications.

4.17.3.1.3 Range Infrastructure

Additional infrastructure that would be constructed under Alternative 1 would include landline communications upgrades (fiber optic connections), instrumentation, up to 20 miles of connector tank trails between the Main Post and Fort Bliss, and up to 150 miles of new North-South tank trail corridors to support test and training capability. Implementation of these changes under Alternative 1 would not result in any noticeable adverse impacts to frequency use and management.

4.17.3.1.4 Specialized Areas

Of the six Specialized Areas discussed in Section 2.3.1.4, JLENS would be the only one likely to pose challenges to frequency management. JLENS would use high powered radio waves to transmit signals from the high altitude balloons to the receiving stations. When JLENS is operating, other radio frequencies over several miles (including off-installation areas) may become “jammed,” resulting in significant impacts to frequency users. Therefore, the Range Scheduling Office would need to collaborate closely with the Frequency Manager to deconflict internal operations and also notify and coordinate with outside agencies such as FAA and the Federal Communications Commission to reduce impacts to frequency users outside the installation. With proper coordination and scheduling, frequency impacts would be reduced to less than significant. Frequency management would be a key consideration during the siting and environmental review process for the Specialized Area to support JLENS.

4.17.3.2 Main Post and Population Effects

Minor increases in personnel that would occur under Alternative 1 would not affect frequency management.

4.17.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.17.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

Under Alternative 2, WSMR would require additional infrastructure to accommodate a HBCT (or comparable unit), as well as to support future test capabilities. The construction and occupancy of the additional infrastructure would not by itself result in any additional adverse impacts beyond those noted under the No Action Alternative. However, use of Single Channel Ground and Airborne Radio Systems and other mobile radios could increase impacts to deconfliction and commercial users, with minor to moderate impacts.

4.17.4.2 Training within the Southeast Multi-Use Area

Impacts to frequencies from Alternative 2 would be similar to Alternative 1. Although most HBCT or comparable training activities would require the use of radio communication and frequency assignments, this would not likely result in any interference impacts to receptors on or off WSMR beyond those identified in Alternative 1.

The total number of all activities (test and training) requiring frequency coordination would also not greatly differ from Alternative 1. In addition, the minor infrastructure changes associated with Alternative 2 (e.g., tank trails and hardened crossings) would not result in any additional adverse impacts.

4.17.5 MEASURES FOR REDUCING IMPACTS

4.17.5.1 Potential Management Practices

WSMR has a robust program to ensure that new missions do not introduce frequencies that would pose a conflict or hazard to other frequency users. No additional management practices would be required. Overall, programs or new facilities that would emit special radio frequencies should continue to coordinate with the WSMR Frequency Manager to determine if the location and power of the source would pose a conflict with existing or planned radio frequency operations in the area.

4.17.5.2 Recommended Management Actions

WSMR has a robust program for managing frequency use that is dictated by and conforms to all Federal, DoD, and Army requirements and guidelines. Therefore, no additional management actions would be warranted for frequency use.

4.17.5.3 Mitigation Measures

No mitigation measures would be warranted for frequency use under either action alternative.

4.18 Wildland Fire

This section evaluates the impacts to Wildland Fire by implementing the No Action Alternative, Alternative 1, and Alternative 2.

Section 4.1 provides the overall approach for assessing impacts, gives definitions for each impact rating, and describes the method used for assessing impacts of the alternatives.

4.18.1 IMPACT METHODOLOGY

Impacts to wildland fire were assessed by comparing WSMR fire management methods and plans to the potential that activities associated with the alternatives would have to cause fires.

4.18.1.1 Region of Influence

The ROI for wildland fire includes all lands within WSMR boundaries, including portions of the Tularosa Valley Basin, the San Andres Mountains, and Oscura Mountains. This includes areas within WSMR boundaries occupied by White Sands National Monument, JER, and SANWR. Although a number of the activities involve use of restricted airspace and call-up areas outside of WSMR boundaries, impacts to wildland fire within these areas from testing activities is highly unlikely, and therefore, these areas are excluded from the ROI for biological resource analysis.

4.18.1.2 Technical Approach

Data was obtained from reference documents to determine potential impacts to wildland fire under each alternative. Wildland fire resources analyzed include existing fire management plans; fire management policies; operational guidelines and procedures; and the wildland fire environment including fuels, weather, and topography. A review of the proposed changes in land use, existing and proposed programs, and testing and training requirements, as described in Chapter 2, was conducted to determine which activities have the potential to either directly or indirectly impact wildland fire resources and increase the likelihood of wildland fire ignitions. The factors for determining significance of potential impacts are further discussed in Section 4.18.1.3.

Activities that have the potential to start wildland fires were analyzed to determine if existing policies, plans, procedures, or restrictions are in place to protect human safety, infrastructure, cultural and biological resources, and mission activities from potential impacts resulting from the Proposed Action and alternatives. Existing policies, plans, procedures, and restrictions at WSMR relating to wildland fire management that were evaluated include:

- The 2002 WSMR INRMP (Ref# 074), which provides management guidance and use restrictions for WSMR testing and training to reduce impacts to natural resources.
- The 2004 WSMR Integrated Wildland Fire Management Plan, which lays out the objectives for the program, presents background information, and provides approaches for implementing these objectives.
- The 2002 WSMR Strategic Wildland Fire Planning Guide, which provides short- and long-term operational direction on how to implement the IWFMP.
- Federal and DoD fire policies (see Section 3.18), which provides guidance for operational and safety aspects of the wildland fire program.

4.18.1.3 Factors Considered for Determining Significance of Impacts

The criteria to evaluate the significance of potential impacts to wildland fire resulting from the No Action Alternative, Alternative 1, or Alternative 2 includes the extent or degree to which implementing the alternative would involve the following wildfire ignition issues:

- Use of weapons with a history of causing wildfires at WSMR
- Use of weapons not previously used at WSMR
- Use of weapons capable of landing outside the WSMR boundary
- Occurrence of activities in areas with higher fuel loadings
- Occurrence of training during high fire danger day

4.18.2 NO ACTION ALTERNATIVE

4.18.2.1 Range Capabilities and Use

Under the No Action Alternative, impacts to wildland fire from current ongoing mission activities would persist. In addition, this includes any future impacts from mission activities that have undergone environmental review but have not been completed prior to this EIS decision. As a result, impacts from these incomplete actions may alter current baseline conditions. As discussed in Section 2.2.1.1 (see Figure 2.2-1) certain existing land use constraints occur within WSMR. The corresponding acreages, limitations of use, and management of these areas would remain unchanged.

The 1,618,000 acres of WSMR range land would not be reclassified to include off-road vehicle use, as these acreages would remain designated as "Primary Test Zone" land use; therefore, the potential for significant impacts due to off-road vehicle traffic (such as heat and sparks from catalytic converters on vehicles) in these areas would be avoided.

Overall impacts to wildland fire resulting from the No Action Alternative would be minor.

4.18.2.2 Main Post and Population Effects

Activities on the Main Post would not likely affect or cause wildland fires. The WSMR Fire Department would continue to manage and respond to emergencies as needed.

4.18.3 ALTERNATIVE 1 - IMPLEMENT LAND USE CHANGES AND ENHANCED TEST CAPABILITIES

4.18.3.1 Range Capabilities and Use

4.18.3.1.1 Range Land Use

The change of land use classifications would not have a direct impact on wildland fire management; however, the change of activities associated with the change in land uses would directly impact the potential for wildland fire.

4.18.3.1.2 Range Activities and Levels of Use

The following sections address potential impacts to wildland fires under Alternative 1 by Activity Class that could be expected from range activities and changes in levels of use.

4.18.3.1.2.1 Ground Operations

Due to the proposed increase of testing activities, specifically ground operations, the potential for unplanned wildfire ignitions would increase. The primary activities included in this Activity Class that would have the potential to cause wildland fire ignitions include on-road vehicle use, off-road vehicle use, dismounted operations and field operations. Actions associated with these activities that may cause fires include: hot catalytic converters on support vehicles coming into contact with dry vegetation; the use of pyrotechnics; camp fires; and ground impact from live weapons.

4.18.3.1.2.2 Hazardous Operations

Potential unplanned fire ignitions from hazardous operations (such as line-fire weapons releases and high-powered microwave weapons) could increase under Alternative 1. Risks would be higher in areas with vegetation and high fuel build-up, particularly during times of prolonged low rainfall or windy conditions.

4.18.3.1.2.3 Air Operations

A slight increase in air operations including UASs under Alternative 1 could increase the risk of a catastrophic mishap that could cause a fire under restricted airspace. The increased risk would be minor and would mostly be minimized through ongoing management practices.

4.18.3.1.3 Range Infrastructure

Any additional tank trails along side or separate roads could have a beneficial impact on wildland fire management by acting as potential fire breaks.

4.18.3.1.4 Specialized Areas

The proposed Specialized Areas would not introduce new activities or facilities that would be expected to cause an increase in the potential for wildland fires. The Local Training Area would be mostly cleared of vegetation through heavy use, limiting the amount of combustible material. Standard field measures could minimize the number of unplanned ignitions. Therefore, no impacts would be expected.

4.18.3.2 Main Post and Population Effects

Minor increases in civilian and contractor personnel that would occur under Alternative 1 would not affect the potential for wildland fires. These personnel would support increased test and training missions on WSMR as described in Section 4.18.3.1 and these operations could increase the likelihood of wildland fires if standard precautions were not followed.

4.18.4 ALTERNATIVE 2 - IMPLEMENT ALTERNATIVE 1 PLUS MILITARY UNIT STATIONING AND TRAINING CAPABILITY

4.18.4.1 Implementation of Heavy Brigade Combat Team or Comparable Unit Stationing

4.18.4.1.1 Construction

Additional development for a HBCT (or comparable unit) would not be expected to increase the risk of wildland fire. Construction contractors would develop and adhere to project-specific site-safety plans that would reduce the risk of fire hazards.

4.18.4.1.2 Main Post and Population Effects

The risk of wildland fire from HBCT operations and increased population would be low, as most activities on WSMR would take place within built-up areas.

4.18.4.2 Training within the Southeast Multi-Use Area

Increase of off-road maneuvering and training activities would increase the potential for unplanned wildfire ignitions in the Southeast Multi-Use Area. The majority of the areas south of US 70 are patchy shrubland areas with limited ground cover, and would have less potential to ignite wildland fires than areas that have grassier and finer fuels.

4.18.5 MEASURES FOR REDUCING IMPACTS

4.18.5.1 Potential Management Practices

As discussed in Section 4.1.3, potential management practices are those that WSMR could implement for future activities on a case-by-case basis, when appropriate, to avoid or minimize impacts. This list of practices could apply to activities that are discussed programmatically in this EIS, and implemented during the siting process, environmental review process, or approval process, where applicable.

WSMR maintains a proactive approach in managing wildland fire. Through proper siting of actions and timing of actions, WSMR can reduce the risk of wildland fire ignitions for current and future actions. Careful consideration should be taken when siting missions that have the potential for wildfire ignition.

The 2004 WSMR Integrated Wildland Fire Management Plan and 2002 WSMR Strategic Wildland Fire Planning Guide provide overall guidance for avoiding wildland fire. Below potential management practices that would apply to ground operations and hazardous operations:

- Avoid areas on WSMR with high fuel loads and continuous fine fuels when possible, including the Pinyon Juniper area in the Oscura Mountains and grassland communities.
- Consider existing fuels breaks and the potential need for creating additional ones during planning.
- If an activity has the potential to start fires, it may be appropriate to site it away from facilities and infrastructure that could be damaged in wildfires.
- Notify the WSMR Fire Department of all activities that have a high potential to ignite wildfires, and have fire suppression resources on standby in case of ignition.
- Reduce the risk of unplanned wildland fires through prescribed burns and mechanical fuels treatments in areas with high fuel loads.

- Use minimal suppression techniques in order to reduce ground disturbance when feasible and the safety of firefighters and the public is not jeopardized.
- Restrict the use of pyrotechnics, camp fires, and live-fire mission activities including weapons impact during high fire danger.

4.18.5.2 Recommended Management Actions

Based on the actions proposed under Alternatives 1 and 2, WSMR should undertake the following management actions:

- Ensure tactical vehicles deployed to field sites are furnished with spark arresters to reduce fire risk.
- Impose a no smoking rule for personnel and troops when in the field away from built-up areas.
- Educate personnel and troops on the dangers of wildland fire, potential ignition sources, and the prevention measures that they must adhere to (particularly for personnel conducting ground operations and hazardous operations).

4.18.5.3 Mitigation Measures

Mitigation measures would not be warranted for wildland fire under either action alternative.

4.19 Cumulative Effects

CEQ regulations, which implement NEPA procedural provisions, define cumulative effects as "the impact on the environment which results from the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions."

EPA guidance to reviewers of cumulative effects analyses (CEA) further adds "…the concept of cumulative impacts takes into account all disturbances since cumulative impacts result in the compounding of the effects of all actions over time. Thus, the cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (Federal, non-Federal or private) is taking the action (Ref# 231)."

The impact analysis in Sections 4.2 through 4.18 analyzes potential *WSMR-specific* impacts and cumulative actions associated with the Proposed Action and alternatives. This CEA takes into consideration both the cumulative actions and associated impacts analyzed in Sections 4.2 through 4.18 and incorporates past WSMR actions and offsite (non-WSMR) regional activities that could cumulatively cause the potential for adverse impacts. The following sections further detail the CEA methodology and past, present, and future actions considered.

4.19.1 IMPACT METHODOLOGY

This CEA considers direct and indirect impacts determined from the alternatives analysis and the past, present, and future projects considered relevant to the analysis (Table 4.19-1). Though certain direct and indirect impacts are determined insignificant, they require further evaluation as elements of cumulative impacts to the resource.

WSMR evaluated the potential cumulative impacts of the Proposed Action and alternatives in accordance with NEPA (42 USC 4321-4347), CEQ regulation (40 CFR Parts 1500-1508), Army Regulation (32 CFR Part 651), and CEQ guidelines for conducting cumulative impact analysis ("Considering Cumulative Effects under the National Environmental Policy Act", Executive Office of the President, January, 1997). Table 4.19-1 lists other actions that were reviewed to complete the CEA. This table summarizes relevant actions, including those programmatic testing and training activities associated with the proposed changes to land use and activities. In addition, this analysis takes into consideration the current and projected levels of military activity at WSMR analyzed in previous NEPA documentation.

4.19.1.1 Region of Influence

Generally, the ROI used for the CEA was limited to WSMR and adjacent lands (including Fort Bliss to the south and the communities of Las Cruces to the west, Holloman AFB and Alamogordo to the east, and Socorro to the north). The ROI is further defined for each resource area in Sections 4.2 through 4.18.

4.19.1.2 Technical Approach

The U.S. Army NEPA Guidance Manual (Ref# 232) was used as a basis for evaluating cumulative impacts. The Army considered a wide range of past, present, and reasonably foreseeable future actions by researching existing literature and contacting local area planners and State and Federal agencies to identify other projects in the region, which could contribute to the CEA. These regional actions are summarized in Table 4.19-1. The Army considered other past, present or foreseeable future actions regardless of whether the actions are similar in nature to the Proposed Action or outside the jurisdiction of the Army.

Table 4.19-1. Past, Present, and Future Actions

Project or Activity	Time Frame	Spatial Extent (if known)
Military		
WSMR (then known as WSPG) established providing critical testing for the nation's nuclear bomb program.	1941 through 1940s	810,400 acres
Development of WSMR Main Post area and infrastructure.	1940s to present	1,530 acres
Expansion of WSMR and development of testing/training facilities and infrastructure.	1952 to present	1,350,500 acres
Call-up areas (Non-DoD land with evacuation agreements)	Past-present	3,290,400 acres
Construction activities in and around Main Post to support garrison and test functions.	Past-present	356,000 s.f. of building space
New and ongoing testing facilities, initiatives, and clients, including the Aeroacoustic Research Complex, Directed Energy Test Sites and Operations, NASA Launch Abort System, Defense Threat Reduction Agency activities, U.S. Navy STANDARD Missile Family Testing Program; Joint Air to Surface Standoff Missile; National Nuclear Security Administration Fight Test Operations; Space Surveillance Optical Telescope; Air Force Laser Test Facility; and Joint Urban RDT&E Complex.	Present-future	WSMR Range Areas
New and ongoing training and facilities including: the Warrior Transition Course; Army Special Forces Exercise; 49th Fighter Wing Transformation; and Air-to-Surface Helicopter Gunnery Training.	Present-future	WSMR Range Areas
Expansion of current programs/new training assets/new testing initiatives.	Future	WSMR Main Post and Range Areas
Arrival of the EN BN on WSMR with training on Fort Bliss.	2009	Up to 300-acre expansion of WSMR Main Post; 700 Soldiers; 1,200 Family members
BCT Modernization test program.	FY 2008 – FY 2015	WSMR (southeast Range; 6,700 acres)/Fort Bliss
WSMR/TNC ITAM Projects.	1997 to future	WSMR Range Areas
Range and Training Land Assessment Monitoring	1997 to future	WSMR Range Areas
WSMR INRMP	2002 to future	WSMR Installation
WSMR ICRMP and PA (currently being developed)	2004 to future	WSMR Installation

Table 4.19-1. Past, Present, and Future Actions (continued)

Project or Activity	Time Frame	Spatial Extent (if known)
War road revitalization project (Ref# 233) involving improvements along a 23-mile paved road (20 miles within Fort Bliss and three miles within WSMR) to provide improved traffic safety, especially for commuters traveling between El Paso and the Main Post.	2009 to 2010 (construction period)	WSMR Main Post, Fort Bliss, and Regional Highways
Fort Bliss, development of facilities and infrastructure.	1957 - present	1,112,000 acres
Fort Bliss (Base Realignment And Closure 2005): Additional BCTs	2008 - 2011	Fort Bliss
Grow the Army Fort Bliss Stationing : Activation of 44th BCT Growth of 48th BCT	 FY 2009 FY 2011	Fort Bliss
Fort Bliss Desalination Plant. A desalination plant to be operated by the City of El Paso Water Utilities is being constructed to treat brackish water from the Hueco Bolson and decrease freshwater withdrawals (Ref# 037).	Present-future	Fort Bliss; South Training Areas
Military Wind Farm Development: Institute for Energy and Environment is collaborating with NASA WSTF to establish the first wind farm in Doña Ana County. IEE is conducting site selection and monitoring of two sites on Fort Bliss in New Mexico for wind resource. Two met towers are in the process of being placed in the Otero Mesa area. This is part of a larger Fort Bliss Energy Plan associated with the large base expansion. The Fort Bliss goal is to install a 200 MW windfarm on the base. (Ref# 234)	Present-future	WSMR/Fort Bliss
Holloman AFB, development of facilities and infrastructure	1942 - present	59,700 acres
German Air Force (GAF) Training at Holloman AFB	1992 - future	Airspace
Air Force replacement of QF-4 drones with QF-16 for Full-scale Target Test Flights on WSMR.	Present-future	Airspace
46th Test Group at Holloman AFB	Present-future	Airspace
Kirtland and Cannon AFBs co-use	Present-future	Airspace
Arrival of F-22A Raptor to Holloman AFB	2008	Airspace
UAS program arrives at Holloman AFB. Predator is part of a UAS program that is currently housed temporarily at Holloman AFB pending an announcement on the official location of the second UAS Formal Training Unit.	June 2009	Military restricted airspace
Holloman AFB UAV Formal Training Unit (Ref# 187)	2009- future	Military restricted airspace
Arrival of F-35 Joint Strike Fighters	2010	Airspace
Non-military Activities and Projects		
White Sands National Monument	1933 - present	146,000 acres
SANWR	1941- present	56,700 acres

Table 4.19-1. Past, Present, and Future Actions (continued)

Project or Activity	Time Frame	Spatial Extent (if known)
JER	1912 - present	192,700 acres (89,700 acres within WSMR boundaries)
Non-military land management activities of adjacent WSMR lands (e.g., Bureau of Land Management and U.S. Forest Service). Grazing, off-road vehicle use, recreation use, mining, development and/or expansion of transportation infrastructure, pipelines, and energy transmission lines.	Past - future	Off-installation
The Tri-County Resource Management Plan (currently being prepared by BLM would provide a planning framework in management of BLM public lands for the next 15 to 20 years (Ref# 235).	Future	Doña Ana, Sierra and Otero Counties
Regional sustainable water initiatives; including reuse of treated wastewater, aquifer recharge, and aggressive water conservation measures such as adopting rate structures which encourage conservation, providing education to consumers about efficient use of water, and monitoring water use to identify how and where water is being used (Ref# 235).	Present-future	Rio Grande River Basin/Regional aquifers
SANWR Land Management for Bighorn Sheep, removal of salt cedar, bird monitoring, mountain lion studies and a large scale study of desert mule deer and chronic wasting disease (Ref# 236).	Present-future	56,700 acres
Jornada Basin Long Term Ecological Research Site studies regarding desertification and ecosystem processes of the Chihuahuan Desert (Ref# 237).	Present-future	247,100 acres; 89,700 acres (within WSMR boundaries)
Spaceport America: research and development of commercial-sector space ventures (Ref# 238).	FY 2010	18,000 acres
Recent Regional Population Growth – Doña Ana, El Paso and Otero Counties (Ref# 022, 164)	1990 to 2006	Population increase by 213,894 persons (27.5 percent)
Projected Regional Population Growth – Doña Ana, El Paso and Otero Counties (Ref# 022, 164)	2010 to 2030	Population increase: 24 percent Doña Ana and El Paso; 9 percent Otero
Doña Ana – urbanization (Ref# 204)	Present-future	Las Cruces metropolitan area; southern part of Doña Ana County.
Las Cruces School Expansion (Ref# 175)	2009-2011	Las Cruces: Elementary, Middle and High School
New Mexico DOT Roadway improvements including (Ref# 157): Expansion of I-10, between Las Cruces and the Texas State line	Construction Periods: 2005 to 2011	Regional Highway Network

Table 4.19-1. Past, Present, and Future Actions (continued)

Project or Activity	Time Frame	Spatial Extent (if known)
Improvements to US 54, between Tularosa and Vaughn Improvements to Route 26, between Deming and Hatch	2005 to 2011 2006 to 2010	
Alamogordo Desalination Plant (Ref# 239).	2009 (proposed)	Alamogordo Regional Water Supply – Tularosa Basin
Water reclamation facility to treat wastewater for use as irrigation water for parks and golf courses and would offset the need to pump groundwater (Ref# 204).	2009	Las Cruces
Off-installation wind turbine development (Ref# 234).	Future	Off-installation
Doña Ana County Solar Power Plant (Ref# 240)	Future	Doña Ana County
SunZia Southwest Transmission Project: new regional electric transmission line to allow potential future development of power from renewable energy sources such as geothermal, wind and solar. (Ref# 241)	Future (FY2013)	Southwest New Mexico/Southeast Arizona

4.19.1.3 Factors Considered for Determining Significance of Impacts

The Army NEPA Guidance Manual guidance was used to determine the potential for significant impact. This manual directs the CEA to focus on those resources that have the potential for experiencing significant cumulative impacts. If the CEA indicated no adverse impacts due to existing or foreseeable future regional actions, or if beneficial programs such as the ITAM are in place to offset adverse impacts, than the CEA discussion was limited. If the CEA indicated the potential for significant adverse cumulative impacts, a more detailed CEA was provided. For the purposes of this EIS, significant cumulative impacts would occur if incremental impacts of the alternative, added to the environmental impacts of past, present, and reasonably foreseeable actions, would result in significant adverse effects to resources for WSMR and the surrounding regions defined in Section 4.19.1.1.

It was determined that CEA on a regional scale was not required for safety, hazardous materials, and facilities and infrastructure as these activities are WSMR-specific and would not affect external (regional) resources in a cumulative manner. In addition, as it was determined that cumulative effects analysis was not warranted for Environmental Justice as the alternatives analysis in Section 4.15 determined no adverse disproportional impacts to Environmental Justice populations.

4.19.2 SUMMARY OF CUMULATIVE IMPACTS

4.19.2.1 Land Use and Aesthetics

The important cumulative land use impact issues considered in this analysis include: the cumulative effects of development associated with baseline population growth in Doña Ana and Otero counties (unrelated to WSMR), in addition to the growth stimulated by the mission changes at WSMR and Fort Bliss; increased urbanization of developing areas on the fringes of Las Cruces and in surrounding rural areas; and changes in the visual landscape, including increased urbanization, and decreased open space.

Military installations have been a major part of the definition of land use in the region, as well as contributing to the population growth that has led to development and increased urbanization in the region's communities. Although land use within the military installations has varied over time with changes in their missions, the overall proportion of land devoted to military use has not changed significantly since the installations were established, and their primary uses have remained relatively constant; for example, WSMR has been primarily a missile test range since its inception. As new facilities and infrastructure have been developed at WSMR, the aesthetic quality has changed, but the overall visual context has remained one of largely open space with few alterations compared to more developed areas.

Table 4.19-1 summarizes a number of the major events shaping the existing environment and land uses within and surrounding WSMR including the establishment of the military (WSMR, Fort Bliss and Holloman AFB) within the region; the establishment of White Sands National Monument, SANWR, and JER; regional growth of population and developed areas; and BLM land management. These activities could combine with actions at WSMR to produce cumulative adverse land use impacts. The overall regional population growth would likely lead to a demand for more commercial facilities and services in areas that are now largely rural or residential and the actions at WSMR could accelerate the rate of population growth in the region with the additional personnel under Alternative 1 and additional personnel and Soldiers under Alternative 2 (see Chapter 2). The pressures of development would make it more difficult to maintain open space, while at the same time population growth would increase the demand for more recreation and quality of life open space. Rural communities like Alamogordo could be susceptible to increased density and urbanization, and the overall open visual quality of the regional landscape, especially in rapidly developing southern Doña Ana County.

Future growth areas are primarily projected around the City of Las Cruces and in the southern part of the Doña Ana County. The Otero County Comprehensive Plan (Ref# 242) anticipates residential growth to occur along US 54 and south of US 70 and commercial/retail growth to occur southwest of Alamogordo along US 70/82 and 54 and industrial growth north of and including the Alamogordo-White Sands Regional Airport. The regional cumulative impacts to land use by alternative are discussed in the following sections.

4.19.2.1.1 No Action Alternative

As stated in Section 4.2, the previously approved activities being implemented under the No Action Alternative would have minor additional impacts on land use and aesthetics at WSMR. No cumulative impacts would be anticipated to adjacent land use and land use compatibility as a majority of the lands surrounding WSMR are Federal or State holdings or are large private land holdings, none of which have foreseeable future development activities that would present a land use conflict.

Although increased use and development at WSMR as part of the No Action Alternative would contribute to cumulative adverse impacts on visual resources, overall cumulative impacts to aesthetics would be minor as a majority of WSMR is off limits to the public. In addition, the large acreage of ranchland and land preservation outside of WSMR and acreage within WSMR with restricted uses including White Sands National Monument, SANWR and JER would buffer the significance of visual impacts due to regional development and WSMR land uses. Incremental growth and development, both on the military installations and in local communities, has led to an increase in light pollution in the region, which has the potential to adversely affect the dark skies that are important to astronomy observatories in the region. Cumulatively, these changes are significant. Activities at WSMR contribute to this cumulative impact to a minor extent.

4.19.2.1.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.2, Alternative 1 would not contribute significantly to regional cumulative land use impacts. No changes are proposed to WSMR installation boundaries, overall population numbers stationed as WSMR with minor increases in civilian and contractor numbers to support increase range activities and hot missions, and the predominant land use within WSMR would remain military. Overall, regional cumulative adverse impacts would be similar to the No Action Alternative. Land use terms and conditions outlined in existing cooperative agreements with immediate WSMR neighbors (White Sands National Monument, SANWR, and JER) would remain unchanged.

Future activities at WSMR would continue to incrementally change the aesthetic quality of the installation. The expansion of the Main Post/Built-Up Areas would increase the "urbanized" quality of the southern part of the installation. The development of new Specialized Areas would affect a relatively small percentage of the land. The largest impact would come from additional roads and tank trails crossing the installation. The changes on WSMR would not contribute significantly to adverse cumulative impacts at sensitive public viewpoints.

4.19.2.1.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.2, Alternative 2 would have potentially moderate impacts to land use and aesthetics at WSMR. Cumulative adverse regional impacts to land use and aesthetics resulting from Alternative 2 would be greater than those under Alternative 1; however, would remain moderate. The potential future stationing of a HBCT (or comparable unit) would require further expansion of the Main Post/Built-Up Areas that would increase the "urbanized" quality of the southern part of the installation. Related development of facilities to accommodate a HBCT would be contained within the proposed Main Post expansion area as a part of Alternative 2. The use of the Southeast Multi-Use Area for training would cause an increase in dust generation during maneuvers and result in a change in vegetation and land cover. Vehicle tracks would leave visible scars on the land. Combined with similar but more extensive changes associated with off-road vehicle maneuvers on Fort Bliss, the activities at WSMR would contribute to a change in the regional landscape to a moderate degree.

In addition, the potential future stationing of a HBCT (or comparable unit) would significantly contribute to a cumulative population growth. Related development and adverse land use changes, however, would be minor when compared to the growth associated with Fort Bliss. Cumulatively, there would be significant regional growth that would lead to increased housing and commercial development within the towns surrounding Fort Bliss, WSMR and Holloman AFB.

4.19.2.2 Airspace

The important cumulative airspace impact considered in this analysis are: cumulative impacts on civil aviation from increased military operations in Special Use Airspace within and surrounding WSMR in combination with aircraft operations at Holloman AFB; and increased airline traffic resulting from population growth within the region. Past military activities in the region have resulted in the designation of large areas of Restricted Area airspace over WSMR and Fort Bliss that are inaccessible to civil aircraft. WSMR returns its Restricted airspace to FAA to allow transit by commercial aircraft. Increased use of the Restricted airspace for military missions would reduce the availability of that airspace for FAA use. None of the alternatives involves changes in designation of Special Use Airspace, however, so there would be no additional barriers to civil aviation.

Other current and future actions within the ROI that could cumulatively affect airspace use include the transformation of the 49th Fighter Wing, which involves bedding down F -22A aircraft at Holloman AFB. The F -22A aircraft uses Special Use Airspace in the region, including Restricted Areas overlying WSMR to conduct training. In addition, Combat Aviation Brigade stationing at Fort Bliss would also increase use of regional airspace. Future new airspace use includes Spaceport America, the nation's first purpose-built commercial spaceport, currently being constructed west of WSMR. As military presence in the area continues to grow and regional population growth is anticipated, restricted airspace use and airline traffic, including future Spaceport America operations can be expected to increase (Table 4.19-1). The regional cumulative impacts to airspace by alternative are discussed in the following sections.

4.19.2.2.1 No Action Alternative

As stated in Section 4.3, the No Action Alternative would have minor additional adverse impacts to WSMR airspace. Use of airspace within the region is likely to increase in the future with Spaceport America, FAA directed air traffic, as well as military uses by WSMR, Holloman AFB and Fort Bliss. As stated in Section 4.3, scheduling of WSMR airspace would need to be closely coordinated by Army and Air Force airspace managers to accommodate increased demands associated with the newly based F-22As. The level of airspace use would likely increase regardless of the alternative selected, existing and future activities at WSMR in combination with overall increase of military civilian airspace use could cause moderate cumulative effects to private, commercial and other military airspace activities. To help offset cumulative adverse effects from future increased anticipated airspace use, the military is establishing an organization at WSMR to evaluate the anticipated scheduling problems and develop management strategies and amend existing airspace management practices. The retirement of older aircraft at Holloman AFB being replaced by F-22As would additionally help to offset overall adverse cumulative impacts.

4.19.2.2.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.3, Alternative 1 would have minor impacts to WSMR airspace. Moderate cumulative adverse impacts would be anticipated for airspace (similar to the No Action Alternative). These impacts could be reduced through amending WSMR airspace scheduling procedures as in Section 4.19.2.2.1.

4.19.2.2.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.3, unit stationing or training within the Southeast Multi-Use Area would have no impact on airspace. Therefore, cumulative impacts to airspace under Alternative 2 would be the same as those under Alternative 1.

4.19.2.3 Air Quality

4.19.2.3.1 Criteria Pollutants

The important cumulative air quality impact issues considered in this analysis are: the potential for increased emissions of criteria pollutants by WSMR activities, in combination with increased emissions due to population growth, to result in non-attainment of National Ambient Air Quality Standards; the impact of increase in ground disturbance and exposure due to construction, off-road vehicle traffic, grazing, and other activities which affect vegetative cover and soils on fugitive dust generation and particulate matter emissions; and the effects of increased human-caused dust generation in combination with natural windblown dust events on ambient air quality in Doña Ana and Otero Counties.

Other actions in the ROI that could combine with potential actions at WSMR to produce cumulative air quality impacts primarily include construction of commercial, industrial, and residential facilities and infrastructure to support the growing population in the ROI, along with associated stationary and mobile sources of air-pollutant emissions. Section 4.4 presents projected construction emissions for facilities and infrastructure on WSMR, operational emissions on WSMR, combustion emissions from military and private vehicles, and fugitive dust from off-road vehicle maneuvers. While these emission sources are analyzed separately, air quality in the ROI would be affected by the cumulative total of these sources, in addition to other off-post sources. The forecast baseline and WSMR population growth, in combination with Fort Bliss induced population changes, is projected to result in an increase in the population of Doña Ana County. This could ultimately result in exceedance of the NAAQS, especially of carbon monoxide associated with increase of POVs and particulate matter (PM_{10}). PM_{10} levels in Doña Ana and Otero counties are further aggravated by windblown dust, especially during dust storms. Additional ground disturbance due to construction both on- and off-post, in combination with agricultural uses and off-road vehicle use (both military and civilian), would all contribute to potentially adverse cumulative increases in PM_{10} emissions in the ROI. The regional cumulative impacts to air quality by alternative are discussed in the following sections.

4.19.2.3.1.1 No Action Alternative

As stated in Section 4.4, the No Action Alternative would have minor impacts to air quality within WSMR and would not exceed Federal or State air quality regulations. Regional development and population growth both within WSMR, surrounding military installations and local communities would all be anticipated to contribute cumulatively to regional air quality conditions. The increased pollutants, primarily due to vehicle emissions associated with population growth, is unlikely to contribute to significant cumulative impacts. No foreseeable future projects are known which would be major emitters of air pollutants. Increased use of airspace, including additional military aircraft and Spaceport America would also contribute to air pollutants on a regional scale. These inputs however, are also unlikely to cause adverse cumulative impacts to air quality.

4.19.2.3.1.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.4, Alternative 1 would have minor to moderate impacts to overall air quality within WSMR. Cumulative regional air quality impacts would be minor and similar to those described for the No Action Alternative.

4.19.2.3.1.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.4, Alternative 2 would have minor to potentially significant impacts to overall air quality within WSMR. The increase in personnel and mission activities with the potential stationing of a HBCT (or comparable unit) under Alternative 2 would result in emissions of priority criteria pollutants within WSMR's existing air permit. The additional particulate matter, vehicle emissions, and fugitive dust emissions generated under Alternative 2, including designation of, and training within, the Southeast Multi-Use Area would not be anticipated to create a regional adverse cumulative impact to air quality, therefore, minor cumulative impacts, similar to the No Action Alternative and Alternative 1 are anticipated.

4.19.2.3.2 Greenhouse Gas Emissions

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs), such as carbon dioxide (CO_2), in our atmosphere. An increase in GHG emissions is said to result in an increase in the Earth's average surface temperature, which together are commonly referred to as global warming. Global warming is expected, in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, precipitation rates, etc., which is commonly referred to as climate change. Large increases in global temperatures could have considerable detrimental impacts on natural and human environments.

GHGs include water vapor, CO_2, methane, nitrous oxide, ozone, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated Global Warming Potential, which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. It is a relative scale that compares the contribution to global warming of a given mass of a gas to the same mass of CO_2, which has a Global Warming Potential of one.

Water vapor is a naturally occurring GHG and accounts for the largest percentage of the greenhouse effect. Next to water vapor, CO_2 is the second-most abundant GHG. Uncontrolled CO_2 emissions from power plants, heating sources, and mobile sources are a function of the power rating of each source, the feedstock (fuel) consumed, and the source's net efficiency at converting the energy in the feedstock into other useful forms of energy (e.g., electricity, heat, and kinetic). Because CO_2 and the other GHGs are relatively stable in the atmosphere and essentially uniformly mixed throughout the troposphere and stratosphere, the climatic impact of these emissions does not depend upon the source location on the earth (i.e., regional climatic impacts/changes will be a function of global emissions).

4.19.2.3.2.1 Regulatory Climate

There have been no significant environmental regulations enacted in the U.S. at the national level to specifically address increasing concentrations of GHGs or climate change. In April 2007, the U.S. Supreme Court determined that the EPA has the regulatory authority to list GHGs as pollutants under the Federal CAA. The EPA has sought comments from the public and other federal agencies, but has not yet proposed or adopted any regulations pertaining to GHGs. Numerous proposals and bills have been circulated and have been considered in the U.S. Congress to regulate GHGs, but no legislation has been adopted.

Although GHG emissions are not currently regulated at the federal level, certain state and local governments are passing legislation and adopting action plans to reduce GHG emissions. In 2005, New Mexico Governor Bill Richardson signed E.O. 05-033 *Climate Change and Greenhouse Gas Reduction*, which, among other things, established the New Mexico Climate Change Advisory Group (the Advisory Group). The Advisory Group was tasked with presenting proposals to reduce New Mexico's GHG emissions to year 2000 levels by 2012, 10 percent below 2000 levels by 2020, and 75 percent below 2000 levels by 2050. In 2006, Governor Richardson signed E.O. 2006-69 *New Mexico Climate Change Action*, which directed actions to state agencies to work toward achieving the aforementioned goals of E.O. 05-033.

In addition to in-state policies to address GHG emissions, New Mexico has entered into two regional agreements: the Southwest Climate Change Initiative and the Western Climate Initiative. The Southwest Climate Change Initiative is a joint governor's initiative between New Mexico and Arizona to collaborate in identifying, evaluating, and implementing ways to reduce GHG emissions. In 2007, the Western Climate Initiative was launched, which currently consists of the States of New Mexico, Arizona, California, Oregon, Washington, Montana, and Utah, as well as the Canadian provinces of British Columbia, Manitoba, Ontario, and Quebec. This initiative was formed with a focus of ultimately implementing a regional market-based GHG emission cap and trade system.

4.19.2.3.2.2 White Sands Missile Range Greenhouse Gas Emissions Assessment

Baseline GHG Emissions

As of April 2009, WSMR has not completed an assessment of their GHG emissions to provide a baseline for comparison with the alternatives. Therefore, a baseline of GHG emissions for current operations was derived from the maximum operational limits for the main GHG emitting equipment stated in WSMR's Title V Operating Air Permit (No. P085R1) (Ref# 058). This is considered a conservative approach as WSMR's actual operation of these sources is considerably less than is allowed by the permit. These data were then used to calculate CO_2 emissions, based on known coefficients.

Direct emissions result from the operation of fuel-consuming equipment, such as boilers, electric generators, and vehicles. Inputs for these sources include natural gas, fuel oil, propane, diesel fuel, and unleaded gasoline. Table 4.19-2 shows the estimated baseline direct CO_2 emissions at WSMR.

Table 4.19-2. Estimated Existing Carbon Dioxide Emissions at WSMR from Direct Sources

Material	Permitted Maximum[1]	CO_2 Coefficient[2]	Estimated CO_2 Emissions (tpy)
Natural Gas	87,600,000 ft^3/year	120.593 pounds CO_2/1000 ft^3	5,282
Fuel Oil	206,272 gallons/year	26.033 pounds CO_2/gallon	2,684.9
Propane	6,500 gallons/year	12.669 pounds CO_2/gallon	41.2
Diesel Fuel	18,953,100 kilowatt-hours/year	0.580 pounds CO_2/kilowatt hour	5,496.4
Unleaded Gasoline	1,618,195 gallons/year	19.564 pounds CO_2/gallon	15,829.2
		Total	**29,333.7**

1. Ref# 058
2. Ref# 243, 244

Indirect emissions sources in this analysis consist of emissions associated with WSMR's electricity use. In 2007, the total quantity of electricity purchased by WSMR was 109,000 MWh (Ref# 184). In 2005, the national average CO_2 output rate for electricity generation was 1,329 pounds of CO_2 per MWh (Ref# 245). Therefore, using this national average, WSMR's electricity use in 2007 would have resulted in 72,430.5 tons of CO_2 emitted.

Alternative 1

It is estimated that WSMR currently contributes, both directly and indirectly, about 102,000 tpy of CO_2. To put this number into context, it is estimated that, in 2005, fossil fuel consumption in the entire State of New Mexico resulted in 65.6 million tons of CO_2 emissions (Ref# 246). Therefore, current and projected future emissions at WSMR resulting from any potential increases in training and testing events due to the proposed land use changes under Alternative 1 would represent a small fraction (less than one percent) of the total CO_2 emissions of the state, and would be considered much less impactful in a larger regional context (e.g., the Southwest U.S.) or globally. In addition, no increases in population levels stationed at WSMR would occur under Alternative 1, therefore, no adverse increase in GHG emissions would be anticipated from the construction of additional facilities (placement of boilers, electric generators, etc.) as would be required for a HBCT (or comparable unit) complex, nor would there be an increase in the number of vehicles and related GHG vehicle emissions often associated with stationing of additional Soldiers. In a general sense, it can be concluded that on a per capita basis, WSMR's contribution to climate change under Alternative 1 would be expected to be at or below the state average. The general trend of WSMR's daily commuter population may slightly increase over time due to the increased testing and training capacities offered by redesignation of land use within the Land Use and Airspace Strategy Plan, however, these increases would be minor.

It is also important to place any potential CO_2 emissions associated with the alternatives in the context of WSMR's participation in the Federal government's overall plan to reduce CO_2 emissions. E.O. 13423 "Strengthening Federal Environmental, Energy, and Transportation Management" sets as a goal for all Federal agencies the improvement in energy efficiency, and the associated reduction of GHG emissions, of the agency through reduction of energy intensity by three percent annually through the end of FY 2015 or 30 percent by the end of FY 2015, relative to the baseline of the agency's energy use in FY 2003. The U.S. Army Energy Strategy for Installations also contains strategies to reduce energy waste and improve efficiency. In addition, the Army has a policy of incorporating Leadership in Engineering and Environmental Design features into new buildings that include an assortment of sustainable design features including energy conservation. The continued implementation of energy efficiency features into new construction, as well as the continued consolidation of military facilities resulting from Base Realignment and Closure decisions, would produce an overall net reduction in GHG emissions from Army and DoD actions in the country.

Alternative 2

Cumulative adverse effects would be greater under Alternative 2 as the potential stationing of a HBCT (or comparable unit) would increase GHG emissions from the additional boilers and electric generators required for facilities. Additional vehicle emissions would result due to the increased population levels within WSMR and surrounding communities, increased commuting to WSMR and from the addition of vehicles associated with HBCT training. Estimates of projected direct CO_2 emissions under Alternative 2 are shown in Table 4.19-3. A factor of 2.4 was utilized to project increased CO_2 emissions from boilers and electric generators based on the anticipated population increase at the installation (see Tables 2.2-9 and 2.3-7), i.e. it is assumed that CO_2 emissions would increase by the same proportion as population. Unleaded gasoline use was projected by utilizing the ratio of the maximum permitted throughput in WSMR's Title V Operating Air Permit (Ref# 058) to the actual storage capacity at the installation. This ratio was then used to calculate the anticipated throughput based on the expected increase in unleaded fuel capacity under Alternative 2 (375,900 gallons) (see Table 2.4-2).

Table 4.19-3. Estimated Carbon Dioxide Emissions at WSMR from Direct Sources Under Alternative 2

Material	Existing Baseline (tpy)	Increase Factor	Estimated CO_2 Emissions – Alternative 1 (tpy)
Natural Gas	5,282.0	2.4	12,676.8
Fuel Oil	2,684.9	2.4	6,443.8
Propane	41.2	2.4	98.9
Diesel Fuel	5,496.4	2.4	13,191.4
Unleaded Gasoline	15,829.2	Note[1]	65,849.4
		Total	**98,260.3**

1. Increase factor was calculated as: permitted maximum throughput/existing storage capacity (1,618,195 gallons/125,000 gallons) (Ref# 058), which was multiplied by the anticipated fuel storage increase (375,000 gallons).

Under Alternative 2, annual electricity usage would be expected to increase to 308,000 MWh (see Section 4.16, Energy). Therefore, based on the national average CO_2 output for electricity (1,329 pounds of CO_2 per MWh [Ref# 245]), WSMR's electricity use in 2013 would indirectly result in 204,666 tons of CO_2 emitted.

Long-term foreseeable emissions under Alternative 2 are dependent upon unforeseen circumstances such as energy supply and demand, technological developments, energy policy, politics, regulations, and future governmental and private actions. Also, considering that analyses of climate change would require an ROI that encapsulates the entire planet, projecting the future emissions of other applicable foreseeable future actions would not be prudent. Therefore, a precise assessment of cumulative effects is not possible; however, based on the estimates above, WSMR's potential contribution to climate change can be assessed.

As stated for Alternative 1, it is estimated that WSMR currently contributes, both directly and indirectly, about 102,000 tpy of CO_2. Under Alternative 2, WSMR would be expected to contribute an estimated 303,000 tpy of CO_2; about a three-fold increase over the existing condition. Current and projected future emissions at WSMR would represent a small fraction (less than one percent) of the total CO_2 emissions of the state, and would be considered much less impactful in a larger regional context (e.g., the Southwest U.S.) or globally. Based on the projected WSMR population estimate for 2013 (if a HBCT or comparable unit were stationed at WSMR) the WSMR per capita CO_2 emission rate would be 21.2 tons under Alternative 2, compared to the 2005 per capita CO_2 emission rate of 34.3 tons per person. WSMR's per capita CO_2 emissions would be considerably less than the State average in 2005; however, this analysis only utilizes emissions sources with information available at this time. In a general sense, it can be concluded that on a per capita basis, WSMR's contribution to climate change under Alternative 1 would be expected to be at or below the state average.

Increased operations and personnel would represent an increase in CO_2 emissions at WSMR, but in the broader geographic context that climate change should be viewed in, these actions would be required in some location to meet the Army's Purpose and Need for the agency action. Furthermore, WSMR's participation in the Federal government's overall plan to reduce CO_2 emissions, similar to those discussed under Alternative 1, would produce an overall net reduction in GHG emissions from Army and DoD actions in the country.

4.19.2.4 Cultural Resources

The primary cumulative cultural resources impact issues are the potential loss of historic properties, loss of archaeological sites, and the loss of scientific information from altered or destroyed sites due to increased ground disturbance and increased exposure to vandalism. Off-road vehicle maneuvers at WSMR and Fort Bliss have the potential to damage archaeological resources. Archaeological resources have also been lost over time due to regional increased development. WSMR is executing a PA with the ACHP and the SHPO, which would manage historic properties and cultural sites to avoid, reduce, or mitigate adverse effects. Private development associated with regional growth would create greater adverse cumulative effects on cultural resources. Development of private property (i.e., residential communities, retail districts, and industrial facilities) where cultural resources are not protected by Federal law has a higher potential for adversely affecting resources that may have important cultural, scientific, or religious value. The regional cumulative impacts to cultural resources by alternative are discussed in the following sections.

4.19.2.4.1 No Action Alternative

As stated in Section 4.5, under the No Action Alternative all projects involving ground disturbance that could affect historic properties have been or would be cleared by WSMR in accordance with current agreements prior to implementation. The increase in population associated with the EN BN could result in minor or moderate indirect effects from increased visits to sensitive locations. Existing SOPs and management of cultural resources through the existing ICRMP or through a future adopted PA would help protect cultural resources within WSMR and avoid or mitigate adverse impacts due to construction and testing and training activities. In contrast, the regional growth and associated private development (not subject to Federal funding or permits) could potentially cause a cumulative loss of cultural sites or impact the integrity of cultural sites. Therefore, overall cultural sites and integrity within WSMR boundaries would be maintained, while regionally, a decline of sites could occur through future regional growth causing moderate cumulative adverse impacts to cultural resources.

4.19.2.4.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.5, Alternative 1 would have potential for adverse impacts to cultural resources at WSMR. Impacts could be avoided or reduced to less than significant, however, using existing SOPs, BMPs, and implementation of the PA. Regionally, cumulative adverse impacts to cultural resources would be similar to those of the No Action Alternative.

4.19.2.4.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.5, Alternative 2 would have potential for adverse impacts to cultural resources at WSMR. The increase in population associated with the potential future stationing of a HBCT (or comparable unit) could result in minor or moderate indirect effects from increased visits to sensitive locations. Existing SOPs and management of cultural resources through the existing ICRMP or through a future adopted PA would help protect cultural resources within WSMR and avoid or mitigate adverse impacts due to construction and training activities. Impacts could be avoided or reduced to less than significant, however, using existing SOPs, BMPs, and implementation of the PA. Regionally, cumulative adverse impacts to cultural resources would be similar to those of the No Action Alternative.

4.19.2.5 Earth Sciences

Soil erosion is the primary impact to earth sciences resulting from the alternatives, therefore, the CEA discussion focuses on soil erosion. As summarized in Section 3.6, over 50 percent of soils within WSMR are moderately to severely susceptible to wind erosion and over 30 percent of soils within WSMR are moderately to severely susceptible to water erosion. The important cumulative soil erosion impact issues considered in this analysis are: the changes in the transition states of ecological sites in the region due to increased development, oil and gas production, and other military and non-military uses; the potential for wind erosion caused by off-road vehicle maneuvers to generate increased fugitive dust; and the potential for increases in sedimentation from increased water erosion on WSMR land in combination with other sources of sedimentation in down-stream surface waters.

Other projects in the ROI that could combine with potential actions at WSMR to produce cumulative impacts on earth sciences include off-road vehicle maneuvers at Fort Bliss, expansion of oil and gas development on BLM lands outside of WSMR, and general construction and development in the ROI (Table 4.19-1). Other influences that contribute to ground disturbance and reduction in vegetation or surface crusts include ongoing recreational off-road vehicle use, livestock grazing, and drought. Although the soil erosion susceptibility is relatively high, much of the undeveloped land in the ROI, including WSMR, is in relatively intact and stable condition (Ref# 090) with minor areas of degradation as a result of past and current uses (human activity and grazing) and due to weather conditions. Off-road recreational vehicles within the region also contribute to vegetation and soil crusts disturbance, cumulatively increasing soil erosion susceptibility. The regional cumulative impacts to earth sciences by alternative are discussed in the following sections.

4.19.2.5.1 No Action Alternative

As stated in Section 4.6, the No Action Alternative would have minor additional adverse impacts to earth sciences. Potential cumulative impacts to soils are related to the direct impact of missile, bombs, and other debris, and to off-road vehicle travel both for debris recovery and testing/training activities. The areas disturbed by the direct impact of missiles or large pieces of debris is generally very small, requiring only minor raking of the area to mitigate for the potential of increased erosion. Continued disturbance can be expected to increase the amount of bare ground, and uncovered soils are more susceptible to wind and water erosion.

Other activities in the region that have contributed to cumulative impacts on soil, specifically increased erosion, include off-road vehicle maneuvers at Fort Bliss and livestock grazing. Natural processes including weather events, and climatic episodes also contribute to desertification, and subsequent soil erosion. These events, however, cannot be predicted and therefore, cumulative impacts to soil erosion due to weather events and climatic episodes cannot be determined. Naturally windy conditions combine with exposed soils to accelerate erosion and generate high levels of fugitive dust. Activities at WSMR contribute to these regional effects to a minor degree.

4.19.2.5.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As discussed in Section 4.6, the impacts from land use changes and activities proposed in Alternative 1 would range from minor to significant in localized areas. The primary direct impacts would result from proposed construction, development and use of weapons impact areas, vehicle travel on unimproved roads and tank trails, and off-road vehicle maneuver-to-test. Facility development would permanently alter soils in the expanded Main Post and Range Centers; areas disturbed during construction would be covered or restored to retard erosion. Weapons impacts and on-road vehicle travel would disturb soils on a continuous basis, making erosion control difficult, but the size of the total area affected would be small within the context of the 2.2 million acre installation. Impacts from off-road vehicle maneuvers could be more widespread; the severity of the impact would depend on the type of soil in the area affected, the areal extent of the disturbance, and the intensity of use, and they could be significant in localized areas.

Under Alternative 1, the proposed construction, range infrastructure development, and off-road vehicle use at WSMR would contribute to the overall increase in impervious surface, bare ground, disturbance of biological and physical crusts, and consequent erosion. At the regional scale, WSMR's contribution would be relatively minor.

4.19.2.5.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

Impacts from Alternative 2 would be the same as Alternative 1 over most of WSMR. Under this alternative, however, the potential for the future stationing of a HBCT (or comparable unit) would exist along with the designation of the Southeast Multi-Use Area for training. The area within the Southeast Multi-Use Area would experience substantially more intense use for off-road vehicle maneuver training.

The stationing of an Armor Division and other units at Fort Bliss increased the area made available for off-road heavy vehicle training by approximately 352,000 acres to a total of almost 687,000 acres. The Multi-Use Area would expand the extent of the area affected by military training by 120,000 acres or 17 percent. Together, the recent actions at Fort Bliss and the actions at WSMR under Alternative 2 would increase the area used for heavy military off-road vehicle training by 133 percent.

Fort Bliss has adopted an adaptive management approach to monitor the effects of the increased training on its land and develop appropriate mitigation measures. If WSMR also implements a similar program and the installations share the information gained, mitigation measures could reduce the severity of the impacts, but it is not known whether impacts can be reduced to less than significant levels.

4.19.2.6 Biological Resources

The important cumulative biological resources impact issues considered in this analysis are: the changes in ecological conditions in the region and increased desertification due to development, grazing, and other ground-disturbing activities; the reduction and alteration of habitat, leading to reduced diversity of wildlife species; the increased pressures from urbanization, habitat loss or alteration; human activity on species listed as threatened or endangered under the Endangered Species Act; and the loss or alternative of wetlands and arroyo riparian areas.

Other actions in the ROI that could combine with potential actions at WSMR to produce adverse cumulative impacts on biological resources include increased development in rural areas and activities at Fort Bliss (Table 4.19-1). Natural resources in the ROI have been historically impacted by ranching and grazing activities, including the introduction of non-native species such as the oryx and feral horse. Approximately 90,000 acres of WSMR has been historically disturbed by human activities, including development of the Main Post and road infrastructure. Developed areas such as Las Cruces and other communities have undergone the most change, with complete alteration of ecological conditions and habitat and concomitant loss of indigenous vegetation and wildlife. Undeveloped areas of WSMR and adjacent military and public lands have been altered by past and present uses such as grazing, recreational use, and oil and gas exploration. Drought cycles have also contributed to increased desertification of the land in the region (Section 4.19.2.7). Because land use on military installations is substantially less intensive than urban development or agriculture, WSMR and surrounding military lands have been able to maintain relatively high species richness, compared to other parts of the region.

Regionally, cumulative impacts on biological resources are likely to continue incrementally, decreasing available grassland habitat, transitioning ecological states, and increasing desertification. These impacts would result from: inevitable urban growth and land development; increased recreational use of public lands due to population growth; military ground operations; and other smaller actions such as increased oil and gas extraction on BLM lands and future wind energy projects on military and surrounding lands.

Overall, cumulative ecosystem impacts are determined by the effects that occur over the broader regional landscape/ecosystem. While many wildlife species are tolerant of and adaptive to change, moving beyond habitats that are stressed into more desirable habitats, large-scale ecological transitions would incrementally decrease options for relocation and may reduce or eventually eliminate species from their natural or current range. This may result in regional population impacts over the long term. This change would result from both human activities and weather conditions (such as droughts) and be affected by development trends that alter water consumption (from irrigation to municipal use) and the long-term economic viability of a number of current land uses (e.g., livestock operations in the face of drought and diminishing grasslands). Given the international expanse of the Chihuahuan desert ecosystem (encompassing more than 200,000 square miles in the US and Mexico), viable “cells” of sensitive habitats (and their species) would likely survive, but they may be limited to discrete geographic areas specifically identified for preservation. Within the ROI, large areas of relatively undisturbed ecosystems, including locations within WSMR such as SANWR and White Sands National Monument occur which provide viable “cells” of protected habitat, which help buffer adverse cumulative impacts due to regional increases in growth and increased use of public lands. In addition, ongoing research at the JER would also contribute to the overall understanding of desertification and would likely provide valuable insight to sustainable use of public lands and military ranges in desert environments into the future. The regional cumulative impacts to biological resources by alternative are discussed in the following sections.

4.19.2.6.1 No Action Alternative

As stated in Section 4.7, the No Action Alternative would have minor impacts (with adherence to existing facility and program approval processes described in Section 2.5) to biological resources at WSMR. Adverse cumulative impacts to both sensitive species and wetland and arroyo riparian areas is unlikely as existing management plans, ESMPs, MOUs, and regulations would direct future activities outside of areas that could potentially impact these resources. Existing use restrictions and constraints would remain in these areas, reducing adverse cumulative effects within WSMR.

Regionally, military actions at Fort Bliss and Holloman AFB have contributed to cumulative adverse effects on biological resources. Current and future activities require conformance to similar Army and Air Force environmental guidelines, reducing the potential for cumulative adverse impacts. Regional development and increased use of public lands would result in additional incremental adverse impacts to biological resources as additional acreage of biological resources would be lost due to private development and potentially degraded as use of public lands increase. No large scale foreseeable future private developments have been identified, however, a high likelihood exists for further urbanization of Las Cruces and Alamogordo and future oil and gas exploration of BLM lands is also likely. Incremental cumulative impacts to biological resources would be reduced to less than significant as areas surrounding WSMR consist of predominantly Federal landholdings and large ranches. Large acreages of relatively undisturbed ecosystems have been and would continue to be preserved, including locations within WSMR such as designated SNAs, Candidate SNAs, SANWR and White Sands National Monument, which would buffer incremental adverse cumulative impacts to biological resources. Ongoing research at the JER would also contribute to the overall understanding of desertification and likely provide valuable insight to sustainable use of military ranges in desert environments.

4.19.2.6.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.7, Alternative 1 would have moderate to potentially significant impacts to biological resources at WSMR. Unlike the No Action Alternative, guidance would be adopted for project planning and efficient use of land (formalized within the Final Land Use and Airspace Strategy Plan). Future projects within WSMR would be sited to maximize land use efficiency, planned for sustainable range land use, utilize existing infrastructure and taking into consideration environmental constrains. A Land Use and Airspace Strategy Plan approach would likely result in a cumulative reduction of vegetation loss, habitat degradation and habitat fragmentation within WSMR. As in the No Action Alternative, large acreages of relatively undisturbed ecosystems have been and would continue to be preserved, including locations within WSMR such as designated SNAs, Candidate SNAs, SANWR and White Sands National Monument, which would buffer incremental adverse cumulative impacts to biological resources. In addition, ongoing research at the JER would also contribute to the overall understanding of desertification and likely provide valuable insight to sustainable use of military ranges in desert environments.

4.19.2.6.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.7, Alternative 2 would have significant localized adverse impacts to biological resources with the addition of the Southeast Multi-Use Area as a result of ground maneuvers from potential HBCT (or comparable unit) stationing. Although this alternative would result in potentially significant impacts, cumulative impacts would likely be less than significant on a regional scale, and be similar in nature to Alternative 1.

4.19.2.7 Water Resources

The important cumulative water resources impact issues considered in this analysis are: the impacts of increased demand for potable water due to actions at WSMR, in combination with increased population growth in both Las Cruces and Alamogordo; the impact on regional water sources, including groundwater in the Tularosa Basin; and the effect of drought and other climatic variations on water production to meet increased demand.

Past management and use have dramatically affected regional surface and groundwater resources. This includes channelization of surface waters for irrigation, and impoundment of surface waters and groundwater extraction for domestic, commercial, agricultural, and industrial use. Increased water consumption within Alamogordo and portions of Fort Bliss would use groundwater aquifers within the Tularosa Basin, the same regional basin used by WSMR. The population in Las Cruces would receive potable water from different aquifers and surface waters than WSMR, however, increased population at WSMR would likely cause increased population within Las Cruces, therefore, indirectly impacting water consumption. Impacts to water supplies from future growth and increased water consumption within these communities would be offset by water management initiatives (including the water conservation), the implementation of future Alamogordo and Fort Bliss Desalination Plants, and the operation of the Las Cruces water reclamation facility (Table 4.19-1).

The cumulative effect of drought and climatic variations within the ROI was analyzed in the *Fort Bliss, Texas and New Mexico, Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement* (Ref# 037). The analysis concluded precise predictions regarding climatic change are not available for assessing cumulative impacts on water supply in the Fort Bliss planning horizon. Other existing climatic variations, however, such as drought cycles, can lead to greater year-to-year and near-term fluctuations in water availability. As part of the nature of the climate in the ROI, drought cycles are already incorporated in the planning conducted by water resource agencies (Ref# 037). This document also summarizes historical precipitation cycle findings from a study of archaeological tree-ring samples from southern New Mexico, which reconstructed precipitation over a 1,300-year period from the early 600's through 1994. This study showed a wide variability in precipitation levels, ranging from a low of less than four inches in the early 1400's to a high of over 15 inches in the early 1800's, with an average of nine inches; reflecting a pattern of dry and wet periods throughout the study period that has not changed markedly (Ref# 037).

In addition, the USACE conducted a 2009 Draft Potable Water Resources Report to evaluate the existing infrastructure at WSMR to assess the current system conditions, water usage and to recommend any improvements that are required for future WSMR growth including expanding the facilities at the installation in order to accommodate additional EN BN military personnel and from the potential future stationing of a HBCT (or comparable unit). The analysis determined that the total well capacity on the WSMR main post and at Soledad provide enough water supply for the future water demand from the addition of a HBCT, however, some hydraulic upgrades would be necessary. The USACE's recommendation was to provide a 300,000-gallon storage tank to aid hydraulic distribution and also to upgrade water distribution lines.

The regional cumulative impacts to water resources by alternative are discussed in the following sections.

4.19.2.7.1 No Action Alternative

As stated in Section 4.8, the No Action Alternative would have moderate impacts to water resources at WSMR. Moderate regional cumulative adverse impacts would be anticipated for groundwater as regional military and population growth and water demand continues. Historical drawdown of the freshwater aquifers in the Tularosa Basin from WSMR Main Post development and population growth has resulted in past non-sustainable use and decline of water quality due to increasing salinity. The additional water supplies from Soledad Canyon, however, coupled with conservation measures have allowed these historical drawdown of aquifers to become replenished. As the Bolson aquifer yield rates (which primarily servers WSMR Main Post) are projected to handle foreseeable future growth trends, no adverse cumulative impacts are anticipated under the No Action Alternative. In addition, regional growth (outside of WSMR) would likely be accommodated through new and evolving water supply technologies including desalination plants at Alamogordo and El Paso (Fort Bliss). These predictions are supported by the USACE's Potable Water System Analysis.

4.19.2.7.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.8, Alternative 1 would have minor impacts to water resources at WSMR. Regional cumulative impacts to water resources would be similar to those discussed under the No Action Alternative.

4.19.2.7.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.8, Alternative 2 would have moderate impacts to water resources at WSMR. The additional increase of population at WSMR due to Alternative 2 would place additional pressure on local water resources, primarily within the Main Post. The Potable Water System Analysis, however, determined that an adequate supply of existing water resources is available to accommodate increased population levels, without compromising the existing integrity of water resources. Regional cumulative impacts to water resources would be similar to those discussed under Alternative 1.

4.19.2.8 Noise

The important cumulative noise impact issue considered in this analysis is the cumulative increase of noise generating activities, in proximity to sensitive noise receptors.

The other principal activities within the region that contribute to noise are those mission activities occurring at Holloman AFB and at Fort Bliss. Cumulative contribution of noise would occur from aircraft noise resulting in increased exposure to elevated noise levels within the ROI. In addition, construction activities, increased vehicle traffic, and general urbanization associated with population growth and development within the ROI would contribute to overall increase of ambient noise levels. The regional cumulative impacts of noise by alternative are discussed in the following sections.

4.19.2.8.1 No Action Alternative

As stated in Section 4.10, the No Action Alternative would have no to minor impacts to noise conditions within WSMR. Although levels of activities would be anticipated to increase, causing an increase in the occurrence of potential noise generating conditions, no known or foreseeable actions within WSMR or the surrounding region have been identified that would cumulatively cause an adverse cumulative increase in noise or the number of noise receptors within proximity to WSMR.

4.19.2.8.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.10, Alternative 1 would likely have additional minor impacts to noise conditions; in general, noise-producing activities would occur in remote locations where sensitive receptors would not be affected. Sites for the Electro-Optical .50 Caliber Range, the Joint Urban RDT&E Environment, and the Local Training Area have not been identified, and noise impacts from these Specialized Areas would need to be assessed when locations are determined; however, it is unlikely they would be located in areas where noise would combine with other sources to result in larger cumulative impacts. Overall, impacts of Alternative 1 would be similar to the No Action Alternative and unlikely to contribute to regional cumulative impacts in noise conditions.

4.19.2.8.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.10, Noise, Alternative 2 would have minor impacts to noise conditions within and surrounding WSMR. The regional cumulative adverse impacts would be similar to those of Alternative 1 and the No Action Alternative.

4.19.2.9 Transportation

The important cumulative impact issues associated with transportation considered in this analysis is the increased population growth on transportation, including the conditions of roads and level of service. Soldier and civilian growth within WSMR and increased of testing and training activities at WSMR would increase the levels of vehicles within WSMR (both POV and military), and increase the potential for temporary road closures. As mentioned in Section 4.13.1.2, the main cause of traffic impacts at WSMR is from increased population levels and resulting increased usage of POVs. Potential impacts mainly consist of increased traffic congestion and delays and roadway hazards to Main Post roads and nearby regional highways (e.g., US 70, US 54, and US 380). Regional population growth (including growth non-related to WSMR) would cause cumulative adverse impacts to traffic congestion. Increases in population within surrounding communities would likely increase POV usage along US 70 (in addition to usage caused by WSMR-related vehicle trips) as visits to Federal lands and parks (such as White Sands National Monument) would also increase. Outside of the installation, New Mexico DOT projects relevant to the WSMR region include the reconstruction and expansion of I-10, between Las Cruces and the Texas State line; improvements to US 54, between Tularosa and Vaughn; and improvements to Route 26, between Deming and Hatch (Ref# 157). As discussed in Section 4.13, these projects are being undertaken by the State to address the growing traffic volumes by improving the flow of traffic and safety hazards in the region. The only transportation-related project identified within WSMR is the planned War Road revitalization project (Ref# 233). In anticipation of the Grow the Force initiative, this project would provide improvements along a 23-mile paved road (20 miles within Fort Bliss and three miles within WSMR), including repair and replacement of drainage facilities and traffic devices. This project is expected to provide improved traffic safety, especially for commuters traveling between El Paso and the Main Post. The regional cumulative impacts to transportation by alternative are discussed in the following sections.

4.19.2.9.1 No Action Alternative

As stated in Section 4.13, the No Action Alternative could cause significant, but mitigable, impacts to traffic during peak commuting hours. A potentially significant cumulative adverse impact could be anticipated for transportation as traffic congestion would increase within the Main Post due to WSMR population increases caused by EN BN stationing, however overall regional population growth and increases in traffic would be minor.

4.19.2.9.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.13, the Alternative 1 would have minor to moderate impacts to transportation. Traffic conditions within the Main Post would be similar to the No Action Alternative. Any minor increases in population over time as WSMR expands its testing and training capabilities with redesignation of land uses within the Land Use and Airspace Strategy Plan would not significantly contribute to adverse cumulative transportation impacts. In addition, the improved trail system proposed within Alternative 1 would improve traffic circulation within WSMR and reduce the need for WSMR mission-related vehicles travelling on roads outside the installation boundaries, further offsetting adverse impacts. The 25 percent projected increase of roadblocks due to increased training would be temporary and would not result in cumulative adverse transportation impacts, provided the frequency and duration of roadblocks and public notification of closures are properly implemented, as outlined in the New Mexico DOT MOA.

4.19.2.9.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.13, Alternative 2 would have significant impacts to traffic and transportation. WSMR would finalize its traffic study and implement measures to address traffic associated with the potential future stationing of a HBCT (or comparable unit). This would likely include the construction or alteration of internal intersections serving the Future Development Area, expansion of Access Control Points, or working with the New Mexico DOT to implement the expansion of local highways. These mitigation measures would aid in offsetting cumulative adverse impacts caused by WSMR growth and WSMR-induced regional population growth. Similar to Alternative 1, the 25 percent projected increase of roadblocks due to increased training would be temporary and would not result in cumulative adverse transportation impacts, provided the frequency and duration of roadblocks and public notification of closures are properly implemented, as outlined in the New Mexico DOT MOA.

4.19.2.10 Socioeconomic Resources

The primary cumulative socioeconomic issues considered in this analysis are: the impacts of population growth on housing, schools, community services (including law enforcement, fire services, and medical services), and quality of life. As regional growth is expected to occur primarily within the Las Cruces area and southern Doña Ana County (adjacent areas to El Paso and Fort Bliss) (Table 4.19-1), this discussion primarily focuses on the potential for regional adverse cumulative impacts within Doña Ana County.

Doña Ana County has grown significantly over the last half century from approximately 100,000 in 1990 to approximately 175,000 in 2000. Most of the growth has taken place in the central and southern portions of the county, especially around the City of Las Cruces (population 75,000) (Ref# 204). Population growth has been primarily due to natural increase rather than net in-migration. In-migration increased between 2000 and 2006, and the City has the potential for continued growth due to increasing numbers of retirees, growing employment opportunities and increasing enrollment at New Mexico State University. Median age and educational attainment at the City, County, and State levels increased between 2000 and 2006. Changes in the age and other characteristics of residents can influence the types of public services that would be required in the future. A more elderly population tends to increase demands for health and alternative transportation system (Ref# 204).

Between 2000 and 2006, residential building activity within Las Cruces equaled or exceeded population growth (depending upon data source) (Ref# 204). The number of single-family units permitted in 2005 exceeded 1,400, which was 75 percent over prior years. This growth, however, slowed between 2006 and 2007, which was also reflected in the home sales market.

During the last century, El Paso grew rapidly, increasing from a population of 16,000 to over 560,000 (Ref# 204). In addition to impacts to Doña Ana population from WSMR expansion, it is likely that the planned expansion at Fort Bliss would have an impact on population in southern Doña Ana County (Ref# 204). The regional cumulative impacts to socioeconomic resources by alternative are discussed in the following sections.

4.19.2.10.1 No Action Alternative

As stated in Section 4.14 the No Action Alternative would have minor impacts to socioeconomic resources on WSMR. Moderate regional cumulative adverse impacts would be anticipated for socioeconomic resources. The need for housing in the community and at WSMR for Soldiers and their Families, and for civilians would increase; however, this would be offset by an existing surplus of housing within the region, including WSMR on-post housing. Public services, including law enforcement and fire services, and quality of life measures such as acreage for public parks, are already strained and below target levels in Doña Ana County. Increasing baseline populations and Fort Bliss and WSMR-induced population increases could further strain these services in combination with regional population growth trends. Schools are anticipated to experience minor cumulative impacts as additional school construction within Las Cruces is anticipated between FY 2009-2011 (Table 4.19-1). Direct and indirect population effects from the actions at WSMR in combination with regional population growth trends would stress the community's ability to maintain existing ratios pertinent to staffing and facilities required in law enforcement, fire protection, and medical services as described in Section 4.14. The cumulative impacts to community services may be significant although mitigable to less than significant with adequate planning and recruitment on the part of towns and counties. The regional economy would experience cumulative beneficial growth as a result of the expansion of WSMR's mission and population.

The economic activity stimulated by the changes at WSMR would have beneficial effects that could improve quality of life by increasing job opportunities, income and tax base. As competition for housing, utilities, and services increases due to population growth, however, costs can also be expected to increase. In addition, increased development and urbanization of the Las Cruces and El Paso region due to growth at WSMR and Fort Bliss in combination with regional population growth would affect living conditions in a variety of ways, ranging from physical changes in the environment to potential longer commuting times.

4.19.2.10.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.14, Alternative 1 would have moderate impacts to socioeconomic resources on WSMR. The types of regional cumulative impacts under Alternative 1 would be similar to those discussed for the No Action Alternative.

4.19.2.10.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

The intensity of cumulative adverse impacts under Alternative 2 would be increased, compared to the No Action Alternative and Alternative 1 due to the additional Soldier and Family populations associated with the potential future stationing of a HBCT (or comparable unit). Although an undetermined timeframe, the arrival of a HBCT could cause a shortage of 600 available and acceptable housing units. The cumulative expansion of Ft Bliss, Holloman and WSMR, if a future HBCT were to be stationed at WSMR would likely reduce the availability of rentable housing within the communities of El Paso, Las Cruces, and Alamogordo and the smaller communities surrounding. The reduction in affordable housing would cause a significant cumulative adverse impact on low-income populations if these populations were priced out of affordable housing. In addition, new school construction would potentially alleviate strains caused by the projected large increases in students if a HBCT (or comparable unit) were to be stationed in the future. The additional WSMR, Fort Bliss and Holloman population growth and population growth within surrounding communities would contribute to potentially adverse impacts on the community's ability to meet staffing and increased facilities required in law enforcement, fire protection, and medical services to maintain existing ratios as described under the No Action Alternative. Overall significance of cumulative adverse impacts would be reduced through Federal subsidies to local schools.

4.19.2.11 Energy

Cumulative energy impacts consider whether regional energy supplies would be incrementally impacted, either through development of new facilities and regional development trends.

The main regional cumulative action that could affect energy demand would be increased population growth within the region, including those associated with growth actions at Fort Bliss. As the regional energy demands increase, regional energy supply could experience cumulative adverse impacts through a reduction in supply or increase of energy cost. The demand increase, however, would be offset through a combination of energy conservation measures, upgrades to the regional energy transmission system or new electric transmission lines, and alternative energy sources such as solar and wind (Table 4.19-1). The regional cumulative impacts to transportation by alternative are discussed in the following sections.

4.19.2.11.1 No Action Alternative

As stated in Section 4.16, the No Action Alternative would have moderate impacts to energy, largely due to the high energy demand associated with Directed Energy Test Sites and HELSTF. Regional population growth would increase the demand for energy sources; however, regional capacities are adequate to meet the increased demand, and conservation measures and future additional alternative energy sources would help offset impacts associated with population growth.

4.19.2.11.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.16 (Energy), energy use under Alternative 1 would be similar to the No Action Alternative because only minor increases in the population at WSMR would occur. Both WSMR and regional energy conservation measures, in addition to the regional development of alternative energy sources (including wind and solar projects discussed in Table 4.19-1), would help reduce cumulative impacts to less than significant. In addition, the proposed SunZia Southwest Transmission Project would reduce energy supply impacts resulting from increasing regional growth.

4.19.2.11.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.16 Alternative 2 would have significant but mitigable impacts on energy distribution. Significant cumulative impacts would be avoided through similar conservation measures described for Alternative 1.

4.19.2.12 Wildfire Management

The important cumulative wildfire management issues considered in this analysis is whether or not the risk of fire start or property damage would be incrementally impacted by development of new facilities, by increased testing and training activities or by regional development trends.

Beyond the activities described in Section 4.18, the main regional cumulative action that could affect wildfire management would be increased population growth within the region. This would cumulatively increase the chance of unintentional fire starts due to increased use of public lands and increased presence of ignition sources such as catalytic converters on vehicles and discarded cigarettes. In addition, increased housing and development within the region would further encroach upon undeveloped lands. Army actions at Fort Bliss would also cause regional population growth and increased training activities, contributing to wildfire management conditions on a regional scale. Historically, the start and spread of fire had less need for human intervention to extinguish and contain wildfires; however, with increasing regional development these unintentional fire starts have increased potential to destroy private properties. Climatic conditions such as drought could also cause a cumulative adverse impact to wildfire management. As stated in Section 4.19.2.7, however, precise predictions regarding climatic change are not available which can be used to assess cumulative impacts of drought as drought cycles common throughout historical records. Regional Federal and State partnerships as discussed in Section 3.18 have helped manage unintentional fire start conditions and spread of fire through time of use restrictions and through prescribed burns.

4.19.2.12.1 No Action Alternative

As stated in Section 4.18, the No Action Alternative would have minor impacts on wildfire management. Likelihood of increased wildfires would be small in the region, as existing wildfire management practices would continue to aid in reducing their causes. As previously stated, fire is a natural part of most Chihuahuan desert ecosystems, and most native species and habitats have adapted to fire. Human management and activities within the region has both suppressed natural fire regimes (resulting in an increase of fuel loading) and caused fire starts as described in Section 4.18. It is likely that increased human presence in the region, development of adjacent lands, and increased activities at WSMR and surrounding military installations would continue to contribute for the potential of wildland fire. Existing fire management strategies, limitation on training and testing activities in areas vulnerable to unplanned fire starts (or when the spread of fire is high) would reduce overall impacts to wildland fire.

4.19.2.12.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in Section 4.18, the potential for unplanned fire starts would be greater under Alternative 1 compared to the No Action Alternative, resulting in potentially moderate impacts. Cumulative impacts would be similar to the No Action Alternative.

4.19.2.12.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in Section 4.18, Alternative 2 would have less than significant impacts on wildfire management, although the potential for unplanned fire starts would be greater in the Southeast Multi-Use Area compared to the No Action Alternative and Alternative 1. Cumulative impacts would be similar to the No Action Alternative and Alternative 1.

4.19.2.12.4 Frequencies

The important cumulative frequency impact issues considered in this analysis are whether or not the interference or disruption of frequencies within or adjacent to WSMR would be incrementally impacts by the increased testing and training at WSMR resulting from the Proposed Action.

Beyond the WSMR activities described in 4.17, the main cumulative action that could affect frequency transmission within WSMR and the surrounding areas would be increased activities at both Fort Bliss and Holloman AFB. The increased occurrences of frequency-emitting activities at WSMR (such as BCT Modernization testing in combination with future UAS training at Holloman AFB) and increased activities at Fort Bliss could incrementally affect frequency transmission by disrupting or interfering with user signals. Frequency disruption to private users would be minimal as lands surrounding WSMR are sparsely populated. WSMR has a robust program for managing frequency use that is dictated by, and conforms to, all Federal, DoD, and Army requirements and guidelines. New programs or facilities that would emit special radio frequencies would continue to coordinate with the WSMR Frequency Manager to determine conflicts with existing or planned radio frequency operations. Both Fort Bliss and Holloman

AFB would adhere to similar DoD requirements and increased coordination among installations would be required.

4.19.2.12.4.1 No Action Alternative

As stated in 4.17, the No Action Alternative would have minor impacts to frequencies. A wide range of frequencies would continue to be used to support military missions in the region and existing procedures to coordinate their use would continue to be followed. Additional frequency coordination may be required due to military activities at Holloman AFB and Fort Bliss.

4.19.2.12.4.2 Alternative 1 - Implement Land Use Changes and Enhanced Test Capabilities

As stated in 4.17, Alternative 1 would have minor impacts to frequencies due to increase in missions, particularly those that are centered on network-centric operations and advanced communication systems, such as BCT Modernization and JLENS. Minor to moderate cumulative adverse impact to frequencies would be anticipated based on the projected increase in regional population in Alamogordo and Las Cruces, increasing the number and types of frequency uses or possible encroachment in the area. There would also be potential mission conflicts between WSMR and Holloman AFB that would require additional coordination and scheduling measures.

4.19.2.12.4.3 Alternative 2 - Implement Alternative 1 Plus Military Unit Stationing and Training Capability

As stated in 4.17, Alternative 2 would also have minor impacts to frequencies, primarily due to its Alternative 1 component. The additional maneuver training that would occur under Alternative 2 in the Southeast Multi-Use Area would require increased radio communication during training events, but this frequency use would be considered minor compared to the frequency use under Alternative 1 activities.

4.20 Mitigation Summary

Most potential adverse impacts identified in this EIS would be either negligible or could be avoided through adherence to existing WSMR practices and Army regulations during the construction of facilities and implementation of test and training activities. Unavoidable adverse impacts, however, would result from implementation of the Proposed Action. Impacts and potential mitigation measures associated with the Preferred Alternative are presented in Table 4.20-1 below.

Table 4.20-1. Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative

Resource Area	Impacts of the Preferred Alternative	Potential Mitigation Measures
Land Use and Aesthetics	Changes to land use, activities and levels of use within WSMR would have a negligible effect on adjacent land uses and no greater than minor impacts on viewsheds. The route of the proposed North-South tank trail could impinge on either the White Sands National Monument or the SANWR. This could result in significant land use conflicts.	WSMR would coordinate with the applicable land management agency(s) to develop mutually acceptable provisions for the location, construction practices, maintenance and operation of the North-South tank trail where it traverses non-WSMR land.
Airspace	Increases in airspace activity at WSMR, such as use of UASs and the JLENS program, would require deconfliction with other military airspace users, such as Holloman AFB. However, existing airspace management processes would accommodate these activities. There would be negligible impact to civilian air space use when compared to the No Action Alternative.	No mitigation measures would be warranted.
Air Quality	The increase in personnel and mission activities under the Alternative 1 would result in emissions of priority pollutants within WSMR's existing air permit limits. The increased use of land for off-road maneuver (Alternative 1) would also increase the potential for airborne dust (particulate matter), particularly during high-wind events.	Effects on ambient air quality from the Proposed Actions would be minor. Existing management programs are adequate to mitigate adverse effects and protect air quality. Fugitive dust emissions from soil disturbance would be minimized through existing WSMR construction BMPs (Ref #155). During site preparation or other earth-moving activities, BMPs would be implemented to minimize fugitive dust emissions, such as wetting soil surfaces, covering truckloads of dirt with tarps to reduce windborne dust, and properly maintaining equipment. Furthermore, WSMR intends to follow erosion control where practical and when it is not in conflict with the mission of WSMR, as well as the recommendations developed under the WSMR Particulate Matter Control Plan. WSMR would also finalize a revised installation-wide air permit that encompasses all new, regulated stationary air-emission sources.

Table 4.20-1. Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative (continued)

Resource Area	Impacts of the Preferred Alternative	Potential Mitigation Measures
Cultural Resources	The increase in facility construction, specialized areas, test missions, and off-road maneuver activity would increase the potential for inadvertent harm or destruction of cultural resources. However, existing WSMR policies, including the 1985 PMOA and the 1988 Historic Preservation Plan, along with the ICRMP would ensure protection of cultural resources.	WSMR would implement the Programmatic Agreement between the Army and the SHPO as a mitigation measure that would govern future actions. WMSR would also abide by its decision to ensure that any areas authorized for off-road maneuver or intensive ground operations would be surveyed and mitigated for archeological and historic properties as necessary. WSMR would request additional resources (funding and manpower) to manage cultural resources surveys and mitigation measures as necessary relative to the degree of anticipated ground disturbance and construction.
Earth Sciences	The increase in facility construction, specialized areas, test missions, and off-road maneuver activity would increase disturbance and compaction of soils. Under Alternative 1, off-road activity would result in moderate to significant impacts to soils.	Due to the variability in timing, duration, frequency, and location of off-road vehicle maneuvers, WSMR would use adaptive management for identifying mitigation measures to reduce the impacts to soils. Mitigative strategies could include using a combination of approaches such as applying soil stabilizers, using windbreaks, and rotating areas authorized for off-road use. WSMR would develop workplans for mitigating impacts to soils and request Army funding to implement these plans. Also, WSMR would request funding to complete soil surveys of applicable portions of the installation. This information would be a necessary foundation for effective adaptive management and siting decisions.

Table 4.20-1. Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative (continued)

Resource Area	Impacts of the Preferred Alternative	Potential Mitigation Measures
Biological Resources	The potential for significant adverse biological impacts primarily exists from the increased land available for off-road testing and training activity under Alternative 1.	WSMR would monitor areas used for ground disturbing activities and develop strategies to rehabilitate areas where significant vegetation is lost due to human activities. WSMR's goal would be to limit man-made vegetation loss to less than 30 percent in areas approved for ground disturbing activities. Methods of achieving this goal could include intensive habitat restoration activities (e.g., stabilizing soils, reseeding, etc.), timing and rotating the locations of off-road vehicle use to allow for proper restoration to succeed, and limiting activities to highly localized areas so as to continually affect the same areas at a rate of less than 30 percent of the total vegetation cover. In order to achieve this, a heavy emphasis would be placed on utilizing an adaptive management approach that allows for variation in environmental conditions and an informed response to such variation. As part of using adaptive management, WSMR would then be able to determine what type and location of specific mitigation measures are needed to protect or restore biological resources through biological monitoring of lands subject to off-road vehicle use. WSMR would request funding for additional monitoring studies and for INRMP and ITAM projects to reduce impacts of testing and training throughout the 1,825,000 acres having the potential for off-road activities. WSMR would request funding for and implement an update to its INRMP to reflect the proposed changes in land use and activities. WSMR would coordinate with the NMDGF and USFWS to ensure that the construction and operation of the proposed tank trail would not adversely affect population of White Sands pupfish. Mitigation measures would include re-routing the tank trail to avoid Limited Use and Essential pupfish habitat (an option that seems feasible based on the local terrain) or working with NMDGF and USFWS to develop BMPs to prevent or limit sedimentation of streams or other adverse impacts where these areas cannot be avoided.

Table 4.20-1. Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative (continued)

Resource Area	Impacts of the Preferred Alternative	Potential Mitigation Measures
Water Resources	Off-road activities could have many detrimental effects to water resources, such as dust generation and sedimentation from accelerated erosion of existing intermittent streams and arroyos.	WSMR should create and employ an adaptive management plan for recovery of disturbed areas. Maintaining soil stability would mitigate the indirect effects of dust generation and sedimentation resulting from accelerated erosion of existing intermittent streams and arroyos. WSMR would also coordinate with the White Sands National Monument on any tank trail or road improvements in the vicinity of the monument to prevent flash flood events from washing unnatural debris into the Monument. WSMR has established BMPs based on land use classification to provide guidelines for avoiding significant water resource impacts from existing known actions and from future undefined actions. These BMPs are treated as guidelines for project planning and contain principals in avoiding impacts during the planning or construction process or through facilitating restoration activities following construction or use. If potential and recommended management actions are followed for future activities, then no regulatory or administrative mitigation measures would be warranted.
Safety	The increase in facility construction, specialized areas, test missions, and off-road maneuver activity would increase the potential for accidents at WSMR. WSMR's existing safety program would be sufficient to address most new activities or increases in missions.	WSMR would develop new SOPs and directives to address safety components of off-road activities. In particular, an SOP would be needed to address potential adverse impacts to visibility on public and military roads from dust created from tactical vehicles conducting off-road maneuvers. WSMR would continue to examine the risks associated with specific test and training activities, tailor operating conditions accordingly, implement evacuations and impose access restrictions as necessary, and cease any operations that would pose an imminent danger to human health and safety.
Noise	The increase in facility construction, specialized areas, test missions, and off-road maneuver activity would increase the potential for minor noise impacts. Mission activities would be conducted in relatively remote locations where receptors would not be affected by their noise.	No mitigation measures would be warranted.
Hazardous Materials and Waste	Based on the anticipated solid waste increase under Alternative 1 from the expected increase in personnel, impacts to the Otero-Lincoln County Landfill would be minor.	No mitigation measures would be warranted.

Table 4.20-1. Summary of Environmental Impacts and Potential Mitigation Measures for the Preferred Alternative (continued)

Resource Area	Impacts of the Preferred Alternative	Potential Mitigation Measures
Facilities and Infrastructure	The increase in population under Alternative 1 would result in minor impacts to the installation's potable water, wastewater, and telephone systems. The increase in off-road activity or ground operations under Alternative 1 could damage buried utility lines if not protected adequately.	To protect existing buried utilities, WSMR would request funding for and construct hardened crossings over existing gas lines in areas designated for off-road maneuver.
Transportation	The increase in population under Alternative 1 would result in minor traffic impacts at the gates and along local highways.	No mitigation measures would be warranted.
Socioeconomics	The increase in construction and population under Alternative 1 would result in beneficial impacts in additional jobs and revenue within the ROI. Minor impacts could occur in terms of increased demand for housing, schools, community services, and recreational facilities.	No mitigation measures would be warranted.
Environmental Justice	Alternative 1 would not have a disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.	No mitigation measures would be warranted.
Energy	The increase in construction and population under Alternative 1 would result in minor additional energy demand.	No mitigation measures would be warranted.
Frequencies	The increase in mission activity under the Proposed Action would increase the types and durations of military frequency use in the region. However, existing regulatory requirements and WSMR policies should ensure that impacts are no greater than moderate.	No mitigation measures would be warranted.
Wildland Fire	The increase in mission activity under Alternative 1 would increase the potential for wildland fire at WSMR. However, existing WSMR policies should ensure that impacts are no greater than moderate.	No mitigation measures would be warranted.

4.21 Unavoidable Adverse Environmental Impacts

This section summarizes adverse impacts in Chapter 4 that are unavoidable because mitigation is either not possible or not practical. Probable unavoidable impacts that would result from the implementation of the alternatives include:

- Ground disturbance during construction, off-road vehicle maneuvers, and testing activities with changes/losses in vegetation cover types and associated wildlife habitat.
- Erosion of soils during off-road vehicle maneuvers and testing activities, with short-term air quality degradation from dust generation. It would not be feasible to employ erosion control measures and fugitive dust control measures throughout the entire extent of maneuver and test areas.
- Loss of undeveloped land and wildlife habitat for the construction of new facilities, housing, roads, tank trails, and infrastructure.
- Impacts to plants and animals, including sensitive species, are not expected to cause population-level adverse impacts.
- Potential loss of undetected archaeological resources in testing and training areas.
- Increase in noise exposure in areas adjacent to testing and training areas.
- Increased development in Doña Ana, Otero, and El Paso counties due to increased population, both direct and induced by the economic activity associated with the actions at WSMR.
- Increased urbanization, reduction in open space, and visual character changes would be likely unavoidable results of increased development.
- Increase of evacuations in the Northern and Western Call-Up Areas due to increased testing and training activities. Increased frequency of US 70, US 54, and US 380 closures due to increased testing and training activities. These increases, however, would not be in excess of current agreements.
- Increase in utilities use (excluding potable water, which is derived from onsite wells), wastewater treatment, solid waste disposal, and energy, which could require additional infrastructure off-post or on-post by service providers.

4.22 Irreversible or Irretrievable Commitments of Resources

All action alternatives include the construction or improvement of facilities and infrastructure, which would involve the irretrievable commitment of construction materials and petroleum-based fuels and chemicals. Transportation and training activities (ground-based, aircraft-based, and projectile-based) would also require the irretrievable commitment of petroleum products throughout the lifespan of operations at WSMR. Facilities, infrastructure, and testing would require electric power which would cause the irretrievable loss of non-renewable fuel resources (coal, natural gas, oil, and nuclear).

Facilities and infrastructure construction on undeveloped land would be considered an irretrievable loss of that land.

Ground disturbances during off-road vehicle maneuvers would cause losses and conversions of vegetation cover types as well as changes in landform and topography. Though these changes are not considered completely irreversible, the length of time required to recover soil, vegetation, and ultimately, wildlife habitat, could be long enough for the impact to be considered nearly irreversible.

Water demands would increase under all of the alternatives, causing the irretrievable loss of groundwater resources in aquifers such as the Rio Grande, Tularosa, and Bolson (Ref# 116, 117).

It would be considered an irretrievable loss if historic resources, which may be eligible for listing in the National Register of Historic Places, were inadvertently lost, stolen, or vandalized during construction, testing, or training activities.

Finally, the construction and operation of additional facilities, and testing and training areas would require the irretrievable commitment of fiscal resources by the Army. These activities and facilities, however, are considered a necessary investment for the Nation's security.

4.23 Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity

The expanded use of land for facilities, testing, and training activities could result in a long-term reduction in the productivity of that land for other uses. All land proposed for use is under Army control and is not accessible to the general public or other entities. Therefore, it would be highly unlikely that these lands would be placed into the public domain in the near future and, from the Army's perspective, the proposed land use changes are considered most appropriate for military uses.

The WSMR mission expansion would likely accelerate local growth, development, and urbanization. Development from the proposed WSMR expansion and associated economic development within the ROI for population growth and housing would commit land to more urban uses, affecting long-term options for land use. Impacts from development may be most notable in more rural areas such as southern Doña Ana County. More urban areas may experience an increase in overall development; however, long-term impacts in these locales would likely consist of a greater strain on existing community services, such as local school systems in the Las Cruces area.

WSMR derives its water from onsite wells, principally drawing from the Rio Grande, Tularosa Basin, and Bolson groundwater aquifers (Ref# 116, 117). Over the long term, water withdrawals to support WSMR functions could reduce water availability for other, non-military users in the area.

5.0 LIST OF PREPARERS

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Name	**Title**	**Education**	**Role in the EIS**	**Description of Experience**
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Howard B. Rock	Senior Analyst	BA., Biology	DOPAA-operations, RF, Airspace	34 years in NEPA analysis of military operations.
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Vanessa Williford	Environmental Analyst	BS., Resource and Environmental Studies	Energy Demand, assisted with Soils, supported prime on Water Resources	5 years experience in natural resources management and NEPA analysis for Federal agencies.
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6.0 DISTRIBUTION LIST

The following list of individuals and entities received a notice that the DEIS was available for comment. Additionally, hardcopies of the DEIS were provided to libraries and public repositories listed and a request was made that the DEIS be made available for public review at these locations. Notifications of the availability of the FEIS will also be made to these individuals and entities. To respect individuals' privacy concerns, names and addresses of private individuals who requested copies of the DEIS have not been included in this distribution list.

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8.0 AGENCIES AND PERSONS CONTACTED

Name, Title	Affiliation	Resource Area Contribution
Robert Andreoli, Environmental Scientist	WSMR	Air quality
Monte Marlin, Public Affairs Officer	WSMR	Public Affairs and community involvement
Samuel Sanchez	WSMR	Base Transformation Office
Walter Christensen, NEPA Planner	Fort Bliss	Cumulative impacts
Nicole Sikula, Environmental Scientist	WSMR	ITAM/RTLA programs
Jerry Tyree, Program Manager	WSMR	FCS program
Jose Gallagos, Chief, Environmental Division	WSMR	Facility planning, tank trails
Jim Bowman	WSMR	Archeology, cultural resources
Junior Kerns	WSMR	Natural resources
Debbie Nethers, ITAM Coordinator	WSMR	ITAM program
Mike Parsons, Range Operation	WSMR	Range operations
Patsy Manzanares-Gomez	WSMR	Schools, socioeconomics
Patrick Morrow, Wildlife Biologist	WSMR	Biological resources
Trish Griffin, Biologist	WSMR	Biological resources
Cristina Rodden, Biologist	WSMR	Biological resources, pest management
Jim Sykes, WSMR Chief of Police	WSMR	Emergency services
Robert Valles, WSMR Fire Chief	WSMR	Wildland fire management
Maria Cueto, POL Logistics	WSMR	Hazardous materials and waste
Wes Hoffman	USACE	Utilities, water and wastewater
Dave Anderson, Soil Scientist	WSMR	Earth sciences
Mike Apadocca, Spectrum Manager	WSMR	Frequency
Darrin Loken, Chief, Radio Section	WSMR	Frequency
Frank Covington, Project Manager	USACE	Infrastructure, transportation
Bob Brennan, Airspace Management	WSMR	Airspace
Bobby Myers, Hydrologist/Geologist	WSMR	Earth sciences, water resources

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9.0 ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AAF	Army Airfield
AAQS	Ambient Air Quality Standards
ABL	Air-to-Air Airborne Laser
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
AEC	Army Environmental Command
AFB	Air Force Base
AFC	Area Frequency Coordinator
AGL	Above Ground Level
AHPA	Archeological and Historic Preservation Act
AIRFA	American Indian Religions Freedom Act
AMR	American Medical Response
AOC	Area of Concern
AR	Army Regulation
ARPA	Archeological Resources Protection Act
ATACMS	Army Tactical Missile System
ATC	air traffic control
ATCAA	Air Traffic Control Assigned Airspace
ATEC	Army Test and Evaluation Command
AT/FP	anti-terrorism/force protection
ATL	Advanced Tactical Laser
ATV	all-terrain vehicle
BA	Biological Assessment
BCT	Brigade Combat Team
BLM	Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CDP	Census Designated Places
CFH	cubic feet per hour
CFR	Code of Federal Regulations

Acronym	Definition
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRCC	Cox Range Control Center
CY	Calendar Year
dB	decibel
dBA	A – weighted decibels
dBC	C – weighted decibels
dBP	peak sound pressure level of impulse noise in decibels
DEIS	Draft Environmental Impact Statement
DNL	day-night average sound level
DoD	Department of Defense
DOT	Department of Transportation
DSERTS	Defense Site Environmental Restoration Tracking System
DTC	Developmental Test Command
DTRA	Defense Threat Reduction Agency
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMRE	Electro-Magnetic Radiation Effect
EMU	Ecological Management Unit
EN BN	Engineer Battalion
E.O.	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEC	El Paso Electric Company
ESMP	Endangered Species Management Plan
ETA	Environmental Test Area
FAA	Federal Aviation Administration
FCS	Future Combat Systems
FEIS	Final Environmental Impact Statement
FIX	Firing-In-Extension
FL	Flight Level
FMA	Fire Management Area
FMZ	Fire Management Zone
FY	Fiscal Year
GHG	greenhouse gas

Acronym	Definition
GIS	Geographic Information System
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
HAP	hazardous air pollutant
HAZMAT	Hazardous Materials
HBCT	Heavy Brigade Combat Team
HELSTF	High Energy Laser Systems Test Facility
HF/DF	hydrogen fluoride/deuterium fluoride
HMMC	Hazardous Materials Minimization Center
HMMWV	High Mobility Multi-Purpose Wheeled Vehicles
HTA	Hazardous Test Area
HUC	Hydrologic Unit Code
Hz	hertz
IAA	Interagency Agreement
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
IED	improvised explosive device
IED-D	improvised explosive device defeat
IMCOM	Installation Management Command
INRMP	Integrated Natural Resources Management Plan
IPED	Institute for Policy and Economic Development
IPM	Integrated Pest Management
ISO	International Organization of Standardization
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JER	Jornada Experimental Range
JLENS	Joint Land Attack Cruise Missile Defense Extended Netted Sensor
JP	Jet Propellant
J-UCAS	Joint Unmanned Combat Air Systems
km	kilometer
km2d	square kilometer-days
kV	kilovolt
kVA	kilovolt-ampere
LADAR	laser detection and ranging
LC	launch complex

Acronym	Definition
LMTV	Light Medium Tactical Vehicle
LOS	Level of Service
LUPZ	Land Use Planning Zone
LUT	Limited User Tests
MBTA	Migratory Bird Treaty Act
MEADS	Medium Extended Air Defense System
mgd	million gallons per day
MHz	megahertz
mi	mile
mi2d	square mile-days
mgd	million gallons per day
mg/L	milligrams per liter
MLRA	major land resource area
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRTFB	Major Range and Test Facility Base
MSL	mean sea level
MTV	Modular Test Vehicle
MU	Map Units
MW	megawatt
MWh	megawatt-hour
MCFH	million cubic feet per hour
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection Act
NASA	National Aeronautics and Space Administration
NAVAID	navigational aid(s)
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutant
NHPA	National Historic Preservation Act
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NMSU	New Mexico State University
NMWQCC	New Mexico Water Quality Control Commission
NO_x	Nitrogen Oxides

Acronym	**Definition**
NOI	Notice of Intent
NOTAM	Notice to Airmen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NRTF	National Radar Test Facility
NWR	National Wildlife Refuge
OBOD	Open Burn–Open Detonation
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCB	Polychlorinated Biphenyl
PEIS	Programmatic Environmental Impact Statement
PHETS	Permanent Height Explosive Test Site
PM	Particulate Matter
PMOA	Programmatic Memorandum of Agreement
POL	Petroleum, oil, and lubricant
POV	privately owned vehicle
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCMP	Range Complex Master Plan
RCRA	Resource Conservation and Recovery Act
RDT&E	Research, Development, Testing and Evaluation
REC	Record of Environmental Consideration
RF	radio frequency
RFM	Range Frequency Manager
RPMP	Real Property Master Plan
ROD	Record of Decision
ROI	Region of Influence
SANWR	San Andres National Wildlife Refuge
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SDZ	Surface Danger Zone
SEIS	Supplemental Environmental Impact Statement
SEL	Sound Exposure Level

Acronym	Definition
s.f.	square feet
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMR	Small Missile Range
SNA	Special Natural Area
SO_x	Sulfur Oxides
SOC	Species of Concern
SOP	Standard Operating Procedure
SPL	Sound Pressure Level
STX	situational training exercises
SUA	Special Use Airspace
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
s.y.	square yards
TC	Training Circular
TCPs	traditional cultural properties
TDS	total dissolved solids
THAAD	Theatre High Altitude Area Defense
TM	technical manual
tpy	ton per year
TSCA	Toxic Substances Control Act
TSP	total suspended particulates
UAS	unmanned aircraft system
UAV	unmanned aerial vehicle
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Service
UXO	Unexploded Ordnance
VEC	Valued Environmental Component
VOC	Volatile Organic Compound
WHPP	Wellhead Protection Plan
WIT	Warhead Impact Target
WoUS	Waters of the United States

Acronym	**Definition**
WSMR	White Sands Missile Range
WSPG	White Sands Proving Ground
WSTC	White Sands Test Center
WSTF	White Sands Test Facility
$\mu g/m^3$	micrograms per cubic meter

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10.0 INDEX

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