ENVIRONMENTAL ASSESSMENT
EXTENDED RANGE CANNON ARTILLERY PROJECT

U.S. ARMY
YUMA PROVING GROUND

January 2017
U.S. Army Garrison Yuma Proving Ground
Environmental Sciences Division
Yuma, Arizona 85365
Draft Finding of No Significant Impact
Extended Range Cannon Artillery Project
Yuma Proving Ground &
Barry M. Goldwater Range
Yuma County, Arizona

The U.S. Army Garrison Yuma Proving Ground (USAG YPG) prepared an environmental assessment (EA) to identify and evaluate potential environmental impacts associated with the Extended Range Cannon Artillery (ERCA) Project.

The ERCA Project is a multi-element, multi-phase test program of U.S. Army’s next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propellant charges. As part of the ERCA Project, a new 495-acre impact area would be established on YPG to sufficiently accommodate test firings of extended range artillery projectiles ranging from approximately 55 kilometers (km) to 73 km. Moreover, existing operational areas at the Barry M. Goldwater Range (BMGR) which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB) would also be used to conduct extended range test firings.

The EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA [Title 40, United States Code, Parts 1500 through 1508]; Department of Defense Directive 4715.9 Environmental Planning and Analysis; and Environmental Analysis of Army Actions (Code of Federal Regulations, Title 32, Part 651). YPG is the NEPA Lead Agency. LAFB and MCASY are NEPA Cooperating Agencies.

Three action alternatives were determined to satisfy the purpose and need of the Proposed Action and were carried forward for analysis. All three alternatives are equally viable and would be implemented individually or in combination as needed. Additional action alternatives on YPG were considered but were not further evaluated due to safety hazards.

**Description of the Proposed Action**

The ERCA Project would test fire extended range artillery projectiles within YPG and BMGR. Three tests per year would be conducted at each location for a total of six tests per year. The duration of each test would be approximately seven days.

On YPG tests may occur for an indefinite period. In order to sufficiently contain the firing distance within YPG, a new 495-acre impact area would be established on the eastern edge of Kofa Region. On BMGR, test firing would utilize existing operational areas on BMGR East and West. The duration of the tests on BMGR would initially be two years and would only be extended with authorization from LAFB and MCASY. Tests conducted on BMGR would be limited to use of inert warheads, while those on YPG would use either inert or high explosive warheads.

Fin-stabilized and spin-stabilized projectiles would be utilized. Spin-stabilized projectiles require an approximately 6 km-wide surface danger zone (SDZ) whereas fin-stabilized projectiles require an approximately 26 km-wide SDZ. The SDZ for fin-stabilized projectiles could be recalibrated to narrower widths as the weapon is further characterized and proved through testing evolutions.
No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct extended range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region would not be established. The existing operational areas on BMGR East and West would be not used. Elements of the ERCA Project that are within the scope of previously authorized programs would continue on YPG including firing into existing impact areas. However, the full distance of extended range test firings could not be conducted. Thus, the full extent of weapon capabilities would not be sufficiently characterized.

Environmental Consequences

The EA evaluated potential impacts on air quality, biological resources, cultural resources, hazardous materials and waste, land use, noise, recreation, safety, soils and water quality. Aesthetics, environmental justice, socioeconomics, utilities, infrastructure and traffic were eliminated from analysis because there is no potential for impacts to these resources. As discussed in the EA, implementing the Proposed Action would result in less than significant impacts to evaluated environmental resources.

Avoidance, Minimization, and Mitigation Measures

YPG would implement avoidance, minimization, and mitigation measures listed on the following page to minimize or reduce impacts to the proposed action.

Public Participation

By letters dated March 3, 2016, USAG YPG announced the preparation of this EA and solicited comments and concerns from interested stakeholders, agencies, and tribal governments using a combined stakeholder list from YPG, LAFB and MCASY.

A public notice was published in the Yuma Sun on January 29, 2017 announcing the availability of the EA and draft FNSI for review and comment. The public review period ends February 28, 2017. Please send comments to the USAG Yuma Proving Ground at usarmy.ypg.imcom.mbx.nepa@mail.mil or by mail to: Yuma Proving Ground Environmental Sciences Division; Attn: ERCA; 301 C St. Bldg. 307; Yuma, AZ 85365.

Conclusion

Based on the analysis presented in the EA, establishment of a new impact area on YPG as well as use of existing operational areas on BMGR East and BMGR West associated with the ERCA Project would not result in significant environmental impacts. Therefore, preparation of an Environmental Impact Statement is not required and a FONSI is the appropriate decision document to conclude the NEPA process.

I concur with the findings and analyses documented in the Environmental Assessment and hereby approve the Finding of No Significant Impact.

RANDY MURRAY  
COL, AV  
Commanding

Gordon K. Rogers  
Manager,  
Garrison

Date  
Date
Extended Range Cannon Artillery Project
Avoidance, Minimization, and Mitigation Measures

Biological Resources

Bio-1: For all operations, implement the Candidate Conservation Agreement for Sonoran Desert Tortoise in Arizona

Bio-2: All ground personnel would be briefed on the Sonoran pronghorn. The briefings cover the status of the species, the importance in reducing impacts to the species, and any mitigation measures the users must comply with while on the range, specifically OI 13-01.

Bio-3: All vehicles are restricted to designated roads except as required by EOD, maintenance, emergency response, and environmental sciences personnel including authorized contractors while conducting required mission support activities. Vehicles will stay within pre-existing EOD clearance areas.

Bio-4: Every effort will be made to minimize surface disturbance and to restore the area to the previous condition when restoration is practicable.

Bio-5: The YPG will make every effort to minimize the impacts of operations to vegetation and friable soils, and for operations to be consistent with the conservation measures and terms and conditions of BO 22410-1995-F-0114-R007 and BO 22410-1996-F-0094-R003 and BO 02EAAZ00-2014-F-0161.

Bio-6: All YPG personnel would obey speed limits on roadways to minimize the probability of a vehicle-pronghorn collision. The 56th RMO OI 13-01 specifies that vehicle speed limits for all ground personnel will be reduced when approaching known Sonoran pronghorn locations. OI 13-01 speed limits on BMGR-East within SPH habitat are 45 mph on paved roads, 35 mph on major graded roads, and 25 mph on all other roads. If a vehicle is 1-2 km from a Sonoran pronghorn, the speed limit is 15 mph; if a vehicle is less than 1 km from a Sonoran pronghorn, every effort is made to use an alternate route; if none are available and movement is essential, then the speed limit is 15 mph; and if Sonoran pronghorn are observed running due to ground disturbance, vehicles near Sonoran pronghorn will stop until the animals have stopped running.

Bio-7: All discarded matter (including but not limited to human waste, trash, garbage, and chemicals) that is generated by test personnel would be disposed of and removed in a manner consistent with federal and State of Arizona regulations. All work sites would be maintained in a sanitary condition.

Bio-8: Vehicles or stationary equipment from which hazardous materials may be spilled or leaked that are parked for longer than 2 days would be placed over temporary containment as appropriate. Hazardous or toxic materials that are generated would be disposed of in a manner consistent with federal and State of Arizona guidelines.
Cultural Resources

Cul-1: All support vehicles will use existing roads or marked routes to access project sites to the extent practicable.

Cul-2: Grading and smoothing of surface soils will be confined to the delineated boundaries for construction activities at gun positions and construction of observation mounds.

Cul-3: If archaeological remains are uncovered or discovered during site preparation activities, all activities in the area of the find would be stopped, and the appropriate Cultural Resources Manager at the installation where the find is located as well as the YPG Cultural Resources Manager will be notified immediately. The installation Cultural Resources Manager would assess the significance of the discovered resources in accordance with the NRHP evaluation criteria and the resources would be managed in accordance with 36 CFR 800, as appropriate.

Cul-4: If human remains are encountered, all project activity on or near the discovery site shall cease immediately. The human remains shall be protected from further disturbance. The appropriate Cultural Resources Manager at the installation where the find is located as well as the YPG Cultural Resources Manager will be notified immediately.

Cul-5: Conduct after-action reports for munition impacts within the SDZ in the event munitions veer off course or fragment midflight as a result of a launch or flight malfunction. Document location of the impact area and assess whether nearby cultural resources, if any, were affected. Coordinate results of the after-action reports with appropriate Cultural Resource Managers at the respective installations; State Historic Preservation Officer; and applicable Tribal Historic Preservation Officer(s) as appropriate.

Safety

YPG

Sfty-1: Coordinate with Kofa NWR prior to test firings and determine mitigations required to address the potential for personnel to be within the SDZ for the duration of each test.

Sfty-2: Schedule test firing to coincide with periods of low traffic on Highway 95 and low visitation periods on Kofa NWR to the extent practicable.

Sfty-3: Implement safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 for all ERCA activities.

Sfty-4: Coordinate all scheduled tests with respective range management office at YPG.

Sfty-5: Coordinate with Arizona Department of Transportation for temporary closure of Highway 95 during times of active testing.
BMGR

Sfty-6: Limit test firings to days when air-to-air training is at a minimum or such training is not scheduled.

Sfty-7: Temporarily suspend air-to-air or air-to-ground training during test firings within affected military airspace.

Sfty-8: Coordinate all scheduled tests with respective range management office at LAFB and MCASY.

Sfty-9: Implement manned roadblocks on all roads traversing the SDZ during active firing times.

Sfty-10 Assign an operations liaison between YPG test officer and U.S. Border Patrol (USBP) for cease fire in the event active USBP pursuit requires entry into SDZ.

Sfty-11: In the event of wildland fire, implement BMGR response protocols.

Sfty-12: Implement safety protocols pursuant to LAFB Operation Instruction 13-212 for all ERCA activities.

Soils

Soils-1 Minimize surface disturbance, minimize off-road travel, avoid vegetation.

Water Quality

WQ-1: Place drip pans under leaking vehicles and generators.

WQ-2: Provide secondary containment for non-mobile containers larger than 55 gallons.

WQ-3: Obtain Section 401 and Section 404 permits as needed and implement terms and conditions therein.

WQ-4: Obtain an Arizona Pollutant Discharge Elimination Construction General Permit as needed (only if disturbance exceeds 1 acres) and implement applicable terms and conditions including preparation of a Storm Water Pollution Prevention Plan as well as implementation of best management practices therein.
# Table of Contents

1.0 Introduction ................................................................................................................................. 1  
 1.1 Yuma Proving Ground .................................................................................................................. 1  
 1.2 Barry M. Goldwater Range .......................................................................................................... 1  
 1.3 NEPA Lead and Cooperating Agencies ....................................................................................... 2  
 1.4 Purpose of the Proposed Action ................................................................................................. 2  
 1.5 Need for the Proposed Action .................................................................................................... 2  
 1.6 Scope of the Environmental Analysis and Decision to be Made ............................................. 3  
2.0 Description of the Proposed Action and Alternatives .................................................................. 6  
 2.1 Description of the Proposed Action .......................................................................................... 6  
 2.2 Alternatives ................................................................................................................................ 9  
 2.3 Alternatives Considered and Eliminated from Detailed Study ................................................. 10  
3.0 Affected Environment and Environmental Effects ....................................................................... 14  
 3.1 Air Quality ............................................................................................................................... 14  
 3.2 Biological Resources ............................................................................................................... 17  
 3.3 Cultural Resources ................................................................................................................ 32  
 3.4 Hazardous Materials and Waste ............................................................................................. 39  
 3.5 Land Use ............................................................................................................................... 45  
 3.6 Noise ...................................................................................................................................... 49  
 3.7 Recreation ............................................................................................................................ 54  
 3.8 Safety ..................................................................................................................................... 56  
 3.9 Soils ....................................................................................................................................... 63  
 3.10 Water Quality ......................................................................................................................... 66  
4.0 Cumulative Impacts ..................................................................................................................... 70  
5.0 List of Agencies Consulted ......................................................................................................... 78  
6.0 List of Preparers and Reviewers ................................................................................................. 79  
7.0 References ................................................................................................................................. 80
## Table of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADEQ</td>
<td>Arizona Department of Environmental Quality</td>
</tr>
<tr>
<td>BO</td>
<td>Biological Opinion</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>BMGR</td>
<td>Barry M. Goldwater Range</td>
</tr>
<tr>
<td>BOR</td>
<td>Bureau of Reclamation</td>
</tr>
<tr>
<td>DODI</td>
<td>Department of Defense Directive</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>ERCA</td>
<td>Extended Range Cannon Artillery</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>GSA</td>
<td>Ground Support Area</td>
</tr>
<tr>
<td>KTR</td>
<td>Kineto Tracking Mounts</td>
</tr>
<tr>
<td>LAFB</td>
<td>Luke Air Force Base</td>
</tr>
<tr>
<td>MCOC</td>
<td>Munitions Constituents of Concern</td>
</tr>
<tr>
<td>MCASY</td>
<td>Marine Corps Air Station Yuma</td>
</tr>
<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NTAC</td>
<td>North Tactical Range</td>
</tr>
<tr>
<td>NWR</td>
<td>National Wildlife Refuge</td>
</tr>
<tr>
<td>POLs</td>
<td>petroleum, oils, and lubricants</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>SDZ</td>
<td>Surface Danger Zone</td>
</tr>
<tr>
<td>SHPO</td>
<td>State Historic Preservation Officer</td>
</tr>
<tr>
<td>STAC</td>
<td>South Tactical Range</td>
</tr>
<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>YPG</td>
<td>Yuma Proving Ground</td>
</tr>
</tbody>
</table>
1.0 Introduction

The primary mission of United States Army Yuma Proving Ground (YPG) is to provide a flexible, responsive, innovative, and diverse set of testing capabilities and services in a desert environment in order to meet the current and future needs of the U.S. Armed Forces.

The Extended Range Cannon Artillery (ERCA) project is a multi-element, multi-phase test program of U.S. Army’s next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propelling charges. The program would also evaluate integration and performance of the cannon with different platforms (towed and self-propelled). The ERCA Project would test fire extended range artillery projectiles at distances ranging from approximately 55 kilometers (km) to 73 km within the Kofa Region at YPG and at the Barry M. Goldwater Range (BMGR) which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB).

1.1 Yuma Proving Ground

YPG encompasses approximately 1,309 square miles of the Sonoran Desert in southwestern Arizona (see Figure 1). Defense systems development at YPG requires the use of impact areas such as those within Kofa Region, a 374,605 acre area within YPG. Kofa Region has been heavily used for munitions testing since the early 1950s and was previously used for World War II troop training as well. The region is heavily contaminated with unexploded ordnance and has been previously disturbed. During this time, defined impact areas had not been created and firing was at will. The first documentation YPG has of the current designated impact areas is from an Environmental Impact Assessment prepared in 1978. Impact Areas have been further defined through the NEPA process. In 2016, YPG completed a Programmatic EIS and Record of Decision for Activities and Operations on YPG which identifies all current impact areas. The action allowed YPG to better utilize and manage its existing land mass to accommodate the future test growth of the test center without having to seek additional land mass or assets.

1.2 Barry M. Goldwater Range

BMGR is an approximately 1.7 million acre military aviation training facility composed of airspace and lands located in southwestern Arizona, south of YPG across the Gila River. BMGR is used by LAFB and MCASY to train military aircrews to fly air combat missions for both air-to-ground and air-to-air operations. To a lesser extent, the range is also used for other types of training most of which support or are associated with air combat training. Examples of existing facilities used for training include an auxiliary airfield complex, realistic targets for air-to-ground attack, air-to-air firing ranges, and electronic warfare training ranges.
The Air Force is the designated administrator for military activities on the entire BMGR, but generally confines its training activities BMGR East, an approximately 1 million acre area. By Letter of Agreement with the Air Force, the Marine Corps is the primary military manager and user of BMGR West, an approximately 700,000 acre area.

1.3 NEPA Lead and Cooperating Agencies

YPG is the proponent for the ERCA Project and is the NEPA Lead Agency responsible for evaluating the potential for direct, indirect, and cumulative effects to the natural and human environment associated with the proposed action.

LAFB and MCASY were formally invited to participate as Cooperating Agencies pursuant to NEPA regulations at 40 CFR 1501.6. The Cooperating Agencies would provide assistance in further developing alternatives for the testing program at BMGR; provide technical literature and documentation on environmental resources; facilitate and participate in site visits to BMGR; and review and provide comments on the EA.

By a memorandum dated November 10, 2015, YPG invited LAFB and MCASY to participate as a NEPA Cooperating Agency. A memorandum dated December 16, 2015 from the US Air Force Air Education and Training Command authorized LAFB to participate as a NEPA Cooperating Agency. By letter dated May 2, 2016, MCASY accepted the invitation to participate as a NEPA Cooperating Agency.

1.4 Purpose of the Proposed Action

The purpose of the proposed action is to establish operational areas for the ERCA Project sufficient enough to accommodate test firings of extended range artillery projectiles.

1.5 Need for the Proposed Action

The distance of long-range artillery projectiles under the ERCA Project would range from 55 km to 70 km. The distance of the shots would nearly span the width of YPG. To sufficiently contain 70 km test shots within YPG, the gun position and the impact area would need to be located close to the edge of the opposing boundaries. Currently, there are no existing impact areas located close to the edge of YPG's boundary. Alternatively, long-range test firings would need to be conducted at other weapon testing or training ranges such as BMGR.

Furthermore, with increased complex and lengthy testing missions at YPG, there are on-going conflicts among test programs which routinely compete for use of the impact areas. The proposed action is needed to reduce range use conflicts, reduce scheduling conflicts, and reduce test delays due to lack of available impact areas while increasing test throughput to meet national defense needs.
1.6 Scope of the Environmental Analysis and Decision to be Made

This EA considers the direct, indirect, and cumulative effects of the Proposed Action alternatives and the No Action Alternative. It was prepared in accordance with the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), Council on Environmental Quality Regulations 40 Code of Federal Regulations (CFR) Parts 1500-1508, and Army Regulation 32 CFR Part 651 (Environmental Analysis of Army Actions). A specific requirement for this EA is to appraise the impacts of the Proposed Action Alternatives, including a determination of a Finding of No Significant Impact or a Notice of Intent to prepare an Environmental Impact Statement (EIS).

This EA provides a discussion of the affected environment and the potential impacts to physical, natural, and human environments. The following resources were identified and analyzed for the Proposed Action alternatives and No Action Alternative:

- Air Quality
- Biological Resources
- Cultural Resources
- Hazardous Materials and Waste
- Land Use
- Noise
- Recreation
- Safety
- Soils
- Water Quality

Recreation is also evaluated as part of the Land Use and Safety chapters. Munitions constituents of concern (MCOC) are evaluated as part of the Hazardous Materials and Waste chapter.

The following environmental resources were not evaluated since the proposed action would not impact or result in negligible impacts:

- **Aesthetics:** With the exception of a new impact area on YPG, the ERCA project would use existing operational areas on YPG and BMGR. The proposed activities on existing operational areas would not result in additional impacts to aesthetics. The vista of the new impact area generally consists of heterogeneous textures and nonlinear form associated with scrub vegetation on desert landscape with varying beige hues. With the exception of observation berms and targets, the new impact area on YPG would retain the existing vista.

- **Environmental Justice:** The proposed action would be located on existing military ranges, away from populated areas. Thus, there would be no disproportionate impacts to low income or minority populations.
• **Socioeconomics:** The ERCA project would utilize existing YPG technical and military personnel. The proposed action is not a new major military program or a major expansion of existing military programs or infrastructure that could induce additional growth of the local and regional economy. The proposed action would not require deployment of mass military personnel; additional staff hiring; construction of additional facilities; or additional support services and personal. Thus, there would be no impacts to socioeconomics.

• **Utilities, Infrastructure and Traffic:** The proposed action is not a new major military program or a major expansion of existing military programs or infrastructure that could induce additional growth of the local and regional economy. There would be no short-term or long-term impacts to traffic levels and patterns. With the exception of a new impact area on YPG, the ERCA project would use existing operational areas and roads on YPG and BMGR. Infrastructure would be limited to construction of observation mounds and access roads on the new impact area at YPG. Mobile generators would provide power for support equipment at the gun position. No permanent utilities would be required for the proposed activities. Thus, there would be no impact to utilities.
Figure 1

Regional Project Area Map

Legend
- Summit
- River/Wash
- Highway
- Airfield Surface Area
- Military Range
- Wildlife Refuge
- County Boundary
- State Boundary

Sources: Esri, USGS, NOAA
2.0 Description of the Proposed Action and Alternatives

2.1 Description of the Proposed Action

The ERCA Project would test fire extended range artillery projectiles within YPG and BMGR. On YPG tests may occur for an indefinite period. On BMGR, the duration of the test would initially be two years and would only be extended with authorization from LAFB and MCASY.

Three tests per year are anticipated at each location for a total of six tests per year. The duration of a typical test would be approximately seven days: three days for mobilization, two days for test firings, and two days for demobilization. Approximately 12 rounds would be fired each of the two test-firing days. Consequently, approximately 24 rounds would be fired per event and 72 rounds would be fired per year. A survey crew consisting of YPG test personnel would access the target subsequent to the conclusion of each firing, if possible. In total, the survey crew would access targets approximately 3 times per year.

Fin-stabilized and spin-stabilized projectiles would be utilized. Spin-stabilized projectiles require an approximately 6 km-wide surface danger zone (SDZ) whereas fin-stabilized projectiles may require an approximately 26 km-wide SDZ. The SDZ for fin-stabilized projectiles could be recalibrated to narrower widths as the weapon is further characterized and proved through testing evolutions.

Both inert and high explosive warheads would be tested. Tests conducted on BMGR would be limited to use of inert warheads, while those on YPG would use either inert or high explosive warheads.

An existing gun position on YPG would be used for tests on YPG. Temporary gun positions on BMGR West would be established within Ground Support Areas (GSAs) 71 and 76 for tests on BMGR. Gun positions would be generally semicircular in shape with an approximately 60 m radius, encompassing approximately 1.5 acres. Once established, the site would serve as multi-purpose use locations for gun emplacement; emplacement of data collection equipment; and emplacement of support vehicles and equipment such as mobile temperature conditioning chambers for the artillery projectiles and blast shields.\(^1\) No permanent infrastructure or utilities would be required for the establishment and use of the gun positions.

2.1.1 Testing Regime at YPG

The weapon would fire from an existing gun position on the southern end of Cibola Range. Fin- or spin-stabilized projectiles would be fired approximately 55 km northward to existing impact areas within the Cibola Range. Spin-stabilized projectiles may be

---

\(^1\) Example of data collection equipment includes Kineto Tracking Mounts, radars, metrological instrumentation, telemetry antennas and/or various other sensors.
fired approximately 67-70 km eastward to a new 495-acre impact area on the Kofa Region. Both inert and high explosive warheads would be used. Two new observation mounds for stationing of instrumentation (telemetry receivers, radars, etc.) may be constructed outside the new impact area. Based on the design of similar observation mounds, these would be compressed earth with fill obtained from the immediate surroundings. The dimensions would be approximately 8 meters high, 8 meters wide, and 12 meters long on the top with base dimensions of approximately 27 meters by 100 meters. Each mound would have a single access road.

Standard safety protocols require use of a statistically developed SDZs along the line of fire designed to contain the munition impact in the event it veers off course or fragments midflight as a result of launch or flight malfunction. The eastward line of fire on YPG would require additional scheduling consideration and coordination due to the SDZ crossing other facilities and jurisdictions including manned facilities on YPG, Highway 95, and Kofa National Wildlife Refuge (NWR). Activation of the SDZ along this line of fire would prompt temporary evacuation of manned facilities, closure of Highway 95, and coordination with the Kofa NWR to mitigate hazards to personnel for the duration of each test. As such, scheduling may be limited to low traffic periods and avoid high visitation periods for Kofa NWR. In the event that the munition veers off course, the test team would use tracking radar data to determine impact location. The decision to recover the munition would depend on terrain, physical accessibility, technical requirement for failure analysis and the proper approvals if it lands in a jurisdiction other than YPG.

2.1.2 Testing Regime at BMGR

Testing would be limited to inert warheads. Temporary gun positions would be established on BMGR West within GSAs 71 and 76. From these gun positions, fin or spin-stabilized projectiles would be fired at existing targets within NTAC and STAC.

Standard safety protocols require use of a statistically developed SDZ along the line of fire designed to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. The eastward line of fire on BMGR would require additional scheduling consideration and coordination due to the SDZ emanating at BMGR West and terminating at BMGR East crossing other jurisdictions such as those used by the U.S. Border Patrol. Activation of the SDZ along this line of fire would require temporary closure of any access roads that enter the SDZ. In order to minimize impact to current activities, scheduling could be limited to periods of low training activities at both BMGR East and West.

On BMGR East, munitions would be directed at Targets 106 or 111 in NTAC and Targets 208, 211 or 215 in STAC. There are no cultural resources within a 500- foot radius of the targets. Impacts to sensitive biological resources such as the Sonoran Pronghorn would be avoided or minimized through implementation of LAFB’s Operation Instruction 13-01. The selected target may be subject to change based on operational constraints and needs. Additional targets, if needed, would be selected to avoid or
minimize impacts to biological and cultural resources. Observation mounds would not be constructed within NTAC or STAC. Instead, a survey party would travel to the target array to assess accuracy/precision of fire and to perform projective recovery operations (if required). Projectile recovery would occur on an as needed basis and YPG would follow range procedures identified by BMGR East or West on a case by case basis. Mobile data collection equipment such as radars and telemetry units would be stationed on existing roads. In order to minimize disruptions to training operations at BMGR East and West, tests would be scheduled in advance to coincide with periods with minimal or no military training operations.

In the event that munitions veer off course during flight or land short of the intended target, recovery operations may be undertaken based on terrain, physical accessibility, technical requirement for failure analysis and compliance with range procedures for BMGR West or East. Recovery efforts would make use of existing roads to the extent practicable and proceed off road as needed. If the impact site is inaccessible or munition recovery is impractical, a survey team would use helicopters to locate the munition and record the impact location. A standardized recovery plan would be developed in coordination with MCASY and LAFB to ensure full compliance with range procedures at BMGR East and West.

2.1.3 Designation of a New Multiple Use Impact Area at YPG

Under all action alternatives, a new 495-acre impact area would be established near the southeast corner of the Kofa Region near the Palomas Mountains at YPG. The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. The site would support testing of mines, networked munitions, anti-vehicle effects, anti-personnel effects, surveillance systems, demolition charges, indirect and direct fire weapon systems and munitions for various air-to-ground, ground-to-ground, ground-to-air, and air-to-air tests.

A variety of munitions to be fired and impacted at this site may include high explosive, illumination, obscurant, non-lethal, and inert warheads. Ballistic munitions include small arms, mines, networked munitions, anti-vehicle effects, anti-personnel effects, demolition charges, aerial guided/unguided bombs, mortars, artillery, and tank. These munitions may range in size from 5.56mm to 203mm. Both foreign and domestic rockets would be also utilized, ranging in size from 20mm up to 240mm. Guided missiles, both foreign and domestic would also be fired and impacted at this site, ranging in size from 20mm with warheads weighing less than 10 pounds, to warheads weighing in excess of 60 pounds. Specialized munitions such as Dual Purpose Improved Conventional Munitions, cluster munitions, flares, illumination, chaff, etc. could also be fired or dispensed during testing.

A variety of stationary targets would be used during testing. The targets would be constructed of common construction materials such as cloth, metal, wood, masonry,
etc. Targets would be emplaced as needed on a test-by-test basis, and removed after each test.

2.2 Alternatives

Three action alternatives were determined to satisfy the purpose and need of the Proposed Action and were carried forward for analysis. All three alternatives are equally viable and would be implemented individually or in combination as needed. Additional action alternatives on YPG were considered but were not further evaluated due to safety hazards.

2.2.1 No Action Alternative

Under the No Action Alternative the elements of the ERCA Project that are within the scope of previously authorized programs would continue on YPG including firing into existing impact areas. However, the distance of the test firings on YPG would be limited and the ERCA Project would not conduct extended range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region would not be established. The existing operational areas on BMGR East and West would be not used. A temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC.

2.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region (see Figure 2). The projectiles could contain either inert or high explosive warheads. The line of fire and the associated 6 km-wide SDZ would cross Highway 95 and the southeast corner of the Kofa NWR near the Castle Dome Mountains. The testing regime described at Section 2.1.1 would be implemented.

2.2.3 Alternative 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West within GSA 76, fin- or spin-stabilized projectiles would be fired approximately 67-73 km eastward along a singular line of fire towards existing targets in NTAC (see Figure 3). The projectiles would only deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.

2.2.4 Alternative 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West within GSA 71, spin-stabilized projectiles would be fired approximately 67-73 km eastward along two different lines of fire towards existing targets in either NTAC or STAC (see Figure 4). The projectiles would only deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.
Table 1: Comparison of Alternatives

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>Test Location</th>
<th>Gun Position Location</th>
<th>Projectile Stabilization</th>
<th>SDZ Width (km)</th>
<th>Warhead</th>
<th>Firing Distance (km)</th>
<th>Construct Observation Mounds?</th>
<th>Target Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>YPG</td>
<td>Cibola Region</td>
<td>Spin</td>
<td>6</td>
<td>Inert/HE</td>
<td>67-70</td>
<td>Yes</td>
<td>New Impact Area on Kofa Region</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>BMGR</td>
<td>BMGR West Within GSA 76</td>
<td>Fin and Spin</td>
<td>26</td>
<td>Inert</td>
<td>67-73</td>
<td>No</td>
<td>NTAC</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>BMGR</td>
<td>BMGR West Within GSA 71</td>
<td>Spin</td>
<td>6</td>
<td>Inert</td>
<td>67-73</td>
<td>No</td>
<td>NTAC and STAC</td>
</tr>
</tbody>
</table>

2.3 Alternatives Considered and Eliminated from Detailed Study

A number of preliminary firing trajectories within YPG were considered for the proposed action.

2.3.1 South Fire Trajectory

Under the South Fire Trajectory Alternative, the entire fire trajectory would be contained within Cibola Range. From an existing gun position on the northern edge of the range, firings would be directed into the south end of Rocket Alley Impact Area. However, the gun position would be located beyond the northern boundary of the special use airspace for Cibola Range. Furthermore, the trajectory would traverse special use airspace reserved for aerostats.

2.3.2 Northeast Fire Trajectory

Under the Northeast Fire Trajectory Alternative, the cannon would be located on GP2, an existing gun position near the southwest corner of Kofa Region. Firings would be directed northeast to an impact area on the northern portion of Kofa Region East Arm. However, most of the fire trajectory would cross the Kofa Refuge. There would be constraints on the ERCA Project as a result. Long-range firings must avoid hunting season or any other times when there may be visitors in parts of the Kofa Refuge underneath the trajectory. Moreover, the associated SDZ would be sufficiently large such that protocol helicopter flyovers to clear the area of visitors before test firings would be insufficient.

2.3.3 Northwest Fire Trajectory

Under the Northwest Fire Trajectory Alternative, the cannon would be located on the western edge of Kofa Region. Firings would be directed northwest to an impact area near the northern edge of the special use airspace boundary of Cibola Range. The trajectory would traverse special use airspace reserved for aerostats.
Figure 2

Alternative 1
(YPG Narrow SDZ)
Figure 3

Alternative 2
(BMGR Wide SDZ)
Figure 4

Alternative 3
(BMGR Narrow SDZ)
3.0 Affected Environment and Environmental Effects

3.1 Air Quality

3.1.1 Affected Environment

National Ambient Air Quality Standards
The Clean Air Act identified and established the National Ambient Air Quality Standards (NAAQS) for a number of criteria pollutants in order to protect the public health and welfare. The criteria pollutants include ozone (O₃), carbon monoxide (CO), suspended particulate matter (PM), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and lead (Pb). PM emissions are regulated in two size classes: Particulates up to 10 microns in diameter (PM₁₀) and particulates up to 2.5 microns in diameter (PM₂.₅).

A region is given the status of “attainment” or “unclassified” if the NAAQS have not been exceeded. A status of "nonattainment" for particular criteria pollutants is assigned if the NAAQS have been exceeded. Once designated as nonattainment, attainment status may be achieved after three years of data showing non-exceedance of the standard. When an area is reclassified from nonattainment to attainment, it is designated as a “maintenance area,” indicating the requirement to establish and enforce a plan to maintain attainment of the standard.

The Arizona Department of Environmental Quality (ADEQ) has adopted the NAAQS (http://www.epa.gov/air/criteria.html) as the Arizona Ambient Air Quality Standards, and the ADEQ Air Quality Division regulates and enforces these standards in Arizona.

National Ambient Air Quality Standards Attainment Status
YPG and BMGR West are located within Yuma County while BMGR East is located in Maricopa County. Yuma County is in attainment for all criteria pollutants with the exception of PM₁₀. Portions of Yuma County were designated a moderate nonattainment area for the 24-hour standard of PM₁₀. Mobile emission sources, such as vehicular and agricultural equipment emissions, and blowing dust are the primary contributors to PM₁₀ emissions in this region. The Yuma PM₁₀ nonattainment area is located in the southwestern portion of Yuma County comprising about 300,000 acres. The nonattainment area encompass primarily agricultural areas near the city of Yuma, west of the proposed action area. Per 40 CFR 81.303, these areas are defined as

- Township 7S, Ranges 21 and 22W,
- Township 8S, Ranges 21-24W,
- Township 9S, Range 21-25W, and
- Township 10S, Ranges 21-25W

A small portion of YPG is located in Township 7S, Range 21W and is within the Yuma PM₁₀ nonattainment area. However, the existing gun position in the Cibola Range is located north of the nonattainment area at Township 6S, Range 21W. The proposed impact area is located east of the nonattainment area at Township 52, Range13W.
A portion of BMGR West from the Gila Mountains to the west is within the Yuma nonattainment areas of Township 9S, Range 21; Township 9S, Range 22, Township 10S, Range 21, and Township 10S, Range 22. The proposed temporary gun position at BMGR is located east of the nonattainment area at Township 9S, Range 17W.

Ports of Maricopa County have been designated as being in nonattainment for three pollutants: particulate matter (PM$_{10}$), carbon monoxide (CO) and ozone (O$_3$) (Maricopa 2005). The majority of the nonattainment areas are located to the north east of BMGR East around the Phoenix metropolitan area. A nonattainment area for PM$_{10}$ is located on the Tohono O’odham Nation in Township 12S, Range 6W.

**General Conformity Rule**

Section 176(c) of the federal Clean Air Act states that a federal agency cannot issue a permit for, or support an activity within, a nonattainment or maintenance area unless the agency determines it will conform to the most recent U.S. Environmental Protection Agency-approved State Implementation Plan. Thus, a federal action must not:

- Cause or contribute to any new violation of a NAAQS.
- Increase the frequency or severity of any existing violation.
- Delay the timely attainment of any standard, interim emission reduction, or other milestone.

A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by the federal action would equal or exceed the General Conformity de minimis rates specified in 40 C.F.R. 93.153.

**3.1.2 Environmental Consequences**

Impacts would be considered significant if the alternative results in:

- Long term emissions that would equal or exceed the General Conformity de minimis rates specified in 40 C.F.R. 93.153.

**3.1.2.1 No Action Alternative**

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG and BMGR, there would be no emissions from vehicle and generator engines at the gun position and impact area. There would be no dust emissions from vehicles using unpaved roads. At BMGR, temporary gun positions would not be established; at YPG, observation mounds would not be constructed. Thus, there would be no emissions from construction equipment (e.g., graders, loaders or bulldozers) or fugitive dust from earthmoving operations.
3.1.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. There would be localized increases in dust and air emissions during the testing period. Use of supporting vehicles and generators at the gun position and impact area as well as transport of armament and other equipment would result in temporary emissions from gasoline or diesel engines. Vehicles travelling to and from the gun position and impact areas on unpaved roads would result in temporary fugitive dust emissions. Construction of observations berms would result in diesel emissions from construction equipment as well as fugitive dust from earthmoving work. Emissions would cease upon conclusion of the test firings. Thus, there would be periodic emission of criteria pollutants. The emissions would neither be long term nor would they exceed General Conformity de minimis rates. Based on the above, impacts would be less than significant.

General Conformity Analysis

The proposed action is located outside of designated PM$_{10}$ nonattainment areas. Thus, a General Conformity analysis would not be required.

3.1.2.3 Alternative 2 (BMGR Wide SDZ)

In general, impacts would be similar to those characterized for Alternative 1 (YPG Narrow SDZ). However, observation mounds would not be constructed within NTAC or STAC. There would be minor periodic emission of criteria pollutants associated with the use of test support vehicles. The emissions would neither be long term nor would they exceed General Conformity de minimis rates. Based on the above, impacts would be less than significant.

General Conformity Analysis

The proposed action is located outside of designated PM$_{10}$ nonattainment areas. Thus, a General Conformity analysis would not be required.

3.1.2.4 Alternative 3 (BMGR Narrow SDZ)

In general, impacts would be similar to those characterized for Alternative 1 (YPG Narrow SDZ). However, observation mounds would not be constructed within NTAC or STAC. There would be minor periodic emission of criteria pollutants associated with the use of test support vehicles. The emissions would neither be long term nor would they exceed General Conformity de minimis rates. Based on the above, impacts would be less than significant.
General Conformity Analysis

The proposed action is located outside of designated PM$_{10}$ nonattainment areas. Thus, a General Conformity analysis would not be required.

3.2 Biological Resources

3.2.1 Affected Environment

3.2.1.1 Vegetation

YPG and the portion of BMGR to the west of State Route 85, where the proposed action is located, are within the Lower Colorado Valley Subdivision of the Sonoran Desert. This arid region is characterized by drought-tolerant shrubs, grasses, and cacti on low and gently sloping alluvial fans and terrace areas commonly referred to as bajadas.

Four plant communities primarily present in the proposed action area are:

- **Creosote-Bursage Desert Scrub Community**: This community is primarily dominated by creosote bush with presence of woody and non-woody cacti and rosette succulents that commonly occur on rocky slopes. The vegetation is found on lower bajadas and intermountain basins that are generally flat or on gentle to moderate slopes. Substrate associated with this community is usually sandy or gravelly alluvium.

- **Paloverde-Mixed Cacti-Mixed Scrub Community**: This community has a conspicuous but relatively sparse layer of saguaro cactus. A sparse to moderately dense short tree/tall shrub canopy is also present consisting of paloverde and creosote bush, along with ironwood and ocotillo in lesser prominence. A sparse herbaceous layer dominated by perennial grasses and forbs with seasonal annuals is present. Vegetation is found on rocky slopes of low mountain ranges where soil consists of gravelly alluvium.

- **Valley Bottom Floodplain Complex**: This community is found on nearly flat terrain (valley bottoms) and includes creosote bush, triangle-leaf bursage, white bursage, acacias, paloverdes, mesquites, and annual and perennial grasses. Associated substrate are deep loams and sandy loams.

- **Desert Xeroriparian Scrub Community**: The desert xeroriparian scrub community occurs in association with wash systems. Characteristic vegetation is variable and includes blue paloverde (*Parkinsonia florid*)a, ironwood (*Olneya tesota*), mesquite and sparse annual grasses and forbes. This community is found in narrow strips alongside linear channels formed by channel constricted flows. Vegetation in this community usually consists of moderate to dense stands of trees and shrubs influenced by ecological process associated with
water flow (Frequency and amount of flow, channel scouring, etc.). This community is generally located on course textured substrates and gravelly silty loam soils associated with stream channels in bajadas and valley bottoms.

On YPG, the existing gun position on Cibola Range is located on the Castle Dome Plain where Creosote-Bursage Desert Scrub community is present throughout. The proposed 495-acre impact area on KFR is located near the Palomas foothills. Thus, the area likely encompasses a transitional area where both Creosote-Bursage Desert Scrub Community and Paloverde-Mixed Cacti-Mixed Scrub Community are present.

On BMGR West, the vegetation association throughout the area in the vicinity of Mohawk Mountains where the TGPs would be located is Creosote-Bursage/Paloverde-Ironwood fans and pavement. On BMGR East, NTAC encompasses the Childs Valley as well as a portion of the Crater Range to the east and a portion of the Aguila Mountains to the west. STAC encompasses the Growler Valley, as well as portions of the Crater Range, Aguila Mountains, and Granite Mountains to the southeast, northwest, and southwest, respectively. Within both ranges, the Creosote-Bursage Desert Scrub Community is present within the valley while Paloverde-Mixed Cacti-Mixed Scrub Community is present on the bajadas and rocky slopes of the mountains. In addition, the Valley Bottom Floodplain Complex is present within the Growler Wash where it traverses STAC.

### 3.2.1.3 Wildlife

Wildlife on YPG and BMGR is typical of the Sonoran Desert scrub habitat. Numerous mammal, reptile, and bird species typical of the Sonoran Desert are present in the vicinity of the proposed action (Sullivan 2015).

- **Large Mammals:** Common large mammals include the desert bighorn sheep (*Ovis canadensis nelson*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), badger (*Taxidea taxus*), bobcat (*Lynx rufus*), ringtail (*Bassariscus astutus*), and mountain lion (*Puma concolor*).

- **Small Mammals:** Common small mammals include the rock pocket mouse (*Chaetodipus intermedius*), Merriam’s kangaroo rat (*Dipodomys merriami*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), woodrats (*Neotoma spp.*), Harris’ antelope squirrel (*Ammospermophilus harrisii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), California leaf-nosed bat (*Macrotus californicus*), California myotis (*Myotis californicus*), and canyon bat (*Pipistrellus hesperus*).

- **Reptiles:** Common reptile species include the western whiptail (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), sidewinder snake (*Crotalus cerastes*), western diamondback rattlesnake (*Crotalus atrox*), coachwhip (*Masticophis flagellum*), and western shovel-nosed snake (*Chionactis occipitalis*).
**Birds:** A wide variety of bird species in the region, many of which are migratory birds that may breed or winter in other locations. Common birds in the region include the ash-throated flycatcher (*Myiarchus cinerascens*), Audubon’s warbler (*Setophaga coronata*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), Brewer’s sparrow (*Spizella breweri*), Eurasian collared dove (*Streptopelia decaocto*), Gambel’s quail (*Calipepla gambelii*), LeConte’s thrasher (*Toxostoma lecontei*), loggerhead shrike (*Lanius ludovicianus*), northern rough-winged swallow (*Stelgidopteryx serripennis*), phainopepla (*Phainopepla nitens*) and red-tailed hawk (*Buteo jamaicensis*).

**Amphibians:** The red-spotted toad (*Bufo punctatus*) as well as other amphibians may be present in the mountains at NTAC and STAC.

Sensitive wildlife include:

**Sonoran Desert Tortoise:** Scattered populations of Sonoran Desert Tortoise (*Gopherus morafkai*) occur throughout the mountainous regions of BMGR East and West. Their habitat mostly consists of rocky slopes and bajadas where there are adequate shelter sites or burrowing substrate. This tortoise generally increases in abundance east of SR 85 on BMGR East (John Arnett pers comm). On YPG, tortoise may be found in the mountainous regions of north Cibola and the East Arm. (YPG INRMP 2012). Surveys of the proposed new impact area on YPG indicate that overall habitat quality in the project area is poor to moderate. No tortoise or tortoise sign were observed (Sullivan 2015).

Sonoran Desert tortoise was a candidate species pursuant to the Endangered Species Act (ESA), but has since been removed from candidate status and is now managed under a Candidate Conservation Agreement between U.S. Fish and Wildlife Service (USFWS) and several other federal state and local agencies including the US Army, Air Force, and Marine Corps.

**Golden Eagles:** Golden eagles are protected by the Bald and Golden Eagle Protection Act. Golden Eagles nests have been found in mountainous areas along NTAC and STAC on BMGR East within the Aguila mountain range. On YPG, large stick nests similar to eagle nests have been found, however, it is difficult to determine if these structures were made by eagles or red-tailed hawks. (Sturla 2014) There is potential nesting habitat for Golden Eagles on YPG, and eagles have been seen in flight over the range (Sullivan 2015). Eagles may be found flying over large parts of the range as the forage for jackrabbits, ground squirrels and other prey animals. Eagles also pass through the region during migration.

**Desert Bighorn Sheep:** Desert Bighorn Sheep (*Ovis canadensis nelson*) are considered a Species of Greatest Conservation Need (SGCN) Tier 1(b). They
occupy mountainous terrain throughout the project area on both BMGR and YPG. Tracks and scat of bighorn sheep were found on the proposed new impact area on YPG (Sullivan 2015).

- **Peregrine falcon**: Peregrine falcon (*Falco peregrinus*) are an SGCN tier 1(b) species that can be found in mountainous areas along high cliffs or in flight throughout YPG and BMGR. Nesting is rare in southeastern Arizona with documented nests at Picacho State Park and on the Kofa National Wildlife Refuge. A Peregrine falcon was observed in flight over the proposed impact area on YPG (Sullivan 2015).

Ground disturbance due to military operations has primarily occurred in valley bottom and low hill habitats, so wildlife species that typically occupy creosote bush desert scrub habitats have been exposed to the greatest potential for impacts due to military activities.

Military features within training ranges and at developed facilities sometimes provide artificial wildlife habitat. For instance, elevated military structures are sometimes used as perch sites for raptors and other bird species. Small mammals burrow in target areas where soil has been loosened by target construction and maintenance and/or munitions impacts. Reptiles, small mammals, and invertebrates may use targets (e.g., vehicle bodies, and simulated tanks and structures) and/or munitions debris (e.g., expended munitions casings, and parachutes) for cover. Also, many disturbed sites near targets exhibit green-up of annual vegetation after rain events which attracts some herbivores such as mule deer and Sonoran pronghorn.

### 3.2.1.3 Threatened, Endangered, and Candidate Species

Threatened, Endangered, or Candidate species within the Proposed Action Area include:

- **Lesser Long-nosed Bat**: The Lesser Long-nosed Bat (*Leptonycteris curasoe yerbabuenae*) is a medium sized leaf-nosed bat that feeds on nectar from the flowers of columnar cacti (e.g., saguaro; cardon [*Pachycereus pringlei*]; and organ pipe cactus and from paniculate agaves (e.g., Palmer’s agave [*Agave palmeri*]). While Lesser Long-nose Bats do occur on BMGR, their forage plants are mostly found in mountainous areas outside the proposed gun positions or target areas. The proposed action and its alternatives are not likely to adversely affect Lesser Long-nosed Bat.

- **Acuna Cactus**: The Acuna Cactus (*Echinomastus erectocentrus var. acunensis*) is a small cactus with straight central spines and a single plump stem that can reach 30 cm in height. The acuna cactus occurs in valleys and on small knolls and gravel ridges of up to 30 percent slope in the Palo-Verde-Saguaro Association of the Arizona Upland subdivision of the Sonoran desert scrub at 1,198 to 3,773 feet in elevation. The Acuna Cactus has been found on BMGR.
East to the east of NTAC approximately 30 miles east of the proposed target arrays in NTAC and STAC. The cactus has not been observed at any of the targets.

- **Sonoran Pronghorn:** The Sonoran Pronghorn (*Antilocapra americana sonoriensis*) occupy portions of the YPG and BMGR. The Sonoran pronghorn is a subspecies of the American pronghorn and was originally listed as threatened with extinction under the Endangered Species Preservation Act of 1966 on February 24, 1967.

  - **YPG:** The USFWS established a Nonessential Experimental Population for Sonoran pronghorn under Section 10(j) of the ESA. The USFWS has released pronghorn from the captive breeding pens onto the Kofa National Wildlife Refuge (NWR) since 2013. Presently, there are more than 72 pronghorn ranging across the King Valley, with some individuals scattering west as far as Highway 95 and east onto the Palomas Plain (YPG BA 2016). Pronghorn from the experimental population have been observed in portions of the Kofa Region. The Section 10(j) population on the YPG is treated as a species proposed to be listed with respect to ESA compliance. Thus, potential impacts to individuals from this population does not require consultation under Section 7 ESA. In contrast, the Section 10(j) population of the Kofa NWR is treated as a federally threatened species. Thus, potential impacts to this population requires consultation under Section 7 ESA. Per consultation with the USFWS, potential impacts to Sonoran pronghorn on the Refuge have been evaluated in Biological Opinion 02EAAZ00-2014-F-0161 dated September 9, 2014. There is no designated critical habitat for the Sonoran pronghorn.

  - **BMGR:** The distribution of Sonoran pronghorn on BMGR encompasses both BMGR West and BMGR East. Starting from BMGR West, the Sonoran pronghorn are present within Mohawk Valley, east of the Copper Mountains. The distribution extends eastward across the Mohawk Mountains and San Cristobal Valley to Ten Mile Wash on BMGR East. The proposed TGP near Baker Peaks is located west of the Sonoran pronghorn distribution. NTAC and STAC are located within the Sonoran pronghorn distribution in the San Cristobal Valley. Though there is occupied Sonoran pronghorn habitat BMGR, there is no designated critical habitat.

Both MCASY and LAFB have separately completed two Section 7 ESA consultations for potential adverse impacts to the Sonoran pronghorn associated with on-going military training and operations on BMGR West and BMGR East, respectively:

3.2.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Extirpation of a regional or local species.
- Damages to ecologic processes to the extent that the ecosystem is no longer sustainable or biodiversity is impaired.
- Loss of habitat necessary for all or part of the life cycle such as lambing areas, migratory corridors, or wildlife watering areas.
- Jeopardize the continued existence or recovery of listed species.

3.2.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of KFR and the associated observation mounds would not be established. Thus, there would be no long term impacts to approximately 1.3 acres of vegetation associated with the establishment of two observation mounds south of the proposed impact area. Likewise, there would be no disturbances to wildlife at the impact area. Potential adverse impacts to Sonoran pronghorn within Kofa NWR and Kofa Region would be avoided. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Thus, potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with on-going training and testing missions would remain.

At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC). Thus, potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with activities proposed under the ERCA Project would be avoided. Potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with on-going training and testing missions would remain.

3.2.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

Under all action alternatives, a new 495-acre impact area would be established near the southeast corner of the Kofa Region near the Palomas Mountains. The new impact area would function as a multi-purpose, multi-use impact area for other test missions.
that may run concurrently with or subsequent to the ERCA Project. The impacts analysis below encompasses the use of the new impact area for the ERCA Project as well as other test missions.

- **Vegetation:** There would be negligible impact to vegetation at the gun position since an existing gun position on the southern edge of Cibola Range would be used. Within Kofa Region, two observation mounds would be established south of the new 495-acre impact area. Construction would require removal of vegetation from an area slightly larger than the approximately 1.3 acre footprint for each site since fill would be borrowed from the immediate surroundings. Bulldozers would scrape vegetation within the footprint and the immediate surroundings. Earthen fill within would be shaped and compacted to design requirements to form the observation mounds. Due to the slow recovery of desert vegetation, disturbance to the vegetation would result in long-term impacts to vegetation. Furthermore, areas where native vegetation is cleared or where soils are disturbed are more susceptible to colonization by exotic invasive plant species. However, given the small size of the disturbed area relative to the larger vegetated landscape in the Kofa Region, impacts to vegetation would be minimal. Thus, the vegetation would continue to provide all functions and services required to sustain the ecosystem; essential elements critical for part of the life cycle of a species (e.g., lambing areas, migratory corridors, or wildlife watering areas) would remain intact.

Vegetation would not be removed within the new impact area for other YPG programs except to meet specific testing requirements. Impacts to vegetation within the impact area could result from damage caused by ordinance delivery or demolition such as explosions or fire. Crushing of vegetation due to accessing target areas or recovering rounds is possible. Actual disturbance within the impact area would be limited as most vegetation would be avoided as much as possible.

- **Wildlife:** Vibration, noise and presence of visual forms associated with an active gun position on Cibola Range during tests would temporarily scatter wildlife from the area into the immediate surroundings. The same characterization holds true for construction of the observation mounds on Kofa Region. Animals, such as birds and mammals, may abandon nests or dens in the immediate area of human activities, including abandonment of young. These types of impacts can be minimized by conducting tests outside of the reproductive period, but avoidance of this type would not be practicable for testing activities. The nearly constant level of testing and training conducted on YPG makes it unlikely that animals would nest or den in proximity to areas used for these purposes unless those animals were already acclimatized to increased human activity. Thus, the potential for nest/den abandonment would be minor.

Use of spin-stabilized projectiles would result in a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-
flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Based on the above, extirpation of local of species is unlikely. Furthermore, similar activities have not resulted in any appreciable loss of species richness anywhere else on the range.

- **Threatened and Endangered Species (Sonoran pronghorn)**
  - **YPG:** Individual Sonoran pronghorns from the nonessential experimental population on Kofa NWR are present within Kofa Region. Due to its distance from Kofa Region, proposed activities at the existing gun position on Cibola Range would not affect the Sonoran pronghorn. Though unlikely, animals on Kofa Region could be injured or killed by munitions strike or explosions from live ordinance on the ground during test firings. Vehicle strikes along roads leading to the observation mounds is possible. Noise from incoming munitions as well as noise from detonation of high explosive munitions would result in visual and auditory disturbance. These disturbances could affect habitat utilization by occasionally frightening pronghorn from food or water sources. These impacts to behavior can affect the nutrition and body condition of the animals and could reduce survival rates, particularly in times of drought. Other indirect impacts may include habitat alteration due to fire. Short term impacts from loss of foraging area could occur subsequent to wildfires.

Use of spin-stabilized projectiles would result in the use of a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.
Based on the above, the proposed action May Affect, and Likely to Adversely Affect Sonoran pronghorn on YPG pursuant to the ESA. Sonoran pronghorn population on Kofa Region is part of a Nonessential Experimental Population established under Section 10(j) ESA. Thus, they are treated as a proposed species for the purpose of Section 7 consultation.

- **Kofa NWR:** The line of fire would briefly traverse one corner of the Kofa NWR boundary located at southern tip of the Castle Dome Mountains. Munitions firing or ordnance deliveries could injure or kill Sonoran pronghorn on the Kofa NWR. However, this is highly unlikely as the proposed impact area is located approximately 17 miles east of the segment where the line of fire would cross the Kofa NWR boundary. The likelihood of ordnance landing within the refuge is low and the likelihood of munitions hitting and injuring or killing Sonoran pronghorn is even lower given that they regularly move and are not fixed on the landscape.

Use of spin-stabilized projectiles would result in a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Based on the above and detailed analysis in the Biological Evaluation, the proposed action May Affect, and is Likely to Adversely Affect Sonoran pronghorn on the Kofa NWR pursuant to the ESA. Potential impacts to Sonoran pronghorn in the refuge have been evaluated in Biological Opinion 02EAAZ00-2014-F-0161 dated September 9, 2014. With continued implementation of conservation measures from the Biological Opinion the proposed action is Not Likely to Jeopardize the continued existence of Sonoran pronghorn and would be in full compliance with the ESA.

### 3.2.2.3 Alternative 2 (BMGR Wide SDZ)

From a temporary gun position on BMGR West near GSA 76, fin- or spin-stabilized projectiles would be fired approximately 67-73 km eastward along a singular line of fire towards existing targets in NTAC.
• **Vegetation:** There would be negligible impact to vegetation at the gun position since gun position would be located on previously disturbed areas near GSA 76. Ordinance impacts would result in small surface craters, ranging from 36 inches to 54 inches in diameter, within the vicinity of selected targets.\(^2\) Due to the slow recovery of desert vegetation, disturbance to the vegetation would result in long-term impacts to vegetation. Furthermore, areas where soils have been disturbed are more susceptible to colonization by exotic invasive plant species. However, vegetation within the vicinity of existing targets have been previously disturbed from past munitions impacts as well as range maintenance. Furthermore, the number of munitions impacts would be small. Approximately 72 inert rounds would be fired at different targets over the course of each year (see Section 2.1). Last, given the small size of the disturbed area around each target relative to the larger vegetated landscape in NTAC, impacts to vegetation would be minimal. Thus, the vegetation would continue to provide all functions and services required to sustain the ecosystem; essential elements critical for part of the life cycle of a species (e.g., lambing areas, migratory corridors, or wildlife watering areas) would remain intact.

• **Wildlife:** Vibration, noise and presence of visual forms associated with an active gun position on GSA 76 during tests would temporarily scatter wildlife from the area into the immediate surroundings.

Within NTAC the possibility of wildlife injury as a result of direct munitions strikes is minimal. Indirect impacts are more likely. Noise from incoming munitions would result in auditory disturbance. These disturbances could affect habitat utilization by occasionally frightening wildlife from food or water sources nearby. Animals, such as birds and mammals, may abandon nests or dens in the immediate area of human activities, including abandonment of young. However, the on-going air-to-ground targeting operations on NTAC makes it less likely that animals would nest or den in proximity to targets. Thus, the potential for nest/den abandonment would be minor. Vehicle strikes along roads leading to the target areas are possible, however, implementing range procedures such as OI 13-01 will reduce that likelihood. Impacts would be limited since there are only six tests per year approximately 72 inert rounds would be fired at different targets over the course of each year (see Section 2.1).

Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the

\(^2\) Surface craters are typically two to three times larger than the projectile diameter (approximately 18 inches).
probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Due to the sparse nature of tortoise distribution on YPG and BMGR East and West, it is unlikely that tortoise will be adversely impacted by the proposed action. Implementation of the conservation measures will further reduce the likelihood of impacts to tortoise.

There are no eagle nests in proximity to the proposed target arrays, therefore there would be no impacts to nesting eagles or their young. With only 72 rounds fired per year, the risk to eagles foraging along the SDZ is negligible. The most likely impact would be that eagles may briefly hear the projectile as it passes by.

Based on the above, extirpation of local of species is unlikely. Furthermore, similar activities have not resulted in any appreciable loss of species richness anywhere else on the range.

- **Threatened and Endangered Species**
  - **BMGR West (Pronghorn):** A temporary gun position within GSA 76 would be established close to existing roads and previously disturbed areas to avoid the need for grading or other ground disturbing activities.

    Noise impacts associated with cannon firings could startle and cause individuals to flee. Over the course of one year, three one-week long tests would be conducted and approximately 72 rounds would be fired. The impulse noise from the gun at one mile is similar to that of thunder, but of shorter duration. This noise is atmospherically attenuated and would be barely audible at approximately 3 miles.

    Use of GSA 76 as a gun position would reduce these impacts because the site is at the western edge of Sonoran Pronghorn range. According to most recent pronghorn locations (2000-2016), pronghorn have not been observed within an approximately four mile radius of GSA 76.

    In addition to noise impacts, vehicle strikes along roads leading to the temporary gun position are possible since mobilization and demobilization of equipment would require vehicles to traverse through the Sonoran pronghorn's range. However, as noted in MCASY’s 2015 Biological Opinion, vehicle strikes are rare. Furthermore, the temporary gun position is located west of the existing Sonoran pronghorn distribution. Thus, potential for vehicle strikes would be further minimized.
Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

- **BMGR East:**

  **Pronghorn:** Within BMGR East, the ERCA Project would fire at selected existing targets within existing air-to-ground target areas (NTAC and STAC). Thus, there would be no additional habitat disturbances within the Sonoran Pronghorn range associated with target placement and construction activities. Projectile impact would be limited to a 36 to 54 inch crater. There is little risk of fire ignition because the rounds would be inert.

  In-coming rounds would make a "whoosh" sound before impact. Noise impacts associated with the incoming rounds would be audible at less than 1 mile from the flight line, but not nearly as loud as an aircraft and shorter in duration. Beyond a muted “thud” sound of metal striking the ground, there would be no additional noise associated when rounds make contact with the ground. The 2010 BO issued to LAFB notes that noise may generally induce increased heart rates in ungulates and may cause them to flee. Indirectly, the Sonoran pronghorn foraged more and bedded less on days without ground and air stimuli. A study cited in the 2010 BO concluded that, “military activity was associated with changes in the behavior of pronghorn, but these changes did not likely influence animals in a detrimental manner.”

  Impacts from direct strikes are unlikely. As noted in the 2010 BO, “The likelihood of practice bombs or inert ordnance affecting pronghorn is remote. Such ordnance or pieces thereof would have to fall on or otherwise strike an animal to kill or injure it. Of greater concern are live bombs and strafing or cannon fire” (p. 54). In addition, the inert rounds would not result in impacts associated with high explosive rounds such as explosion noise and wildland fire. Last, with implementation of avoidance and minimization measures specific to target closures as prescribed in LAFB’s Operation Instruction 13-01, impacts from ordinance impacts would be avoided.
Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Vehicle strikes are possible. A survey crew would access the target subsequent to the conclusion of each firing. In total, the survey crew would access targets approximately three times per year. With implementation of avoidance and minimization measures specific to vehicle use on the range as prescribed in LAFB's Operation Instruction 13-01, potential impacts from vehicle strikes would be minimized.

Based on the above and detailed analysis in the Biological Evaluation, the proposed action May Affect, and Likely to Adversely Affect Sonoran pronghorn on BMGR East pursuant to the ESA.

**Acuna Cactus:** The acuña cactus on BMGR East has only been found on the eastern portion of the range approximately 30 miles from the proposed targets for the project. Projectiles fired at the targets would not affect acuña cactus. Direct impacts from projectiles hitting the ground would be many miles from acuña cactus locations or proposed critical habitat. Because the rounds are inert, there would be no likelihood of indirect impacts from wildland fire spreading into acuña cactus habitat.

**Lesser Longnose Bat:** According to Biological Opinion 22410-1996-f-0094-R003, NTAC and STAC generally do not support lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) forage plants except in the mountains (BO 2010). The selected gun positions and targets are not located in mountainous areas so there would be no habitat disturbance in foraging areas. If any shots occur at night, it is possible that foraging bats could hear the projectile in flight; however, this sound would likely not disturb foraging bats or their habitat. The projectile would have a very high trajectory (up to 75,000 feet) except on firing and landing. Lesser long-nosed bats fly much lower. It is highly unlikely that the projectile would strike long-nosed bats so this impact would be discountable. Therefore,
the ERCA may affect, but is not likely to adversely affect the lesser long-nosed bat.

Section 7 Consultation

Based on the analysis in the Biological Assessment, USAG YPG makes the following determinations of effect for the ERCA project.

Table 2: Summary of ESA Effect Determinations

<table>
<thead>
<tr>
<th>Species</th>
<th>Determination</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acuña Cactus</td>
<td>No Effect</td>
<td>Does not occupy the proposed project area.</td>
</tr>
<tr>
<td>Lesser Long-nosed Bat</td>
<td>May Affect, Not Likely to Adversely Affect.</td>
<td>Proposed gun positions and impact targets are not within roosting or foraging areas. Projectile overflight would cause negligible disturbance.</td>
</tr>
<tr>
<td>Sonoran pronghorn</td>
<td>May Affect, Likely to Adversely Affect</td>
<td>The effects of the proposed project do not cause effects not already considered in existing biological opinions for BMGR West and East. All conservation measures and terms and conditions would apply to the proposed action.</td>
</tr>
</tbody>
</table>

USAG YPG initiated consultation with the United States Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act on October 4 2016.

3.2.2.4 Alternative 3 (BMGR Narrow SDZ)

From a temporary gun position on BMGR West near GSA 71, spin-stabilized projectiles would be fired approximately 67-73 km eastward along two different lines of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

- **Vegetation:** Impacts to vegetation at GSA 71, NTAC and STAC would be similar to those characterized under Alternative 2.

- **Wildlife:** Impacts to wildlife at GSA 71, NTAC and STAC would be similar to those characterized under Alternative 2.

- **Threatened and Endangered Species (Sonoran pronghorn):** Impacts to Sonoran pronghorn at GSA 71, NTAC and STAC would be similar to those characterized under Alternative 2.
3.2.3 Avoidance, Minimization, and Mitigation Measures

Bio-1: For all operations, implement the Candidate Conservation Agreement for Sonoran Desert Tortoise in Arizona.

Bio-2: All ground personnel would be briefed on the Sonoran pronghorn. The briefings cover the status of the species, the importance in reducing impacts to the species, and any mitigation measures the users must comply with while on the range, specifically OI 13-01.

Bio-3: All vehicles are restricted to designated roads except as required by EOD, maintenance, emergency response, and environmental sciences personnel including authorized contractors while conducting required mission support activities. Vehicles will stay within pre-existing EOD clearance areas.

Bio-4: Every effort will be made to minimize surface disturbance and to restore the area to the previous condition when restoration is practicable.

Bio-5: The YPG will make every effort to minimize the impacts of operations to vegetation and friable soils, and for operations to be consistent with the conservation measures and terms and conditions of BO 22410-1995-F-0114-R007 and BO 22410-1996-F-0094-R003 and BO 02EAAZ00-2014-F-0161.

Bio-6: All YPG personnel would obey speed limits on roadways to minimize the probability of a vehicle-pronghorn collision. The 56th RMO OI 13-01 specifies that vehicle speed limits for all ground personnel will be reduced when approaching known Sonoran pronghorn locations. OI 13-01 speed limits on BMGR-East within SPH habitat are 45 mph on paved roads, 35 mph on major graded roads, and 25 mph on all other roads. If a vehicle is 1-2 km from a Sonoran pronghorn, the speed limit is 15 mph; if a vehicle is less than 1 km from a Sonoran pronghorn, every effort is made to use an alternate route; if none are available and movement is essential, then the speed limit is 15 mph; and if Sonoran pronghorn are observed running due to ground disturbance, vehicles near Sonoran pronghorn will stop until the animals have stopped running.

Bio-7: All discarded matter (including but not limited to human waste, trash, garbage, and chemicals) that is generated by test personnel would be disposed of and removed in a manner consistent with federal and State of Arizona regulations. All work sites would be maintained in a sanitary condition.

Bio-8: Vehicles or stationary equipment from which hazardous materials may be spilled or leaked that are parked for longer than 2 days would be placed over temporary containment as appropriate. Hazardous or toxic materials that are generated would be disposed of in a manner consistent with federal and State of Arizona guidelines.
3.3 Cultural Resources

Cultural resources consist of prehistoric and historical districts, sites, buildings, structures, objects, artifacts, or other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. In particular, cultural resources include historic properties as defined in the National Historic Preservation Act (NHPA; 54 U.S.C. 300101 et seq.); cultural items as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. sections 3001-3013); archaeological resources as defined in the Archaeological Resources Protection Act (16 U.S.C. sections 470aa-470mm); sacred sites as defined in Executive Order 13007, Indian Sacred Sites, May 24, 1996; and traditional cultural properties as defined in the National Park Service’s National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties.

Section 106 of the NHPA requires that federal agencies with jurisdiction over a proposed federal project take into account the effect of the undertaking on cultural resources listed, or eligible for listing, on the National Register of Historic Places (NRHP), and afford the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation an opportunity to comment with regard to the undertaking.

3.3.1 Affected Environment

3.3.1.1 Background

Native American occupation of the region dates back at least 10,000 years. Between 10,000 B.C. and A.D. 200, the typical settlement pattern appears to have been one of small nomadic bands inhabiting the valley floors along major watercourses (YPG 2010). Reliance on native plants, animals and stone tools characterize this period. Floodplain horticulture, ceramics, and the bow and arrow were introduced during the Patayan Period (A.D. 150-1500). The regional population appears to have expanded dramatically at this time, occupying both the lower Colorado River basin and the lower reaches of the Gila River, as well as the peripheral desert regions (YPG 2010). Site types typical of the area include trails, rock shrines, and habitation sites that have rock rings, rock piles, clearings in the desert pavement, and artifact scatters (YPG 2010).

Between 1540 and 1848, the Quechan, Cocopah, Halchidhoma, Maricopa, Yavapai, and other Yuman language family groups occupied the lower Colorado and Gila river valleys where they practiced floodwater farming. The Quechan primarily occupied the Lower Colorado River Valley and surrounding region. The Yavapai typically occupied areas to the north and east, while the Cocopah occupied regions immediately to the south, including the Colorado River Delta. Pima, Maricopa, and Tohono O’odham occupied the regions to the east and southeast of the Gila River valley (YPG 2010). Internecine warfare led to frequent territorial shifts among these groups.
Spanish exploration of the lower Colorado River area began in 1540 (YPG 2010). The only permanent Spanish settlement in the area was a mission established in 1780 on the California side of the Yuma Crossing; however, it was abandoned after it was attacked by the Yumans in 1781 (YPG 2010).

Contact between Native Americans and Euro-Americans increased in the region between 1848 and 1941, even though American trappers had been present in the area since 1780 (YPG 2010). U.S. troops first traveled along the Gila River during the Mexican-American War in 1848. As a result of the Mexican-American War, the United States acquired the region north of the Gila River in 1848. By 1850, the U.S. Army had established a camp at Yuma Crossing (YPG 2010). The area south of the Gila River to the present-day US/Mexico border, which was home to the Hia C-ed and Tohono O’odham, was acquired through the Gadsden Purchase of 1853-1854. Further contact with Euro-Americans occurred during the California Gold Rush of 1849. During this period, only the Cocopah and Quechan remained in residence along the lower Colorado River below the confluence with the Gila River, and no native groups resided on the lower Gila River (LAFB 2010).

From the late 1800s to the early 1900s, ranching and homesteading also were pursued in the area that was to become the BMGR (LAFB 2010). River steamboats and the railroad provided shipping and commerce to the area. Agriculture, an important part of the Yuma economy in the late 19th century, expanded dramatically in the early 20th century.

Precursors to both YPG and BMGR were established during the World War II period. YPG was initially established as a U.S. Army training camp in 1942 (YPG 2010). In 1943, the Yuma Test Branch began to operate along the banks of the Colorado River, testing new bridge designs, boats, and well-drilling equipment for the Allied Armies during World War II. The Yuma Test Branch was officially closed in 1950. In 1951, the installation was reactivated as the Yuma Test Station and used for desert environment testing. By 1955, the post had become a test center and, in 1963, the installation had been placed under the command of the U.S. Army Materiel Command and redesignated as YPG. Today, YPG is the only general-purpose proving ground located in a desert environment.

The use of lands within what is now BMGR began in 1941 when pilots from both Luke Field and Williams Field began gunnery training to prepare for wartime deployment (LAFB 2010). The initial parcel of land set aside for training included most of what is today BMGR East. In 1943, additional parcels had been added to the range to expand the training capacity of the eastern portion of the range and support flight training programs to the west at Yuma Army Air Base (LAFB 2010). The Yuma Army Air Base was developed as a training command separate from those at Luke and Williams fields. This base, and the addition of the western parcels to the gunnery and bombing range, established a second area for training operations that were independent from those conducted in the eastern range areas. This basic east-west split of range resources has
been continued ever since and is currently represented by the BMGR East and BMGR West divisions of the range. The Yuma Army Airfield became Vincent AFB in 1956 and then in 1959, MCASY (LAFB 2010).

3.3.1.2 Areas of Potential Effect

The Area of Potential Effect (APE) is the geographic area within which a proposed action may directly or indirectly affect cultural resources. The APE for the ERCA Project encompasses areas where the Proposed Action would result in ground disturbing activities such as construction of observation mounds or access roads as well as ground disturbances associated with the use of munitions. The APE would encompass:

- The new 495-acre impact area on Kofa Region including the two new observation mounds and access roads within the new impact area on YPG.
- Areas within the vicinity of Targets 106 or 111 in NTAC and Targets 208, 211 or 211 in STAC.
- Proposed gun positions on Cibola Range on YPG and GSAs 71 and 76 on BMGR West.

3.3.1.3 Site Specific Cultural Resources

The cultural resources, including site-specific cultural investigations within the APEs, are summarized below.

- **New Impact Area on Kofa Region (YPG):** Two cultural surveys have been conducted in the newly proposed impact area that encompass 100% of the area as well as a minimum 600 foot buffer. There are nine sites located within the impact area, all determined to be not eligible for listing on the NRHP. Seven are rock features and artifacts associated with historic military use of the area and one is a historical section marker. The last site is a multicomponent site comprised of historic military rock features and artifacts as well as a prehistoric mano.

There are five sites located within the larger 600 foot buffer area outside the proposed impact area. Three historic sites, a military site, a rock feature, and mining cairns, are located more than 350 feet from the impact area. A multicomponent historic military and prehistoric lithic scatter site located is 219 feet from the edge of the impact area. The last site is the historic Palomas Road which just clips the southwestern edge of the buffer. These five sites are determined to be not eligible to the NRHP. Other sites within the vicinity of the new impact area include:

- **White Tanks:** The proposed impact area is located approximately twelve miles (19 km) and two mountain ranges south of White Tanks Management
Area (“White Tanks”), a 2,069 acre area that encompasses 46 archaeological sites in the northern part of the East Arm of the Kofa Region. White Tanks is also located outside of YPG’s Zone I noise contour (57-62 dBA) for on-going operations. The contours do not extend past the first set of mountains north of the proposed impact area.

- **Observation Mound West**: Two cultural surveys have been conducted in the proposed western observation mound area. No sites or eligible isolated occurrences (IO) were observed.

- **Observation Mound East**: One cultural survey has been conducted in the proposed area of the eastern observation mound. Only one site, the historic Palomas Road, clips the northeastern edge of the survey area. It has been determined not eligible to the NRHP.

- **GSA 71 and 76 (BMGR West)**: Four cultural surveys have been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has full cultural survey cover to a radius of 500 feet while the surveys encompass all of GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

  There are two known archaeological sites located one mile from GSA 71. Both sites have been determined not eligible for the NRHP and occur at least 2,708 feet from the GSA. Additionally, there are four known archaeological sites located within one mile of GSA 76. Three of the sites have been determined not eligible to the NRHP while one remains undetermined. The closest site to GSA 76 is located 1,852 feet away.

- **NTAC and STAC (BMGR East)**: Multiple cultural surveys have been conducted that include Targets 106 or 111 in NTAC and Targets 208 and 211 in STAC. A total of 86.9% of the APE in NTAC and 87.5% of the APE in STAC have had Class III surveys conducted. There is one known site of undetermined eligibility to the NRHP located within 500 feet of Target 106. There are no known sites located within 500 feet of Targets 111, 208, or 211.

  There are three known archaeological sites located within 1,000 feet of Target 106, all determined eligible for the NRHP. There are three known archaeological sites located within 1,000 feet of Target 208. Two sites are of undetermined eligibility while one is determined eligible. There are no known archaeological sites located within 1,000 feet of Targets 111 and 211. The closest eligible archaeological site to Target 111 is located 1,860 feet away and the closest eligible archaeological site to Target 211 is located 1,563 feet away.
3.3.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- A substantial, irreversible, or unmitigatable change to unique prehistoric or historic site(s) representative of the prehistorical or historical character of the area.

3.3.2.1 No Action Alternative

Under the No Action Alternative, the ERCA Project would not conduct long-range test firings at YPG or BMGR.

At YPG, the existing gun position at the southern terminus of Cibola Range would continue to be used for other test missions as needed. The proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. Thus, there would be no munitions-related surface disturbances in the impact area. Furthermore, there would be no surface disturbances associated with construction of observation berms and access roads. Munitions-related surface disturbances associated with use of existing impact areas within Kofa Region are expected to continue.

On BMGR, GSAs 71 and 76 would not be used for gun emplacement. Furthermore, the ERCA Project would not fire at selected targets NTAC and STAC. Thus, there would be no munitions-related surface disturbances at BMGR East. However, there would be continued surface disturbances within NTAC and STAC in the immediate vicinity of established targets associated with on-going training operations.

3.3.2.2 Alternative 1 (YPG Narrow SDZ)

- **Proposed Impact Area:** Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

Nine sites, all determined to be not eligible for listing on the NRHP, have been identified within the proposed boundary of the proposed impact area. In addition, there are five sites located within 500 feet of the proposed impact area, all determined to be not eligible for the NRHP.

Construction of the earthen observation mounds would result in disturbance of surface soils around the perimeter of the observation mound. The construction of the western observation mound will have no direct, indirect, or cumulative impacts to cultural resources as there are no sites or eligible isolated occurrences in this area. One site, the not-NRHP-eligible historic Palomas Road, is present in the vicinity of the eastern observation mound. Direct impacts to
Palomas Road may include increased traffic use and sight blading of the extant road. Indirect and cumulative impacts may include increased use and improvement of the road which may accelerate the rate of erosion along the right-of-way and road bed.

Ordnance impacts within the impact area would result in varying levels of surface impacts such as craters throughout the impact area. Levels of surface disturbance would be commensurate with the types and sizes of munitions tested. For example, high explosive rounds would result in craters that are wider and deeper than inert rounds. Potential direct impacts to the nine sites within the proposed impact area may include being at the epicenter of where the munition lands, thereby, fracturing and/or displacing the artifacts. Potential indirect impacts may include additional visitation to the area during munition removal which can afford the sites greater visibility and increase the potential for tampering with and/or removing artifacts from the sites. Cumulative impacts may include increased ground disturbance which may accelerate the rate of erosion within and just outside of the proposed impact area, both uncovering and covering cultural resources. There will be no direct, indirect, or cumulative impacts to the five sites on the periphery of the proposed impact area.

- **White Tanks:** Noise from the impact area would not result in indirect impacts to White Tanks. Several studies (King et al.1985, Battis 1983, Lavallee and Loubser 2015) have been conducted that study the effects of vibration on archaeological ruins and petroglyphs. King et al. (1985) recommend the following minimum distances from standing archaeological ruins to prevent adverse impacts, 1.2 kilometers (km) from blasting, 0.5 km from railroad traffic, 45 meters (m) from road building, and 25 m from vehicular traffic. Battis (1983) examines the seismo-acoustic recording of sonic booms at two rock shelter and pictograph sites in Texas. These studies indicate that sonic booms are unlikely to cause damage to the archaeological finds. The expected motions are, at worst, 8 percent above the limits set by strict blasting codes (Battis 1983).

Lavallee and Loubser (2015) provide the best evidence for any potential impacts on rock art from military activities. They have several tables in the document that outline the critical distance for effects to occur from vibrations caused by groundborne mortar fire, airborne mortar fire, demolition from TNT and airblasts, and ground maneuvers. They state that as long as mortar ranges and firing points are restricted to distances beyond 321 feet from any rock art site, there will be no adverse impacts (Lavallee and Loubser 2015).

As stated in the Noise Chapter, the maximum decibel at 25 feet from the gun position is approximately 178 dB. Furthermore, atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Since White Tanks is located approximately 19 km north of the impact area, any noise made from munition impacts would sound like distant, muffled
thunder and nowhere near the 142 dB needed to adversely impact the petroglyphs at White Tanks.

Based on the above, there would be no substantial, irreversible, or unmitigatable change to unique prehistoric or historic site(s) representative of the prehistorical or historical character of the area. Impacts would be less than significant.

3.3.2.3 Alternative 2 (BMGR Wide SDZ)

Munitions would be directed at Targets 106 or 111 in NTAC. Inert ordnance impacts would result in varying levels of surface impacts such as craters within the vicinity of the target, ranging from 36 inches to 54 inches in diameter. However, the areas within the vicinity of existing targets are already disturbed. LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target. Explosive ordnance disposal operations typically entail light resurfacing of the top soil layer surrounding each target using graders or an array of chains attached to heavy duty trucks. Thus, potential for impacts to cultural resources from munitions strikes within this range would be minimal. Furthermore, selected targets are not located within 500 feet of recorded cultural sites. Based on the above, there would be no impacts to cultural resources.

3.3.2.4 Alternative 3 (BMGR Narrow SDZ)

Munitions would be directed at Targets 106 or 111 in NTAC and Targets 208 or 211 in STAC. Inert ordnance impacts would result in varying levels of surface impacts such as craters within the vicinity of the target, ranging from 36 inches to 54 inches in diameter. However, the areas within the vicinity of existing targets are already disturbed. LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target. Explosive ordnance disposal operations typically entail light resurfacing of the top soil layer surrounding each target using graders or an array of chains attached to heavy duty trucks. Thus, potential for impacts to cultural resources from munitions strikes within this range would be minimal. Furthermore, selected targets are not located within 500 feet of recorded cultural sites. Based on the above, there would be no impacts to cultural resources.

3.3.3 Avoidance, Minimization, and Mitigation Measures

Unanticipated discoveries of archaeological remains may occur even in areas that have been previously surveyed. To avoid disturbance of known and previously undiscovered or undocumented cultural resources or remains, the following measures would be implemented.

Cul-1: All support vehicles will use existing roads or marked routes to access project sites to the extent practicable.
Cul-2: Grading and smoothing of surface soils will be confined to the delineated boundaries for construction activities at gun positions and construction of observation mounds.

Cul-3: If archaeological remains are uncovered or discovered during site preparation activities, all activities in the area of the find would be stopped, and the appropriate Cultural Resources Manager at the installation where the find is located as well as the YPG Cultural Resources Manager will be notified immediately. The installation Cultural Resources Manager would assess the significance of the discovered resources in accordance with the NRHP evaluation criteria and the resources would be managed in accordance with 36 CFR 800, as appropriate.

Cul-4: If human remains are encountered, all project activity on or near the discovery site shall cease immediately. The human remains shall be protected from further disturbance. The appropriate Cultural Resources Manager at the installation where the find is located as well as the YPG Cultural Resources Manager will be notified immediately.

Cul-5: Conduct after-action reports for munition impacts within the SDZ in the event munitions veer off course or fragment midflight as a result of a launch or flight malfunction. Document location of the impact area and assess whether nearby cultural resources, if any, were affected. Coordinate results of the after-action reports with appropriate Cultural Resource Managers at the respective installations; State Historic Preservation Officer; and applicable Tribal Historic Preservation Officer(s) as appropriate.

3.4 Hazardous Materials and Waste

Hazardous materials are broadly defined as materials of general use containing clearly hazardous properties in commercial, military, or industrial applications. Hazardous materials are chemical substances which pose a substantial threat to human health or the environment. In general, these materials pose hazards due to quantity and concentration, or physical and chemical characteristics.

Hazardous constituents are defined as hazardous materials present at low concentrations in a generally non-hazardous matrix, such that their hazardous properties do not produce acute effects. Component hazardous materials are considered hazardous constituents. Components that contain hazardous constituents include propellants, batteries, flares, igniters, jet fuel, diesel fuel, hydraulic fluid, and explosive warheads. Each of these may potentially affect human health and the environment through direct contact with water, soil, or air.

A hazardous waste may be solid, liquid, semi-solid, or contain gaseous material that alone or in combination may: (1) cause, or significantly contribute to, an increase in
mortality or an increase in serious irreversible or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

Section 6901 of the Resource Conservation and Recovery Act (RCRA) regulates management of solid waste and hazardous waste. Solid wastes include garbage; refuse; sludge (from a wastewater treatment plant, water supply treatment plant, or air pollution control facility); other discarded material including solid, liquid, semi-solid; and contained gaseous materials resulting from industrial, commercial, mining, and agricultural operations.

Military munitions differ from other wastes; the rules and regulations regarding the management of military munitions hazards and military munitions waste differ from those regulating other wastes. The Military Munitions Rule (promulgated in Federal Register Volume 62, Number 29, Pages 6621-6657), defines when military munitions become waste and how these waste military munitions will be managed. Military munitions are not a solid waste when used for their intended purposes, which include use in training military personnel in the recovery, collection, and on-range destruction of unexploded ordnance and munitions fragments during range clearance activities. However, used or fired munitions are classified as solid waste when managed off-range or recovered, collected, and subsequently buried/placed in a landfill on the range. In both cases, once the used or fired munition is a solid waste, it is potentially subject to regulation as a hazardous waste.

- **Hazardous Materials:** Hazardous materials such as aircraft, automotive, and generator fuels, oils, lubricants, paints, cleaning solvents, pesticides, and herbicides are currently used at developed range administration and support facilities. Use of hazardous materials at other dispersed locations, such as manned and tactical ranges, is generally limited to petroleum, oils, and lubricants; however, latex paints used in the construction and repair of simulated targets are also potentially hazardous.

- **Solid Wastes:** Municipal solid wastes from administrative, support, and temporary field facilities are collected and transported off-range to approved landfills. Human sewage from temporary field facilities is contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities.

- **Munitions Constituents of Concern:** Munitions constituents of concern (MCOC) are hazardous constituents associated with munitions. Expended munitions such as artillery rounds, obscurants, bombs, missiles, targets, pyrotechnics, flares, as well as small, medium, to large munitions could release contaminants to the environment upon use or leach small amounts of toxic substances as they explode and decompose. The MCOC are found in the explosive, propellant, and pyrotechnic elements of munitions. MCOC may also leak from munitions that do not detonate on impact as intended. Most MCOC are
located within firing ranges, training ranges, and air-to-ground targeting ranges. Propellants are a potential source of MCOC at gun positions. MCOC associated with each munitions class are summarized below:

- **Small Caliber Munitions**: Lead is the primary potential MCOC. Other metals, including antimony, copper, and zinc, are also MCOC. Nitroglycerin, a component of solid propellant for small caliber munitions is considered a potential MCOC.

- **Medium and Large Caliber Munitions**: High explosives used in these munitions may result in the release of trinitrotoluene and cyclotetramethylenetetranitramine. The propellants for these munitions may contain 2,4-dinitrotoluene (DNT), 2,6-DNT, and nitroglycerin.

- **Pyrotechnics and Obscurants**: Perchlorate compounds are the primary MCOC associated with pyrotechnics. White phosphorous is frequently used as an incendiary and smoke-screening agent in training areas.

- **Other Munitions**: Pentaerythritol tetranitrate is a component of detonation cord and could be a potential MCOC at ranges where demolition training is performed. Additionally, the explosive components used in some of these munitions may result in the release of trinitrotoluene and cyclotetramethylenetetranitramine.

In addition to the hazardous constituents from energetic chemicals, other hazardous constituents may also leach from solid components of munitions such as bomb hulls, targets, and small arms ammunition. These hazardous constituents may include: carbon, manganese, phosphorus, sulfur, copper, nickel, chromium, molybdenum, vanadium, columbium, or titanium.

- **Munitions Constituents of Concern Assessments**: MCOC within YPG and BMGR are routinely assessed pursuant to Department of Defense Directive 4715.11 (DODI 4715.11). The Directive requires evaluation of MCOC sources; potential for off-range migration (i.e., wind erosion, surface flows, and ground water plumes); potential human and ecological receptors; and whether such release poses an unacceptable risk to human health or the environment.

### 3.4.1 Affected Environment

#### 3.4.1.1 YPG

Portions of YPG have historically been used as firing ranges starting in 1942. Both the volume of expended munitions decomposing within the range and the amounts of MCOC in the environment have gradually increased over time. Concentrations of some
substances in sediments surrounding the expended material may also increase over time.

Though weapons testing within both Kofa and Cibola regions, the majority of munitions testing occurs within the Kofa Region. Cibola Region also includes drop zones and small arms ranges in addition to ranges used for munitions testing. Due to the presence of operating ranges throughout YPG, the entirety of YPG is a potential source of MCOC. Munitions use included small, medium, and large caliber ammunition; mines; linked and unlinked ammunition; high explosive and ball munitions; pyrotechnics/obscurants; as well as the potential for aircraft-based weapons.

Though spent munitions are present within various firing ranges, off-range migration of MCOC is considered unlikely due the ephemeral surface waters; depth to groundwater (several hundred to over a thousand feet deep), a low annual precipitation (less than 4 inches), and an extremely high evapotranspiration rate (3.3-7.1 feet per year) (YPG 2015a). These factors limit surface water flow off-range and/or recharge into the underlying aquifer, which preclude groundwater from being affected by range activities. Past soil and water sampling as well as periodic revaluations pursuant to DODI 4715.11 including the 2015 revaluation of MCOC concluded insufficient evidence of MCOC migration off-range (YPG 2015a). Thus, no complete MCOC exposure pathways to potential human and ecological potential exist in the vicinity of YPG.

### 3.4.1.2 BMGR

Munitions delivered from training aircraft to air-to-ground ranges within BMGR are mostly inert warheads, with the exception of a small spotting charge which produces a puff of smoke to reference the location of a hit. In BMGR East, use of live warheads is strictly limited to five specific targets (one high explosive hill target in each TAC range and the existing air-to-ground missile targets in NTAC and East TAC).

For the same reasons cited above for YPG, MCOC assessments conducted pursuant to DODI 4715.11 at BMGR concluded insufficient evidence of MCOC migration off-range. Thus, no complete MCOC exposure pathways to potential human and ecological potential exist in the vicinity of BMGR.

### 3.4.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Increased and long-term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes.

#### 3.4.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern
end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Future test programs could conduct test firings into the proposed impact area, thereby increasing the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC). All existing air-to-ground target areas within BMGR West would continue to be used for on-going training programs; thereby increasing the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

At YPG and BMGR, transport, use, and disposal of hazardous materials associated with on-going operations would be managed in compliance with RCRA. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities.

3.4.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

Spent munitions and potential sources of MCOC would be increased at the new impact area. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. Hazardous materials at the gun position may include storage and use of petroleum, oils, and lubricants (POLs); adhesives; sealants; hydraulic fluids; brake fluid; antifreeze; and routine cleaning products. Use of vehicles and supporting equipment such as generators may result in spills or leaks of POLs. Leaks and spills of POLs would be minimized through implementation of best management practices such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area; or providing secondary containment for non-mobile containers larger than 55 gallons. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with applicable range rules. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in
approved sewage treatment facilities. Based on the above, the Alternative 1 (YPG Narrow SDZ) would not result in increased and long term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes. Impacts would be less than significant.

3.4.2.3 Alternative 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-stabilized projectiles would be fired approximately 70 km eastward along a singular line of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

In general, impacts would be similar to those characterized for the Alternative 1 (YPG Narrow SDZ). The use of inert warheads would result in decreased sources of MCOC associated with explosive elements of munitions at NTAC or STAC on BMGR East. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. On BMGR West, hazardous materials at the gun position on Ground Support Area 76 may include storage and use of POLs; adhesives; sealants; hydraulic fluids; brake fluid; antifreeze; and routine cleaning products. Use of vehicles and supporting equipment such as generators may result in spills or leaks of POLs. Leaks and spills of POLs would be minimized through implementation of best management practices such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area; or providing secondary containment for non-mobile containers larger than 55 gallons. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with applicable range rules on BMGR West. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities. Based on the above, the Alternative 1 (YPG Narrow SDZ) would not result in increased and long term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes. Impacts would be less than significant.

3.4.2.4 Alternative 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

In general, impacts would be similar to those characterized for the Alternative 2 (BMGR Wide SDZ). Impacts would be less than significant.
3.5 Land Use

3.5.1 Affected Environment

Land uses surrounding YPG and BMGR are primarily undeveloped open space and sparsely populated areas. Most of the land is owned by the federal government, primarily under the control of the Bureau of Land Management, Bureau of Reclamation, and the U.S. Fish and Wildlife Service. BLM-managed lands circumscribe YPG on the west, north, and east. Kofa NWR is located between Cibola Region and the Kofa Region east arm. The Gila River Valley is adjacent to the southern border of YPG and the northern border of BMGR. Private lands used for agriculture, lands managed by the Bureau of Land Management and Bureau of Reclamation, as well as lands managed by the state of Arizona are interspersed throughout the Gila River Valley. Residential, commercial, agricultural, industrial land uses are concentrated within the vicinity of the city of Yuma, west of both YPG and BMGR, at the confluence of the Colorado River and the Gila River. Cabeza Prieta NWR is located immediately adjacent to the south of BMGR. Also to the south of BMGR West within Mexico is El Pinacate y Gran Desierto de Altar Biosphere Reserve. The Tohono O’odham Nation is located to the southeast of the BMGR East. Most land use within tribal lands is typically associated with ranching and the grazing of livestock, and may include seasonal cattle camps. The Sonoran Desert National Monument is located along the northeast corner of BMGR East near East TAC.

3.5.1.1 YPG

YPG is primarily used for military testing and evaluation. Most land on YPG is reserved for firing ranges, munitions impact areas, mobility test courses, and drop zones. These activities typically require large open areas with safety and buffer zones. Test ranges are officially closed to civilian use, except for specifically designated public hunting areas. YPG is subdivided into three geographic and functional areas: Laguna Region, Cibola Region, and Kofa Region.

- **Laguna Region**: Within the Laguna Region are the cantonment, Yuma Test Center (YPG’s administrative and command facilities) as well as vehicle and aircraft testing facilities. The cantonment includes public works facilities, housing, and community support facilities. Aircraft testing facilities include the Castle Dome Heliport and Laguna Army Airfield. Vehicle testing includes facilities that provide courses and obstacles to evaluate vehicle endurance, performance, reliability, and maintainability.

- **Cibola Region**: The Cibola Region supports a variety of testing and training functions, including aircraft armament testing, static detonation, conflagration testing, combat skills training, instrument drop zones, and extraction zones. Thus, the majority of area is open space and designated as a training range. Development is primarily located within the Castle Dome Annex, airfields
supporting unmanned aircraft systems and helicopters, gun positions, vehicle courses and urban combat training facilities.

- **Kofa Region:** The Kofa Region is used primarily for direct and indirect firing of weapons and munitions, mainly artillery pieces. Thus, the majority of area is open space and designated as a training range. Most of the approximately 400 firing positions at YPG are concentrated along the Kofa Firing Front. Developed areas are located along the western edge along the Kofa Firing Front. The area to the east of the Kofa Firing Front is primarily used as munitions impact areas.

3.5.1.2 BMGR

BMGR is an approximately 1.7 million acre military aviation training facility. BMGR is used by the LAFB and MCASY to train military aircrews to fly air combat missions. To a lesser extent, the range is also used for other national defense purposes, most of which support are associated with air combat training. BMGR is subdivided into BMGR West and BMGR East. The Air Force generally confines its training activities BMGR East while the Marine Corps is the primary user of BMGR West.

- **BMGR West:** BMGR West has both aircraft tactical ranges, ground troop training areas as well as small arms ranges. The principal facilities supporting this diversity of training include: AUX-2 airfield complex; F-35B auxiliary Landing Field; Moving Sands and Cactus West air-to-ground target ranges; and more than 40 ground support areas. Ground support areas are locations where ground units responsible for air defense, radar surveillance, control of aircraft, and arming and refueling of helicopters can deploy to train as well as support aviation training.

Non-military uses on BMGR West is limited to areas east of the Copper Mountains. Recreational activities include geocaching, off-road vehicle usage, hunting camping, picnicking, hiking, sightseeing, and nature observation. Without exception, all BMGR recreation users are required to obtain an access permit for entry to the range.

- **BMGR East:** BMGR East has multiple ranges for aircrew training: Manned Ranges 1, 2, 3, and 4 (used to train pilots in precision air-to-ground delivery of practice, conventional ordnance, and special weapons); North, South, and East TAC ranges (designed to simulate targets of opportunity for air-to-ground firing); and the Air-to-Air Range within R-2301E (used for air combat training). In addition, there are two outlying auxiliary airfields that are periodically used for certain forward deployed training missions (Auxiliary Airfield 6 and Stoval Auxiliary Airfield); one Explosive Ordnance Disposal training range; one small arms range; and four support areas for maintaining sub-ranges and storing and processing spent ordnance and target debris (Range Munitions Consolidation Points).
Non-military uses on BMGR East are limited to areas east of State Route 85. Activities include off-road vehicle usage and hunting. Since this area is east of NTAC and STAC, it is beyond the geographic limits of the ERCA Project.

3.5.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Permanently conflicts with existing land use on YPG and BMGR or with adjacent, offsite land uses.

3.5.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC. Existing military operations on YPG and BMGR would continue in accordance with existing land uses.

3.5.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

Cibola Region supports a variety of testing and training functions including gun emplacements. Thus, use of an existing gun position would not conflict with existing land uses within Cibola Region. Likewise, Kofa Region is used primarily for direct and indirect firing of weapons and munitions, mainly artillery pieces. Currently, there are 11 impact areas within Kofa Region. Thus, establishment of a new 495-acre impact area would not conflict with existing land uses. Furthermore, most of the line of fire and the associated 6 km-wide SDZ is contained within the boundary of YPG with the exception of a short segment which will cross the airspace of the Kofa NWR near the Castle Dome Mountain. There would be periodic disruption of recreational activities within the area of Kofa NWR which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. However, use of the airspace would not result in permanent conflict with existing land use within Kofa NWR. Based on above, there would be no significant impacts to land use.
3.5.2.3 Alternative 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-
stabilized projectiles would be fired approximately 70 km eastward along a singular line
of fire towards existing targets in either NTAC or STAC. The projectiles would only
deliver inert warheads.

An approximately 1.5 acre temporary gun position would be established in a previously
disturbed area within Ground Support Area 76 on BMGR West. Since ground support
areas are multi-use training areas, establishment of temporary gun position would not
permanently conflict with existing land use.

On BMGR West, the line of fire and the associated 26 km-wide SDZ would cross areas
east of the Copper Mountains. This area is open to public recreational uses. There
would be periodic disruption of recreational activities within the area which overlaps with
the SDZ footprint since users would need to be temporarily excluded from the area.
Furthermore, temporary closures would likely occur on weekends when recreational use
would likely peak. State and federal agencies such as the US Border Patrol and the
Arizona Department of Game and Fish also use the land and airspace for ongoing
operations and training. Thus, agency operations during weekends would need to
temporarily cease and agency personnel would need to be temporarily excluded from
the area during the course of each test. Furthermore, the air space within the SDZ
would not be open to other uses during testing. Impacts to land uses on BMGR West
would be temporary since the actions proposed under ERCA would occur at a
maximum of three times per year.

Inert rounds would be fired into selected targets within NTAC or STAC on BMGR East.
Since both areas are designated for munitions use, test firings would not conflict with
the existing land use. Moreover, no other uses are authorized on the ranges due to the
danger posed by munitions. Furthermore, the entire line of fire and the associated 26
km-wide SDZ would be contained within the boundary of BMGR. Thus, there would be
no land use conflicts with areas outside of BMGR.

The proposed line of fire would traverse the air-to-air training range on BMGR East.
Thus, air-to-air training would need to be temporarily suspended during the course of
each test. In order to minimize disruptions to training operations at BMGR East, test
firings would likely be limited to weekends when air-to-air training is at a minimum or
such training is not scheduled. The number of rounds that would be fired may also be
limited. The testing regime on BMGR would not conflict with military land uses.
However, there would be temporary impacts to recreational and other non-military uses
of the land within BMGR. There would be no permanent conflicts with existing land use
on BMGR or with adjacent, offsite land uses. Impacts would be less than significant.
3.5.2.4 Alternative 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.

In general, impacts would be similar to those characterized for the Alternative 2 (BMGR Wide SDZ). However, the SDZ width would be reduced from 26 km to 6 km. As a result, the area subject to potential closure to non-military land use would be reduced. Impacts would be less than significant.

3.6 Noise

3.6.1 Affected Environment

Noise is defined as unwanted sound. The effects of noise on human receptors can range from annoyance to permanent hearing loss. Sound travels from a source in the form of wave, which exerts a pressure on a receptor, such as those found in the human ear. The pressure level associated by a sound wave is commonly measured in decibels (dB, which is used to equally weight all frequencies of sound. However, the human ear is not equally sensitive to sounds at all frequencies. Therefore, the dBA scale, which primarily weighs frequencies within the human range of hearing, is used to assess the impact of noise on human hearing.

Table 2: Range of Noises Levels and Human Receptor Response

<table>
<thead>
<tr>
<th>Noise level (dBA)</th>
<th>Examples</th>
<th>Human Receptor Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>recording studio</td>
<td>hearing threshold</td>
</tr>
<tr>
<td>20</td>
<td>rustling leaves</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>conversational speech</td>
<td>quiet</td>
</tr>
<tr>
<td>60</td>
<td>freeway at 50 feet</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>freight train at 100 feet</td>
<td>moderately loud</td>
</tr>
<tr>
<td>90</td>
<td>heavy truck at 50 feet</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>ambulance siren at 100 feet</td>
<td>very loud</td>
</tr>
<tr>
<td>120</td>
<td>jet engine at 200 feet</td>
<td>threshold of pain</td>
</tr>
</tbody>
</table>

Ambient noise on both YPG and BMGR includes natural sources such as wind and man-made noise. Nonmilitary noise sources include traffic on public roads, railways, construction, and commercial aircraft overflight. Military sources include aircraft operations andmunitions training; munitions and equipment testing; and other military training activities.
3.6.1.1 YPG

Transportation, aviation, and explosive detonations from weapon testing activities are the main noise sources on YPG especially within Kofa and Cibola Regions where most training and testing operations occur. Both regions are unpopulated and lack administrative facilities where human receptors reside. Human receptors in these areas are personnel involved in testing and training activities. All personnel involved in testing and training are required to wear hearing protection suited to the training or testing activity.

Under the Proposed Action, the ERCA Project would use an existing gun position on the southern edge of Cibola Range. A new 495-acre impact area would be established near the southeast corner of the Kofa Region adjacent to the Palomas Mountains. Land use involving human receptors within the vicinity of the existing gun position is the Martinez Lake area and Castle Dome Landing on the Colorado River, recreational areas located approximately five miles to the west. The proposed 495-acre impact area adjacent to BLM-managed lands and is not within the vicinity of populated land uses. The nearest land uses are agricultural areas located approximately nine miles to the south and six miles to the southeast.

To assess noise impacts from on-going training and testing operations to surrounding nonmilitary land uses, YPG utilizes noise contour maps (YPG 2015b, Appendix H). The maps delineate three noise zones based on long term, averaged noise levels and noise attenuation rates. Zone I areas exhibit acceptable noise levels (less than 62 dB) and are compatible with all land uses including those with sensitive receptors such as hospitals, houses of worship, and schools. Zone II areas exhibit moderate noise levels (62-70 dB) and Zone III areas exhibit unacceptable noise levels (greater than 72 dB). Both Zone II and Zone III areas are not compatible with noise sensitive land uses. Due to on-going training and testing operations, both Cibola and Kofa Regions contain Zone II and Zone III areas. All Zone II and Zone III areas are contained well within the bounds of the installation, with the exception of one small area located in a remote portion of the Kofa National Wildlife Refuge. Thus, areas outside of YPG are not subject to averaged noise levels greater than 62 dB associated with the use of large caliber munitions within Cibola and Kofa Regions.

3.6.1.2 BMGR

GSA 71 and 76 on BMGR West provide approved off-road locations to which Marine Corps ground units can deploy with vehicles and equipment to participate in air and/or ground training activities. These facilities are used occasionally throughout the year. The primary noise sources during periods of use are vehicles and portable equipment such as generators; otherwise, wind would be the primary source of ambient noise. Non-military lands to the north of GSA 71 are primarily agricultural lands interspersed with Bureau of Reclamation lands. Industrial, agricultural and a recreational vehicle camp grounds are present approximately two miles to the northwest of GSA 71 and six
miles to the northwest of GSA 76. Citrus City, a sparsely built out rural residential area is located approximately four miles north of GSA 71 and over seven miles north of GSA 76.

Both NTAC and STAC on BMGR East are air-to-ground training ranges. Thus, aircraft operations and explosive ordnance are the primary noise sources in these areas. Non-military lands to the north of NTAC are primarily unpopulated State Trust Lands or BLM-managed lands. Non-military lands to the south of STAC are lands within the Cabeza Prieta NWR. There are no permanent human receptors in these areas.

Noise contours based on long-term noise level averages indicate that the 60 dB level noise contour for NTAC is contained within the bounds of BMGR East. The 60 dB level noise contour for STAC extends approximately five miles into the Cabeza Prieta NWR.

3.6.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Results in a substantial change in the level and scope of the operational noise environment for human receptors in the vicinity of YPG and BMGR.

3.6.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the existing gun position at the southern terminus of Cibola Range would continue to be used for other test missions as needed. At BMGR West, there would be no noise impacts associated with the temporary gun positions. Neither would the ERCA Project fire at selected targets NTAC and STAC. Thus, there would be no noise impacts on within the vicinity of targets in NTAC and STAC. However, there would be continued noise disturbances within NTAC and STAC associated with on-going training operations.

3.6.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. At the gun position on Cibola Range there would be periodic increases in noise levels during test periods. There would be temporary increases in the immediate vicinity of the gun position associated with portable generators, mobile temperature conditioning chambers, and vehicles. Approximately 12 rounds could be fired over the course of each firing day. Pulse noise associated with self-propelled and towed howitzers at the gun position would range from 166 dB to 178 dB at approximately 25 feet from the gun (USA 2016). Within the immediate vicinity, technical personnel would be protected from

---

high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities. Sound levels would be attenuated for human receptors at further distances. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Thus, for off-post human receptors at the Martinez Lake area and Castle Dome Landing, located five miles away from the gun position, pulse noise associated with gun bursts would sound like distant, muffled thunder. Since an existing gun position would be used, there would be no changes to existing noise contours.

Once the munition is in flight, there would be no detectable noise for human receptors on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the line of fire.

Construction of earthen observation mounds within the new 495-acre impact area would result in use of earthmoving equipment such as graders, loaders or bulldozers, resulting in temporary increases in noise within the construction footprint. Typical construction equipment generates noise levels ranging from approximately 76 to 88 dBA at a distance of 50 feet from the source. Noise impacts would be temporary and would return to ambient levels upon completion of construction.

Noise from munition impacts at the new 495-acre impact area would vary depending on the type of munition and warhead used. In-coming rounds would make a "whoosh" sound before impact. The sound would not be nearly as loud as an aircraft and would be shorter induration. Inert warheads would result in a muted “thud” sound from metal striking the ground. High explosive warheads would result in high intensity pulse noise upon detonation. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the point of impact. Personnel outside the SDZ would be protected from high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities.

The impact area and the adjacent BLM-managed lands are located on the southern slopes of the Palomas Mountains. There are no developments with human receptors in the adjacent areas. The nearest land uses are agricultural areas located approximately nine miles to the south and six miles to the southeast. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. At these distances, pulse noise associated with high explosive munition detonations would sound like distant, muffled thunder. Last, since the proposed new impact area would be east of existing impact areas, the existing noise contour is expected to extend further eastward. Based on above, there would be no significant impacts to noise.
3.6.2.3 Alternative 2 (BMGR Wide SDZ)

A temporary gun position would be established within GSA 76 on BMGR West. At the
gun position there would be periodic increases in noise levels during test periods.
There would be temporary increases in the immediate vicinity of the gun position
associated with portable generators, mobile temperature conditioning chambers, and
vehicles. Approximately 12 rounds could be fired over the course of each firing day.
Pulse noise associated with self-propelled and towed howitzers at the gun position
would range from 166 dB to 178 dB. Within the immediate vicinity, technical personnel
would be protected from high noise levels through safety training, use of appropriate
hearing protection, and compliance with YPG standard operating procedures for testing
activities. Sound levels would be attenuated for human receptors at further distances.
Atmospheric attenuation of sound level is approximately 6 dB for every doubling of
distance from a noise source. Thus, for off-post human receptors located approximately
six to seven miles away from the gun position, pulse noise associated with gun bursts
would sound like distant, muffled thunder.

Once the munition is in flight, there would be no detectable noise for human receptors
on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the
SDZ would be approximately 26 km in width, the closest human receptor would be
located approximately 13 km away from the line of fire.

Tests conducted on BMGR would be limited to use of inert warheads. Thus, noise from
munition impacts at NTAC would be limited. In-coming rounds would make a "whoosh"
sound before impact. The sound would not be nearly as loud as an aircraft and would
be shorter in duration. Inert warheads would result in a muted “thud” sound from metal
striking the ground. Based on above, there would be no significant impacts to land use.

3.6.2.4 Alternative 3 (BMGR Narrow SDZ)

A temporary gun position would be established within GSA 71 on BMGR West. At the
gun position there would be periodic increases in noise levels during test periods.
There would be temporary increases in the immediate vicinity of the gun position
associated with portable generators, mobile temperature conditioning chambers, and
vehicles. Approximately 12 rounds could be fired over the course of each firing day.
Pulse noise associated with self-propelled and towed howitzers at the gun position
would range from 166 dB to 178 dB. Within the immediate vicinity, technical personnel
would be protected from high noise levels through safety training, use of appropriate
hearing protection, and compliance with YPG standard operating procedures for testing
activities. Sound levels would be attenuated for human receptors at further distances.
Atmospheric attenuation of sound level is approximately 6 dB for every doubling of
distance from a noise source. Thus, for off-post human receptors located approximately
two to four miles away from the gun position, pulse noise associated with gun bursts
would sound like distant, muffled thunder.
Once the munition is in flight, there would be no detectable noise for human receptors on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the line of fire.

Noise from munition impacts at NTAC and STAC would be similar to those characterized for Alternative 2.

3.7 Recreation

3.7.1 Affected Environment

General public access to YPG and BMGR are authorized in designated areas. There are no recreational facilities, programs, or other amenities for the general public on lands where public access is authorized. However, lands on BMGR do offer opportunities for hunting, camping, hiking, and wildlife viewing as well as opportunities to visit cultural sites, historical sites, or geographical features. Publically accessible lands on YPG are primarily used for hunting and hunting-associated activities such as camping.

3.7.1.1 YPG

Publically accessible lands on YPG are limited to western and northern areas of Cibola region where lands are contiguous with BLM-managed lands. Most lands from the center of Cibola Region extending eastward are restricted. Existing gun positions that could be used for the ERCA program are located within the restricted area. Public access on is not authorized on Kofa Region with the exception of the northern terminus of the Kofa East Arm where hunting is authorized. The proposed impact areas is located approximately 8 miles south of the hunting area.

The proposed line of fire and the associated 6 km-wide SDZ would cross the southeast corner of the Kofa NWR near the Castle Dome Mountains. Recreational opportunities are associated with wildlife such as wildlife watching and photography, hiking, camping, and limited hunting.

3.7.1.2 BMGR

Approximately 38 percent of the BMGR in total is open general public access (LAFB 2012). With the exception of lands west of the Gila Mountains and an area southwest of the Wellton Hills, most of the lands on BMGR West are open to the general public access including areas near GSA 71 and GSA 76 as well as those areas within the SDZ footprints. Multiple training ranges encompass the majority of lands on BMGR East. Thus, with the exception of lands between the Sauceda Mountains and State Route 85, there is no general public access to lands on BMGR East. NTAC and STAC, where targets for the ERCA program are located, are approximately 10 to 12 miles east of lands where the general public access is allowed.
The remaining areas on BMGR are restricted due to safety hazards presented by ongoing military training operations. Some special use recreation such as bighorn sheep hunting may be authorized when compatible with military operations. Areas where public access is authorized may be subject to temporary closures as specific training needs arise. Without exception, all BMGR recreation users are required to obtain an access permit for entry to the range.

3.7.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Results in a substantial and permanent disruption of recreational opportunities.

3.7.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC. Existing military operations on both YPG and BMGR may result in periodic disruptions to recreation activities.

3.7.2.2 Alternative 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

The gun position at Cibola Region is within a restricted area and the line of fire would not cross hunting areas. Thus, weapon firings would not disrupt hunting activities. The line of fire and the associated 6 km-wide SDZ is contained within the boundary of YPG with the exception of a short segment which will cross the airspace of the Kofa NWR near the south eastern portion of the Castle Dome Mountains. There would be periodic disruption of recreational activities within the area of Kofa NWR which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. Use of the new impact area on Kofa Region would not impact recreation since it is located approximately 8 miles south of hunting areas on the Kofa East Arm. Based on the above, most recreational activities on YPG would remain unaffected while recreational activities near the southeast corner of Kofa NWR near the Castle Dome Mountains would periodically be affected. Impacts would be less than significant.
3.7.2.3 Alternative 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-stabilized projectiles would be fired approximately 70 km eastward along a singular line of fire towards existing targets in either NTAC or STAC. The line of fire and the associated 26 km-wide SDZ would cross areas east of the Copper Mountains. This area is open to public recreational uses. There would be periodic disruption of recreational activities within the area which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. Furthermore, temporary closures would likely occur on weekends when recreational use would likely peak. However, disruptions would be limited since testing would occur at a maximum of three times per year.

Inert rounds would be fired into selected targets within NTAC or STAC on BMGR East. Since both ranges are designated for munitions use and there is no general public access to these areas, test firings would not conflict recreational land uses. Impacts would be less than significant.

3.7.2.4 Alternative 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC.

In general, impacts would be similar to those characterized for the Alternative 2 (BMGR Wide SDZ). However, the SDZ width would be reduced from 26 km to 6 km. Thus, the area within the SDZ footprint where recreational uses would be temporarily suspended would decrease. The frequency of closures would remain at a maximum of three times per year. Impacts would be less than significant.

3.8 Safety

3.8.1 Affected Environment

By their very nature, military operations and weapons testing on YPG and BMGR pose some level of hazard to both airspace and ground users. The primary ground-based hazard on both locations are unexploded ordnance. YPG, MCASY, and LAFB operate ranges for testing and training where the types of spent munitions include: artillery shells, mines, rockets, bombs, missiles, gunnery bullets. The number of spent munitions on the ranges is commensurate with the respective designated uses and intensity of military operations. As an example, 940,000 to 1,620,000 rounds, including small arms, are fired annually on YPG; the number of artillery rounds is approximately 25,000 rounds per year depending on the demand for testing. Furthermore, due to historical uses of both installations for military operations, unexploded ordnance can be present on lands outside of active ranges.
All three installations have numerous unpaved roads traversing their respective ranges. For example, there are approximately 622 miles of road within BMGR West alone. Thus, in addition to unexploded ordnance, other ground-based hazards include poor road conditions and military vehicle use. Furthermore, ancillary and support facilities on active ranges such as electronic warfare facilities; aircraft and missile control facilities; and ballistic tracking facilities entail additional hazards such as high energy electromagnetic waves from microwave transmitters and radars; and lasers. Hazards associated with use of military air space include mid-air collisions; collisions with manmade structures or terrain; weather-related accidents; mechanical failure; pilot error; or bird-aircraft collisions.

In general, YPG, MCASY and LAFB follow similar protocols to avoid and minimize safety hazards:

- Public access to lands managed by the installations is prohibited except in designated areas.
- Locked gates, fencing and warning signs serve to limit inadvertent entry by unauthorized military personnel or members of the public.
- Public access, where allowed, is controlled through a permitting system and range safety training is required prior to entry.
- Access to and movement within active ranges must be authorized by the respective range management offices on the installations. Range safety training is required for authorized personnel.
- All military operation on active ranges are coordinated through the respective range management offices on the installations.

In addition, each installation implements safety protocols specific to their missions. Regulations that specify and implement safety procedures for military operations at YPG are:

- Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000 (April, 2016) prescribes general range control procedures, instructions, and information necessary for safe conduct of all types of test operations, demonstrations, training, and ground and airspace utilization at Yuma Proving Ground.

- Yuma Proving Ground Regulation 385-1 (June, 2014) provides specific guidance for all safety programs at YPG and applies to all personnel working and living at YPG to include military, civilian, contractor, tenant personnel, and dependents.

- Army Regulation 385-63 (January, 2012) prescribes Army-wide range safety policies and responsibilities for firing ammunition, lasers, guided missiles, and rockets and provides guidance for the application of risk management in range operations.
Military operations on BMGR East are conducted in compliance with Air Force Instruction 13-212 and LAFB Instruction 13-212 which provides specific safety instructions for all operations on the range. Military operations on BMGR West are conducted in compliance with Marine Corps Order (MCO) 3570.1c Range Safety (January 2012) and STO 3710.6 Range and Training Areas Standard Operating Procedures (January, 2013).

Military activities such as the use of explosive ordnance, equipment operation and maintenance can be a wildfire risk. In this region of the Sonoran Desert, wildfires are typically small in size due to the low density of vegetation. However, during wet years, there is an increase in vegetation that can carry wildfire. Most fires on YPG and BMGR are very small and isolated due to the sparse nature of fuels in this region.

From 2003 to present, there were an estimated 26 fire events that burned a total of 3,170 acres on YPG. Of that total, 3,000 acres was from one event, the King Valley Fire in September 2005. The King Valley Fire, ignited due to munitions impact, is the only major documented fire originating on YPG in over 70 years of military testing and training activities. The King Valley Fire was carried by dry annual plants left from the wet winter, in particular, dried Indian wheat (*Plantago insularis*) and Mediterranean grass (*Schismus barbatus*), along with other species. Cured herbaceous vegetation carried the fire over the terraces between the ephemeral washes and also along the washes where it provided ladder fuels to the denser woody vegetation. Although this type of fire is very rare, YPG has adopted more effective communication protocols in responding to fires in effort to reduce the spread of such wildfires.

### 3.8.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial increases in health and safety risks for public and military personnel

#### 3.8.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC).
All existing safety protocols and regulations would continue to be implemented for on-going military operations and public uses on both YPG and BMGR. There would be no substantial increases in health and safety risks for public and military personnel.

3.8.2.2 Alternative 1 (YPG Narrow SDZ)

- **Gun Position**: Weapon malfunction could result in release of kinetic energy or fragments that would pose a hazard in the vicinity of the gun position. Thus, all ancillary equipment requiring technicians such as instrumentation vans and other support vehicles would be located behind blast shields. Furthermore, ammunition conditioning chambers would be located 500 m away from the gun position to avoid secondary ignition of munitions. Furthermore, a 500 m surface danger zone around the firing point is restricted. Roadblocks would be emplaced at all roadway and entry points to the gun position ensuring the safety of non-military personnel would not be compromised. Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000 Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

- **New Impact Area**: Though the proposed impact area is new, potential for presence of unexploded ordnance within the proposed area remains a possibility due to historical uses of YPG for testing and training.

  During tests, kinetic energy or fragments from high explosive warheads may be present within the SDZ. However, there would be no personnel inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest personnel would be located approximately 3 km away from the line of fire or the point of impact. Observation berms located outside of the SDZ would be used.

  All tests would be scheduled in advance with the range office at YPG to ensure that tests do not coincide with other military operations within the same area. Furthermore, observers and technicians within the impact area would be located outside the SDZ otherwise under adequate protective cover. Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented during construction and operational phases of the proposed impact area. As an active impact area, the area would be restricted to the public. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

Once established, use of the new impact area would increase the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and
environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

Establishment of the new impact area could increase the frequency of non-lightning ignited wildfires. Vegetation clearing and land disturbance associated with construction of targets may create conditions favorable to establishment of exotic invasive vegetation which would create increased fuel loads and increase the risk of wildfire. Furthermore, live-fire and vehicle use would increase the number of ignition sources. Due to the presence of unexploded ordnance, wildfires are typically not suppressed and are allowed to burn out to minimize risks to firefighting personnel. However, the vegetation within the impact area is not sufficiently dense and is unlikely to promote or propagate wildfires. Furthermore, the proposed impact area is not adjacent or within the vicinity of the general population and is buffered by public lands managed by the Bureau of Land Management. Thus, potential hazards to the general public and military personnel would be minimal.

- **Surface Danger Zone:** The proposed line of fire and the associated 6 km-wide SDZ would cross manned facilities within YPG, Highway 95, and Kofa NWR. The SDZ size and shape is designed/established to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. During times of active testing, any manned facility and Highway 95 would require evacuation or closure. Also advanced coordination will be required with USFWS to address protocol or mitigations required for any portion of the Kofa NWR inside the SDZ for the duration of the test periods. Furthermore, scheduling would be limited to low traffic periods and avoid high visitation periods for the refuge. Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant. In the event that the munition veers off course, the test team will use tracking radar data to determine impact location. The decision to recover the munition will depend on terrain, physical accessibility, technical requirement for failure analysis and the proper approvals if it lands in a jurisdiction other than YPG.

### 3.8.2.3 Alternative 2 (BMGR Wide SDZ)

- **Gun Position:** Gun position safety protocols discussed under Alternative 1 would be implemented. As a result, impacts to safety would be similar to those characterized for Alternative 1. In addition, safety protocols pursuant to STaO 3710.6 Range and Training Areas Standard Operating Procedures (January, 2013) would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.
• **NTAC and STAC:** The proposed action would fire munitions with inert warheads into existing targets on BMGR East. In contrast to the testing regime at YPG, observation mounds would not be constructed within NTAC or STAC. Because NTAC and STAC are active air-to-ground training ranges, there is no public access. Likewise, access for personnel is restricted during flying hours and ground based observers cannot be utilized during flight mission days. Instead, a survey party would travel to the target array to assess accuracy and precision of fire at the conclusion of the firing, escorted by appropriate Air Force personnel. All tests would be scheduled in advance with LAFB’s Range Management Office and the air space above North and STAC would be active and scheduled for the duration of each test. Furthermore, applicable portions of LAFB Instruction 13-212 would be implemented during testing. Utilization of these measures would ensure that there would be no substantial increases in health and safety risks for public and military personnel. Use of inert projectiles greatly reduces the risk of ignition of wildfire at the target area. Impacts would be less than significant.

• **Surface Danger Zone:** On BMGR West, the line of fire and the associated 26 km-wide SDZ would cross areas east of the Copper Mountains. This area is open to public recreational uses. State and federal agencies such as the US Border Patrol and the Arizona Department of Game and Fish also use the land and airspace for ongoing operations and training. The SDZ size and shape is designed/established to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. Debris strikes as well as kinetic energy associated with impacts pose hazards for military and non-military personnel within the SDZ. Thus, both military and non-military uses in this area would be temporarily suspended for the duration of each test. The proposed line of fire would also traverse an air-to-air training range on BMGR East. Thus, air-to-air training would be temporarily suspended during the course of each test in order to avoid midair strikes. Both ground-based military and non-military uses in this area within the air-to-air range would be temporarily suspended. The use of manned roadblocks, on all major roads traversing the SDZ will be implemented to prevent personnel from entering the SDZ during active test times. In order to maximize safety at BMGR East, test firings would likely be limited to weekends when air-to-air training is at a minimum or such training is not scheduled. With implementation of these measures, potential for hazards would be avoided or minimized. Impacts would be less than significant. In order to address the possibility of U.S. Border Patrol pursuit leading into the SDZ during active firing times, YPG will assign an operational liaison that can be reached by USBP if a cease-fire is required. In the event that the munition veers off course, the test team will use tracking radar data to determine impact location. The decision to recover the munition will depend on terrain, physical accessibility, technical requirement for failure analysis and any other protocol directed by BMGR West or East.
3.8.2.4 Alternative 2 (BMGR Narrow SDZ)

Impacts to safety would be similar to those characterized for Alternative 2 (BMGR Wide SDZ). However, the smaller, 6 km-wide SDZ associated with a spin-stabilized projectile would further decrease potential impacts to safety when compared to the 26 km-wide SDZ associated with Alternative 2 (BMGR Wide SDZ). With implementation of safety measures from Alternative 2 (BMGR Wide SDZ), there would be no substantial increases in health and safety risks for public and military personnel. Use of inert projectiles greatly reduces the risk of ignition of wildfire at the target area. Impacts would be less than significant.

3.8.3 Avoidance, Minimization, and Mitigation Measures

YPG

Sfty-1: Coordinate with Kofa NWR prior to test firings and determine mitigations required to address the potential for personnel to be within the SDZ for the duration of each test.

Sfty-2: Schedule test firing to coincide with periods of low traffic on Highway 95 and low visitation periods on Kofa NWR to the extent practicable.

Sfty-3: Implement safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 for all ERCA activities.

Sfty-4: Coordinate all scheduled tests with respective range management office at YPG.

Sfty-5: Coordinate with Arizona Department of Transportation for temporary closure of Highway 95 during times of active testing.

BMGR

Sfty-6: Limit test firings to days when air-to-air training is at a minimum or such training is not scheduled.

Sfty-7: Temporarily suspend air-to-air or air-to-ground training during test firings within affected military airspace.

Sfty-8: Coordinate all scheduled tests with respective range management office at LAFB and MCASY.

Sfty-9: Implement manned roadblocks on all roads traversing the SDZ during active firing times.
Sfty-10 Assign an operations liaison between YPG test officer and U.S. Border Patrol (USBP) for cease fire in the event active USBP pursuit requires entry into SDZ.

Sfty-11: In the event of wildland fire, implement BMGR response protocols.

Sfty-12: Implement safety protocols pursuant to LAFB Operation Instruction 13-212 for all ERCA activities.

3.9 Soils

3.9.1 Affected Environment

3.9.1.1 Topography

YPG and BMGR are located in the Basin and Range Physiographic Province of Arizona, which is distinguished by broad alluvial valleys separated by steep, discontinuous, northwest to southeast trending mountain ranges.

The Colorado River and the Gila River are in the vicinity of both YPG and BMGR. Their confluence is located in the city of Yuma, just east of Interstate 8. The Colorado River is located west of the installations, flowing north to south while the Gila River and the associated river valley bisects both areas. YPG is located immediately to the north while BMGR is located immediately to the south.

Within the Kofa Region of YPG, the Castle Dome Plain and King Valley are the dominant landscape features. The Castle Dome Plains are composed of broad slopes that radiate outward from the Castle Dome Mountains, an irregular aggregate of mountains centered in the Kofa Refuge. The slopes terminate at the northern face of the Muggins Mountains. Feeder washes on the slopes drain into large collector washes that circumscribe the northern face of the Muggins Mountains. The collector washes convey storm flows into the Gila River. King Valley is formed by adjoining slopes from Castle Dome Mountains and the Palomas Mountains. The east arm of Kofa Region encompasses the Tank Mountains and the Palomas Mountains and their associated slopes. The proposed impact area is located on the southern slopes of Palomas Mountains.

Narrow mountain ranges and broad, low-gradient alluvial valleys characterize the topography of BMGR. Gila Mountains, Tinijas Mountains, Mohawk Mountains are located at BMGR West along with Mohawk Valley. San Cristobal Valley, Aguila Mountains, Crater Range, and Sauceda Mountains are located within BMGR East.

3.9.1.2 Soils

Soil depths range from very deep in alluvial basins to very shallow in the mountain regions where bedrock is often exposed. Within washes, the streambed alluvium ranges from 10 feet thick in the smaller washes to as much as 110-feet thick in the Gila River.
Soil characteristics range from extremely gravelly sand, to very fine, sandy loam. Gravelly loam dominate in areas with steep mountains ranges and slopes. Sand and loamy sand tend to dominate the broad alluvial valleys and low gradient slopes.

Within YPG, the dominant soil is gravelly loam due to the large footprint occupied by the Muggins Mountains, Castle Dome Mountains, and the Laguna Mountains, as well as their associated slopes. In contrast, mountains within BMGR are narrower and the alluvial valleys are broader. Thus, soils within BMGR range from sand at BMGR West to sandy loam at BMGR East (UA 2010).

3.9.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial increase in wind or water erosion of soils, either on or off the site

3.9.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR.

At YPG, the existing gun position at the southern terminus of Cibola Range would continue to be used for other test missions as needed. Minimal surface disturbances are anticipated. The proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. Thus, there would be no munitions-related surface disturbances in the impact area. Munitions-related surface disturbances associated with use of existing impact areas within Kofa Region are expected to continue.

At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets NTAC and STAC. However, there would be continued munitions-related surface disturbances within NTAC and STAC associated with on-going training operations.

3.9.2.2 Alternative 1 (YPG Narrow SDZ)

Long-range test firings would be conducted from an existing gun position on the southern edge of Cibola Range. The line of fire would be directed eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The gun position would be established on an existing site on previously disturbed soils. Ground disturbing activities such as grading would not be required at the gun position.

Construction of the earthen observation mounds would result in disturbance of surface soils around the perimeter of the observation mound. Construction would mix soil layers and disturb consolidated soils. The disturbed area would be subject to wind and water erosion. However, the erosional and sediment transport processes associated with
surface flows during periods of rain would restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Construction may result in disturbance of surface area greater than one acre and thus may be subject to AZDEQ Construction General Permit requirements. Implementation of Soils-1 would minimize wind and water erosion around the disturbed area during construction.

Ordnance impacts within the impact area would result in varying levels of surface impacts such as craters throughout the impact area. Levels of surface disturbance would be commensurate with the types and sizes of munitions tested. For example, explosive rounds would result in craters that are wider and deeper than inert rounds. Surface disturbances would result in mixing of soil layers at the area of impact. For example, desert pavement would mix with the alluvial soils underneath. Disturbance of soils consolidated over time via geologic processes would result in localized erosion from wind and rain. However, the erosional and sediment transport processes associated with surface flows during periods of rain would partially fill in craters and restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Thus, impacts would be localized. Wind and slow erosion would decrease over time as the same processes work to consolidate loose soils. There would be no substantial increase in wind or water erosion of soils, either on or off the site. Impacts would be less than significant.

3.9.2.3 Alternative 2 (BMGR Wide SDZ)

A temporary gun position would be established within GSA 76 close to existing roads and previously disturbed areas. Vehicles and supporting equipment would be staged at the gun position. The disturbed area would be subject to wind and water erosion. However, the erosional and sediment transport processes associated with surface flows during periods of rain would restore surface disturbances over time. Water infiltration would also cause loose soils to settle and consolidate.

Inert ordnance impacts would result in varying levels of surface impacts such as craters within the vicinity of the target, ranging from 36 inches to 54 inches in diameter. However, the areas within the vicinity of existing targets are disturbed. LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target.

Disturbance of soils consolidated over time via geologic processes would result in localized erosion from wind and rain. However, the erosional and sediment transport processes associated with surface flows during periods of rain would partially fill in craters and restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Thus, impacts would be localized. Wind and slow erosion would decrease over time as the same processes work to consolidate loose soils. There would be no substantial increase in wind or water erosion of soils, either on or off the site. Impacts would be less than significant.
3.9.2.4 Alternative 3 (BMGR Narrow SDZ)

Impacts would be similar to those characterized for the Alternative 2 (BMGR Wide SDZ).

3.9.3 Avoidance, Minimization, and Mitigation Measures

Soils-1 Minimize surface disturbance, minimize off-road travel, avoid vegetation.

3.10 Water Quality

3.10.1 Affected Environment

3.10.1.1 Surface Water

YPG and BMGR are located within a highly arid environment within southwest Arizona. Average rainfall for the area is generally less than 5 inches. Evaporation rates, ranging from 72 to 107 inches exceed precipitation rates. Most of the annual rainfall occurs in mid-winter and in the late summer, often as intense rainfall. Soils in the area are permeable alluvium consisting of gravelly or cobbly sand, to very fine, sandy loam located in deep alluvial basins (YPG 2010). The combination of low precipitation, high evaporation, and permeable soils effectively counter surface water build-up. Thus, there are no perennial, intermittent streams, or wetlands present within the area. Surface waters are ephemeral and flow only immediate response to sizable rainfall events.

The Colorado River and the Gila River are in the vicinity of both YPG and BMGR. Their confluence is located in the city of Yuma, just east of Interstate 8. The perennial Colorado River is located west of the installations, flowing north to south. The Gila is an ephemeral river and flows to the southwest. The riverbed is dry except for local ponds and discharge from agricultural drainage. Rainfall and water releases from Painted Rock Dam cause occasional flows in the river. The Gila River bisects YPG and BMGR. YPG is located immediately to the north while BMGR is located immediately to the south. Thus, surface waters on the BMGR flow northward to the Gila River. Surface waters within the Kofa Region of YPG flow south toward the lower Gila River while those within the Cibola Region and Laguna Region flow west toward the Colorado River. A matrix of braided washes cover the landscape throughout both ranges, draining water and concentrating flows into a number of large washes.

Major washes on BMGR East traversing through NTAC and STAC include Ten Mile Wash, Growler Wash, and Daniels Arroyo (LAFB 2010, p. 3-10). At YPG, major washes on in the Cibola and Laguna Region include Mohave Wash, Trigo Wash, McAllister Wash, Indian Wash, and Los Angeles Wash (YPG 2013); major washes in the Kofa Region include Yaqui Wash, Gravel Wash, Big Eye Wash, Fuzzy Belly Wash, Winston Wash, Cedric Wash, and Rutherford Wash.
• **Jurisdictional Waters of the United States**: The Colorado River and Gila Rivers are waters of the U.S. and are subject to the Clean Water Act. Major washes and their tributaries that are hydrologically connected to these rivers and present sufficient evidence of ordinary high water mark (i.e., physical evidence of surface flows such as incised banks, sediment transport, etc.) are likely waters of the U.S. General discharges in regulated waterways may be subject to Sections 401 and 404 of the Clean Water Act; discharges of fill are subject to Section 404 of the Clean Water Act.

• **Water Quality**: The matrix of braided washes as well as the major washes are highly erosive due to the sandy alluvium. Thus, during the infrequent heavy rainfall events, the braided drainages carry highly turbid waters into the main wash beds.

Surface flows across training ranges could transport MCOCs off range into the lower Gila River. MCOCs are munitions constituents that have the potential to migrate from a source area to a receptor (human or ecological) in sufficient quantity to cause an unacceptable risk to human health or the environment (Department of Defense Instruction 4715.14, 30 November 2005). However, studies of MCOCs on ranges at YPG and BMGR have concluded that concentrations were below detectable levels and that surface water does not represent a viable pathway for migration of MCOC off of the range complex (LAFB 2010, p. 3-116; YPG 2010, p.17).

Water in the lower Gila River is unsuitable for most uses including irrigation and human consumption due to the presence of pesticides, metals, inorganics, and nutrients (ADWR 2015). Pesticide contamination in the Gila River is some of the most significant in the western United States (ADWR 2015). The use of DDT was prevalent in the lower Gila River Valley from 1945 to 1969. The pesticide toxaphene was also used in the valley in the mid-1960s. Most domestic use of toxaphene and DDT was on cotton crops. Before the suspension of both products, toxaphene-DDT mixtures were frequently used to control insect pests.

The total farmland irrigated by DDT- and toxaphene-contaminated drain water exceeded 100,400 acres. Agricultural drain water canals have transported an estimated 4,917 tons of DDT to the river (ADHS 2015). Multiple studies conducted over the previous four decades indicate substantial bioaccumulation of DDT, DDT-derivatives, toxaphene, and metals in tissues of birds and fish. Currently, the lower Gila River from Coyote Wash to Fortuna Wash is designated as an impaired water pursuant to Section 303(d) of the Clean Water Act due to the presence of selenium and boron, byproducts of agricultural operations in the river valley.

**3.10.1.2 Ground Water**

YPG and BMGR are located within the western half of the Lower Gila groundwater basin. Sources of recharge in the basin in decreasing order of volume are: Infiltration of
irrigation water; surface and subsurface flows from washes during rain events; and periodic large flood flows from the Gila River. Use of Colorado River water for irrigation in the river valley dominates the recharge rate. Recharge from rainfall is small because of the arid climate and high evaporation rates. Inconsistent flow in the Gila River causes recharge from the river usually to be negligible.

Depth of alluvium within washes range from 10 feet thick in the smaller washes to as much as 110-feet thick in the Gila River floodplain (ADWR 2015). Depth to groundwater on the BMGR, ranges from about 50 feet below ground surface along major wash tributaries near the Gila River to nearly 600 feet below ground surface near mountain ranges (LAFB 2010). On YPG, depths to groundwater range from 30 feet to more than 1,000 feet (in north Cibola Region).

Groundwater in the Lower Gila basin has high concentrations of dissolved solids and is generally unsuitable for most uses including irrigation and human consumption. Recycling of irrigation water in the floodplain gradually increased the salinity of the local groundwater and rendered it unsuitable for irrigation and domestic use by the late 1940's.

Sources of discharge in decreasing order of volume are evapotranspiration from crops and ground water pumping. Ground water is pumped to relieve excess recharge stemming from agricultural irrigation. Excessive recharge from irrigation can have adverse impacts on groundwater quality because the recharge water may contain leached nutrients or other agrichemicals.

3.10.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial long term impairment of surface and ground water quality

3.10.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Use of equipment such as generators and instrumentation vehicles at the gun position may periodically result in fuel and oil leaks. Due to the infrequency of surface flows sufficient enough to convey to flows into nearby rivers as well as the depth of alluvial fill in the washes, oil and fuel leaks would entail negligible impacts to surface water quality.

Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Presence of spent munitions within other impacts areas would not degrade surface water quality. As noted above, surface water
does not represent a viable pathway for migration of MCOC off of the range complex. Other ERCA activities would not require the use of ground water or discharge of water that would infiltrate into the ground water basin.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC).

3.10.2.2 Alternative 1 (YPG Narrow SDZ)

Under Alternative 1, long-range test firings would be conducted from an existing gun position on the southern edge of Cibola Range. Firings would be directed eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

Placement of equipment such as generators and instrumentation vehicles would be required for the duration of long-range firing tests at the gun position and the observation mound. Vehicular maintenance is not anticipated. However, vehicle and equipment fueling may be required due to the remoteness of the site. Furthermore, generators and instrumentation vehicles may periodically leak fuel and oil. Due to the infrequency of surface flows sufficient enough to convey pollutants into nearby rivers as well as the depth of alluvial fill in the washes, the potential for conveyance of oils and fuels off range would be minimal. With implementation of WQ-1 and WQ-2, potential impacts to surface water quality would be avoided or further minimized.

Presence of spent munitions within the impact area would not degrade surface water quality. As noted above, surface water does not represent a viable pathway for migration of MCOC off of the range complex.

The approximately 27 meter by 100 meter (0.7 acre) earthen observation mound may contribute to turbidity during surface flows. Runoff from the observation berm could carry fine silts and sands integrated with the sand and gravel material into nearby washes. Impacts would be localized since sand and cobbles tend to settle out of the water column quickly. Furthermore, the washes are highly erosive due to the sandy alluvium and typically carry turbid waters into the main wash beds. Thus, fine sand and silts from the observation mound would result in negligible impacts to turbidity.

ERCA activities would not require the use of ground water or discharge of water that would infiltrate into the ground water basin.

Potential Discharges of Fill in waters of the U.S.

Use of an existing gun position would not require earthmoving activities that would result in discharges of fill. Construction of observation berms may result in discharges of fill within small washes. Artillery rounds landing within washes would change the cross sectional contour of the affected wash, an activity deemed to be a discharge of fill. However, impacts would be temporary since sediment loads from surface flows would
reestablish smooth contours associated with surface flows. If the affected washes are deemed to be waters of the U.S., then the discharges would be subject to Section 401 and Section 404 of the Clean Water Act. Implementation of WQ-3 would ensure compliance with the Clean Water Act.

Based on the above, there would be no impacts to ground water. Impacts to surface water quality would be negligible or avoided with implementation of minimization and avoidance measures as appropriate.

3.10.2.3 Alternative 2 (BMGR Wide SDZ)

In general, impacts would be similar to those characterized for Alternative 1 (YPG Narrow SDZ). Under Alternative 2, an observation mound would not be constructed. Thus, potential discharges of fill into waters of the U.S. associated with construction would be avoided.

3.10.2.4 Alternative 3 (BMGR Narrow SDZ)

In general, impacts would be similar to those characterized for Alternative 1 (YPG Narrow SDZ). Under Alternative 3, an observation mound would not be constructed. Thus, potential discharges of fill into waters of the U.S. associated with construction would be avoided.

3.10.3 Avoidance, Minimization, and Mitigation Measures

WQ-1: Place drip pans under leaking vehicles and generators.

WQ-2: Provide secondary containment for non-mobile containers larger than 55 gallons.

WQ-3: Obtain Section 401 and Section 404 permits as needed and implement terms and conditions therein.

WQ-4: Obtain an Arizona Pollutant Discharge Elimination Construction General Permit as needed (only if disturbance exceeds 1 acres) and implement applicable terms and conditions including preparation of a Storm Water Pollution Prevention Plan as well as implementation of best management practices therein.

4.0 Cumulative Impacts

The ERCA Project would conduct tests on YPG and BMGR across three jurisdictions: MCASY, LAFB, and YPG. The scope of analysis for cumulative impacts encompasses all three installations as well as adjacent lands.

Most land uses surrounding YPG and BMGR are primarily undeveloped open space and sparsely populated areas. Most of the land is owned by the federal government,
primarily under the control of the BLM, BOR, and USFWS. BLM-managed lands circumscribe YPG on the west, north, and east. Kofa NWR is located between Cibola Region and the Kofa Region east arm. The Gila River Valley separates YPG from BMGR. Private lands used for agriculture, BLM and BOR-managed lands, and State Trust Lands are interspersed throughout the Gila River Valley. Residential, commercial, agricultural, industrial land uses are concentrated within the vicinity of the city of Yuma, west of both YPG and BMGR, at the confluence of the Colorado River and the Gila River. Cabeza Prieta NWR is located immediately adjacent to the south of BMGR. The Tohono O’odham Nation is located to the southeast of the BMGR East. Most land use within tribal lands is typically associated with ranching and the grazing of livestock, and may include seasonal cattle camps. The Sonoran Desert National Monument is located along the northeast corner of BMGR East near East TAC.

Most non-Federal lands through the Gila River Valley corridor and Yuma Valley are used for agriculture since agriculture is central to the economy of Yuma County. The county ranks in the top 1 percent in sales of all crop and livestock products combined among U.S. counties (YCAWC 2015). Furthermore, it ranks in the 0.1 percent and 0.2 percent for vegetable acreage and lettuce acreage, respectively (YCAWC 2015). Thus, the extent of agricultural land use is expected to remain largely unchanged. Incremental increases in acreage used for agriculture is expected in the foreseeable future. For example, from 2007 to 2012, the acreage of land used for agriculture increased from 210,480 acres to 214,675 acres (USDA 2015).

Due to the contribution of agriculture and military installations to the local and regional economy, the general area within the vicinity of YPG and BMGR, including the city of Yuma, has increased in population. The general population of the city of Yuma, where 48% of the county population resides, increased from 77,515 in the year 2000 to 93,064 in the year 2010 (COY 2012). The population is expected to increase to somewhere between 164,142 and 276,000 by the year 2055 (COY 2012). As a result, continued development in the areas of housing, transportation, and utilities are expected in the foreseeable future through the Gila River Valley corridor and Yuma Valley. For example, approximately 100,000 acres of fallow Paloma Ranch agricultural land west of Gila Bend is planned for future development of either residential or light and heavy industrial uses.

On BLM-managed lands, existing grazing practices and mineral developments are expected to continue. In addition, increased recreational uses associated with increases in the general population; border control operations; and development of solar energy projects such as the Quartzsite Solar Energy project and transmissions lines are expected in the foreseeable future (BLM 2008).

On lands under the jurisdiction of YPG, LAFB, and MCASY, support areas (cantonment areas, airfields, support facilities, etc.) and associated infrastructure would likely be redeveloped or repurposed in accordance with evolving training and testing needs. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. Operation areas such as impact areas on YPG as well as tactical
ranges on BMGR would continue to be subject to testing and training uses. As in the case of the new impact area at YPG, incremental increases in operational areas are likely in the foreseeable future. However, disturbances within these areas are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010).

Lands under the jurisdiction of all three installations are subject to authorized and unauthorized non-military uses. For example, energy transmission corridors traverse YPG and BMGR. Maintenance, upgrades, and establishment of new energy transmission lines are likely in the foreseeable future. The southern border of BMGR is part of the international border between the US and Mexico. Thus, unauthorized cross-border traffic and Border Patrol training and interdiction operations are likely to continue on the BMGR.

4.1 Air Quality

Yuma County is in attainment for all criteria pollutants with the exception of PM$_{10}$. Portions of Yuma County were designated a moderate nonattainment area for the 24-hour standard of PM$_{10}$. Mobile emission sources, such as vehicular and agricultural equipment emissions, and blowing dust are the primary contributors to PM$_{10}$ emissions in this region. The Yuma PM$_{10}$ nonattainment area is located in the southwestern potion of Yuma County comprising about 300,000 acres. The nonattainment area encompass primarily agricultural areas near the city of Yuma, west of the proposed action area.

Military training and testing activities as well as continued development of the surrounding area as summarized above would result in continued emissions of criteria pollutants from stationary and mobile sources including PM$_{10}$. However, due to the larger regional trends in increased agriculture and development which represent the major contributors to PM$_{10}$ within the cumulative impact assessment area, contribution from military training and testing activities to cumulative impacts would be minor. Thus, with the exception of PM$_{10}$, the region would likely continue to be in attainment for all NAAQS. Cumulatively, an increase in the ambient levels of PM$_{10}$ over the long term is expected.

4.2 Biological Resources

4.2.1 General Fauna and Flora

Due to use restrictions on federally-managed lands including YPG and BMGR, these lands would continue to harbor a representative cross section of indigenous Sonoran Desert natural communities and biodiversity. Furthermore, in conjunction with other large masses of protected lands such as BLM-managed lands and the Kofa NWR circumscribing YPG, Sonoran Desert and Organ Pipe Cactus National Monuments, Cabeza Prieta NWR, and El Pinacate Biosphere Reserve, the ecology of YPG and BMGR is expected to retain much of the natural process and function only attainable across large protected landscapes.
However, regional trends discussed above may have long-term ramifications to species and habitats on YPG and the BMGR as continued expansion of industrial, residential, and agricultural development along the Interstate 8 corridor encroach on the borders of YPG and BMGR. Restrictions on wildlife movement patterns intensify as roads, canals, railroads, border barriers, fencing, and patrols further limit intra-species contact in a regional context. Other edge effects at the interface of development and protected lands may include an increase baseline noise levels, increased predation, and increase potential for dispersal of non-native species onto YPG and BMGR.

The ongoing military training and testing activities on YPG and BMGR would entail continuation disturbances within the landscape. On BMGR, non-military activities such as unauthorized cross-border traffic and Border Patrol training and interdiction operations would contribute to on-going disturbances. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. However, disturbances within these areas are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010). Furthermore, all three installations would continue to implement their respective integrated natural resources management to minimize impacts to native Sonoran Desert flora and fauna. The ERCA Project would utilize existing operational areas on BMGR, limiting impacts to previously disturbed areas. On YPG a new impact area would be established. However, given the small size of the disturbed area relative to the larger vegetated landscape in the Kofa Region, cumulative impacts to flora and fauna would be minimal.

4.2.2 Threatened and Endangered Species

The current range of the pronghorn is mostly located on military lands or public lands managed by federal agencies such as the BLM, USFWS, or BOR. The geographical distribution is due to the loss of the habitats adjacent to and within the former Gila River riparian corridor is one of the most critical affecting its continued survival. The availability of these habitats have been irreversibly lost to this species as a result of the development of the railroad and interstate highway that block its north-south movements, conversion of river corridor habitats to agriculture and other economic uses, and dewatering of the river itself. As a result of these and other additive impacts, range of the pronghorn would mostly be limited to public lands managed by federal agencies in the foreseeable future.

Relatively small parcels of private and State lands occur within the currently occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to Tacna. State inholdings in the BMGR were acquired by the USAF. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres, on lands outside the BMGR, have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and the effects of these activities are expected to
continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. Thus, most activities that could potentially affect pronghorn are Federal activities. On YPG, the Sonoran pronghorn population on Kofa Region is part of a Nonessential Experimental Population established under Section 10(j) ESA. Thus, they are treated as a proposed species for the purpose of Section 7 consultation. Furthermore, Federal activities on BMGR would not result in cumulative impacts to the pronghorn since they are subject to Section 7 consultation and the terms and conditions of issued BOs. Likewise, the ERCA Project would be located on the pronghorn’s current range on BMGR and would be subject to Section 7 consultation. However, with the implementation of the terms and conditions of the program specific BO as well as avoidance and minimization measures contained therein, the proposed activities on BMGR would not result in cumulative impacts.

Of most significant concern to pronghorn is the high level of border related activity in the action area resulting from illegal border crossing and interdiction efforts. Border activity has resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires, and increased chance of wildfire. Habitat degradation and disturbance of pronghorn have resulted from these activities. Though border activity levels are still high, the trend in overall border apprehensions and drive-throughs has declined in recent years within the action area likely due to increased law enforcement presence, the border fence, and the status of the economy in the U.S. Despite high levels of border activity and law enforcement response throughout the action area, pronghorn in the U.S. have managed to increase since 2002, although their use of areas subject to high levels of border use and law enforcement appear to have declined. We expect border activities and their effects on pronghorn to continue.

4.3 Cultural Resources

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentrations of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture and associated industrial, commercial, and residential developments to the economy of Yuma County, incremental increase in development of open space areas along the Interstate 8 corridor is expected in the foreseeable future. As a result, incremental impacts to cultural resources commensurate with the rate of development is expected on non-Federally managed lands.

Lands on YPG and BMGR are designated for military training and testing. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. On BMGR, the ERCA Project
would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. Though there are nine cultural sites within the new impact area, they are not eligible for the NRHP. Nine sites, all determined to be not eligible for listing on the NRHP, have been identified within the proposed boundary of the proposed impact area. In addition, there are five sites located within 500 feet of the proposed impact area, all determined to be not eligible for the NRHP. Cumulative impacts may include increased ground disturbance which may accelerate the rate of erosion within and just outside of the proposed impact area, both uncovering and covering cultural resources. In general, cumulative impacts to cultural resources on YPG and BMGR would be de minimis.

4.4 Hazardous Materials and Waste

Increased agriculture and industrial development along the Interstate 8 corridor as well as mineral developments on BLM-managed lands would result in increased use of hazardous materials in the vicinity of YPG and BMGR. Military training and testing activities on YPG and BMGR would continue to occur in the foreseeable future. Thus, there would be continued transport, use, and storage of hazardous materials at administration and support facilities on YPG and BMGR. Required compliance with federal, state, and local regulations would reduce the potential release of these materials and wastes to the environment with continued implementation of pollution prevention, waste minimization, and spill response programs.

The ERCA Project would not result in construction of new permanent facilities that would consume and generate hazardous wastes. Hazardous materials at the gun position and observation mounds such as fuels, oils, and lubricants would be managed via best management practices. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with RCRA. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities. Thus, contributions to cumulative impacts would be de minimis.

Continued military training and testing activities on YPG and BMGR would result in increased concentration of MCOCs. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. Furthermore, ongoing EOD clearance operations and periodic evaluation of the potential for munitions constituents to be transported off-range would have countervailing impacts. Given that ERCA is not a permanent program and the large volume of munitions used on YPG and BMGR for ongoing testing and training activities, the contribution to cumulative impacts would be minimal.
4.5 Land Use

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentration of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture and associated industrial, commercial, and residential developments to the economy of Yuma County, incremental increase in development of open space areas along the Interstate 8 corridor is expected in the foreseeable future.

Lands on YPG and BMGR are designated for military training and testing. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. On BMGR, the ERCA Project would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. The new impact area would not result in the loss of open space since there would be no loss of land to development. With the exception of access roads, observation mounds, or targets, most elements of the existing open space would remain unchanged.

4.6 Noise

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. Military sources include aircraft operations and munitions training; munitions and equipment testing; and other military training activities. On BMGR, the noise environment also includes non-military uses such as traffic and aircraft operations associated with US Border Patrol activities. Noise sources on other Federally-managed lands outside of YPG and BMGR would include those associated with recreation and mineral developments.

The most audible noise source from YPG and BMGR are noise associated with aircraft since they may overfly populated areas in route to the technical ranges. In contrast, weapons testing and live munitions used are generally confined to the interior of YPG and BMGR where the operational ranges are located. Thus, noise associated with cannon fire or munition detonation are typically muted due to atmospheric attenuation. The ERCA Project would not result in additional aircraft overflights across populated areas, but would result in cannon fire and munition detonations. Thus, there would be minor contributions to the existing noise environment.

4.7 Recreation

Due to the contribution of agriculture and military installations to the local and regional economy, the general area within the vicinity of YPG and BMGR, including the city of Yuma, has increased in population. The general population of the city of Yuma, where 48% of the county population resides, increased from 77,515 in the year 2000 to 93,064 in the year 2010 (COY 2012). The population is expected to increase to somewhere between 164,142 and 276,000 by the year 2055 (COY 2012). As a result, recreational
use within Federally-managed lands are expected to increase. For example, recreational use of BMGR has increased steadily. From the reporting season of 2006-2007 to the 2010-2011 season, there has been a 62 percent increase in the number of recreation permits that have been issued (LAFB 2012).

Though lands on YPG and BMGR are designated for military training and testing, recreational uses are allowed in designated areas. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. However vast amounts of open space would continue to remain available for recreation on both ranges in addition to those available on adjacent NWR and BLM-managed lands. Within this regional context, the ERCA Project would result in temporary closure of recreational areas within the SDZ footprint of range lands. There would be no permanent loss of recreational opportunities. Thus, there would be little to no cumulative impacts to recreation.

On BMGR, the ERCA Project would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. The new impact area would not result in a loss of recreational opportunities since there is no general public access to Kofa Region.

4.8 Safety

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. By their very nature, military operations and weapons testing on YPG and BMGR pose some level of hazard. The primary ground-based hazard on both locations are unexploded ordnance. Thus, there would be an incremental increase of unexploded ordnances commensurate with the level and intensity of military operations over time. The ERCA Project would result in minor contributions to the overall increase through the use of inert and high explosive rounds on YPG, and inert rounds on BMGR. Impacts to safety would be avoided or attenuated through implementation of range safety protocols.

4.9 Soils

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentration of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture to the economy of Yuma County, incremental increase in conversion of open space to agriculture lands is expected. The associated soil disturbances would increase wind and water erosion. Yuma County is a nonattainment area for PM$_{10}$ due to wind erosion from agricultural operations.

The ongoing military training and testing activities on YPG and BMGR would entail continuation disturbances within the landscape. On BMGR, non-military activities such as unauthorized cross-border traffic and Border Patrol training and interdiction
operations would contribute to on-going disturbances. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. The associated soil disturbances would increase wind and water erosion. However, disturbances are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010). In consideration of the size of soils disturbance associated with agriculture, contribution to the cumulative impacts of soil erosion from the ERCA Project would be de minimis.

4.10 Water

Surface flows from YPG and BMGR drain into the Gila River. Both surface and ground water in the lower Gila River is unsuitable for most uses including irrigation and human consumption. Pesticides, metals, inorganics, and nutrients associated with runoff from agricultural operations in the Gila River Valley have impaired surface water quality. Recycling of irrigation water in the floodplain gradually increased the salinity of the local groundwater.

Most of non-Federal lands through the Gila River Valley corridor and Yuma Valley are used for agriculture since agriculture is central to the economy of Yuma County. Thus, the extent of agricultural land use is expected to remain largely unchanged. Incremental increases in acreage used for agriculture is expected in the foreseeable future. Thus, both surface and ground water quality in the Gila River are unlikely to improve in the foreseeable future.

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. There would be continued storage and use of hazardous materials that support facilities; ground disturbing activities on the operational areas; and presence of MCOCs on the firing and testing ranges. Due to the infrequency of surface flows sufficient enough to convey pollutants into nearby rivers as well as the depth of alluvial fill in the washes, the potential for conveyance of oils and fuels off range would be minimal. Presence of MCOCs would not degrade surface water quality. Surface water does not represent a viable pathway for migration of MCOC off of the range complex. Last, implementation of RCRA and CERCLA requirements would minimize the potential transport of hazardous materials into the Gila River. Thus, contribution to further impairment of water quality from military testing and training operations including the ERCA Project would be minimal.

5.0 List of Agencies Consulted

Arizona Game and Fish Department
Bureau of Land Management Yuma Field Office
US Marine Corps Air Station Yuma
US Fish and Wildlife Service, Ecological Services, Tucson AZ
US Fish and Wildlife Service, Kofa National Wildlife Refuge
6.0 List of Preparers and Reviewers

6.1 Preparers

Erin Goslin  
Archaeologist, Environmental Sciences Division  
U.S. Army Garrison, Yuma Proving Ground

Daniel Steward  
Wildlife Biologist/Acting Chief, Environmental Sciences Division  
U.S. Army Garrison, Yuma Proving Ground

Kenneth Wong  
Environmental Coordinator  
U.S. Army Corps of Engineers, Los Angeles District

6.2 Reviewers

John Arnett  
Wildlife Biologist and Acting Chief, Environmental Sciences Management  
56th Fighter Wing, Luke Air Force Base

Tim Berry  
Explosive Ordnance Technician, Range Management Office  
56th Fighter Wing, Luke Air Force Base

Randy English  
Conservation Manager, Range Management Department  
Marine Corps Air Station Yuma

Steve Flores  
Chief, Artillery & Mine Branch  
U.S. Army Garrison, Yuma Proving Ground

Dominic Graziani  
Natural Resources Planner, Environmental Sciences Management  
56th Fighter Wing, Luke Air Force Base

Carol Heathington  
Chief, Air Range Operations  
56th Fighter Wing, Luke Air Force Base

Karla James  
Archaeologist, Range Management Department  
Marine Corps Air Station Yuma
Sergio Obregon  
NEPA & SDWA Program Manager, Environmental Sciences Division  
U.S. Army Garrison, Yuma Proving Ground

Adrienne G. Rankin,  
Archaeologist, Environmental Sciences Management  
56th Fighter Wing, Luke Air Force Base

David Rodriguez  
Environmental Department, Environmental Director  
Marine Corps Air Station Yuma

Abigail Rosenberg  
Biologist, Range Management Department  
Marine Corps Air Station Yuma

7.0 References

Arizona Department of Health Services. 2015.  
http://www.atsdr.cdc.gov/HAC/pha/pha.asp?docid=908&pg=1

Arizona Department of Water Resources. 2015.  
http://www.azwater.gov/azdwr/StatewidePlanning/RuralPrograms/OutsideAMAs_PDFs_for_web/Lower_Colorado_River_Planning_Area/Lower_Gila_Basin.pdf


City of Yuma. 2012. General Plan


Maricopa County. 2005. State Implementation Plan

Daniel P. Sturla, Martin D. Piorkowski, and Joel M. Diamond Ph.D. 2014. Planning Level Surveys to Determine the Distribution and Nesting Status of Golden Eagles
on Yuma Proving Ground in Southwestern Arizona. Final Report. Arizona Game and Fish Department, Phoenix, Arizona, USA.


US Fish and Wildlife Service, 2015 Biological Opinion RE: Reinitiation of Formal Section 7 Consultation on Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station-Yuma, Yuma and Maricopa Counties AZ.

US Fish and Wildlife Service, 2014 Biological Opinion RE: Formal Section 7 Consultation on Activities and Operations at the United States Army Garrison Yuma Proving Ground, Yuma and La Paz Counties, Arizona


University of Arizona. 2010. NEMO Watershed-Based Plan Colorado-Lower Gila Watershed

Yuma County Agriculture Water Coalition. 2015. A Case Study in Efficiency-Agriculture and Water Use in the Yuma, Arizona Area

Yuma Proving Grounds. 2010. Impact Areas Expansion Environmental Assessment

Yuma Proving Grounds. 2013. Long Range Munitions Environmental Assessment


Yuma Proving Grounds. 2015a. Final Operational Range Assessment Program Phase I Qualitative Assessment Report Addendum – Yuma Proving Ground, Arizona

Yuma Proving Grounds. 2015b. Programmatic EIS for Activities and Operations at Yuma Proving Ground