



## ENVIRONMENTAL ASSESSMENT TRIGO NORTH IMPACT AREA U.S. ARMY GARRISON YUMA PROVING GROUND

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Prepared for U.S. Army Garrison Yuma Proving Ground Environmental Sciences Division Yuma, Arizona 85365



## **Draft Finding of No Significant Impact**

## Trigo North Impact Area

## **U.S. Army Garrison**

## Yuma Proving Ground, Arizona

The U.S. Army Garrison (USAG) Yuma Proving Ground (YPG) prepared the attached environmental assessment (EA), hereby incorporated by reference, to identify and evaluate potential environmental impacts associated with creation and operation of the Trigo North Impact Area (Proposed Action). The Proposed Action would establish a new Research, Development, Testing, and Evaluation (RDT&E) impact area in YPG's North Cibola Range. This impact area would accommodate current and future weapon development associated with artillery test activities, by providing additional space for longer ranges and wider safety buffers.

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, USC, Parts 1500 through 1508); Department of Defense (DOD) Directive 4715.9 Environmental Planning and Analysis; and Environmental Analysis of Army Actions (CFR Title 32, Part 651).

In preparation of the EA, no alternatives other than those presented in the EA, were determined to satisfy the purpose and need of the Proposed Action. No other alternatives were identified for the new impact area. Therefore, only the No Action Alternative and the Proposed Action were carried forward for analysis.

#### **Description of the Proposed Action**

Under the Proposed Action, a new RDT&E impact area would be established. The North Trigo Impact Area would serve as an RDT&E impact area to accommodate current and future weapon development associated with artillery test activities, by providing additional space for longer ranges and wider safety buffers from inhabited areas (such as Highway 95). The artillery range capability on YPG would be increased to a range of approximately 70 kilometers.

The location of the proposed Trigo North Impact Area features relatively flat terrain, which allows for good observation of direct and indirect fire impacts and facilitates placement of target vehicles, target structures, and instrumentation to record and capture data during test events. The proposed impact area would be approximately 88 acres in size.

The proposed impact area would be used to support diverse test and training activities that require the firing of air-to-ground, ground-to-ground, ground-to-air, and air-to-air munitions. A variety of munitions would be fired into the impact area, including high explosive, illumination, obscurant, non-lethal, guided, and inert warheads. Expulsion rounds/submunitions would not be fired due to the unexploded ordnance (UXO) hazard; munitions used in the proposed impact area would be limited to those that can be removed or detonated at the conclusion of each test.

Access to the proposed impact area would be via Cibola Lake Road and Ehrenberg Road. The existing access roads are graded, unimproved gravel, and maintained to minimize environmental concerns. Although existing roads or trails would be used as much as possible, sometimes off-road travel may be necessary to place targets and instrumentation or to recover unexploded ordnance. A variety of targets would be used during testing or training, ranging from vehicles (stationary and/or moving) to targets 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. Some vegetation trimming or

removal may be required as part of the Proposed Action for target placement to prevent accidental fires and to allow for an unobstructed view of targets.

#### **No Action Alternative**

There would be no designation of a new impact area under the No Action Alternative, and YPG would continue to operate as it currently does. Without the addition of the new impact area in Trigo North, YPG would be unable to support Long Range Precision Fires and similar long-range artillery test missions. Additional space would not be available to accommodate the range and safety buffers associated with extended range artillery test activities to meet U.S. Army modernization priorities.

#### **Environmental Consequences**

The EA evaluated potential impacts on the following resources: Air Quality, Biological Resources (Vegetation and Wildlife), Cultural Resources, Environmental Justice and Protection of Children, Farmlands – Prime/Unique, Floodplains, Hazardous Materials and Waste, Health and Safety, Land Use and Recreation, Noise, Socioeconomic Values, Soil Resources, Transportation and Infrastructure, Visual Resources, and Water Resources. After the initial evaluation, Air Quality, Environmental Justice and Protection of Children, Farmlands – Prime/Unique, Floodplains, Noise, Socioeconomic Values, Soil Resources, Transportation and Infrastructure, and Visual Resources, Transportation and Infrastructure, and Visual Resources were eliminated from further analysis because the potential for impacts to these resources was determined to be nonexistent, unlikely, or negligible. As a result, the scope of environmental analysis focused on the resources listed below that were determined to be potentially affected in connection with the Proposed Action.

#### **Summary of Impacts**

As summarized below, the Proposed Action would result in less than significant impacts to the resources analyzed in the EA.

#### **Biological Resources**

Vegetation within the proposed impact area is typical of the lower Sonoran Desert, with generally lowdensity vegetation interspersed with areas of bare gravel, rock, and soil. Impacts could include a decrease in representative native plant cover as a result of trimming to create a clear line of site to targets from existing gun positions, damage to, or removal of, vegetation caused by ordnance delivery or demolition such as explosions or fire, or projectile recovery. The increased presence of humans and equipment could alter the landscape and lead to an increase in invasive weeds. Although some adverse impacts to vegetation resources are expected to occur from vegetation management and ground disturbance associated with extended range artillery testing, the relative location and size of the proposed impact area in conjunction with mitigation measures, would reduce the impacts to below the threshold for significance.

Use of the proposed impact area would result in disturbance of wildlife habitat that is within or immediately adjacent to the proposed impact area. Vibration, noise, and presence of visual forms during testing activities would temporarily disturb or displace wildlife from the area into the immediate surroundings. Sonoran desert tortoise potentially occupy the hills and mountains east of the project area; however, mitigation measures would reduce possible impacts to individual tortoise. Sonoran pronghorn has been reintroduced to this region as part of a nonessential experimental population. Pronghorn do not currently occupy the project area. However, as the population increases, it is possible that they could occupy the surrounding area in the future. Implementation of mitigation measures would reduce potential impacts to pronghorn in the area. Because this pronghorn population is a nonessential experimental population, by definition, it is not essential to the continued existence of the species and any impact would not jeopardize the continued existence of the species. The Proposed Action would have minimal impact on vegetation including milkweed or flowering plants used by monarch butterfly. Impacts would be limited to target or instrumentation placement and munitions impact at the target area and recovery of

rounds or debris. Surface disturbance would be very small in relation to the vast expanse of surrounding desert habitat. Potential breeding habitat and forage would continue to be present on site as well as surrounding region to support Monarch migration through the area.

#### **Cultural Resources**

Consultation under Section 106 of the National Historic Preservation Act is ongoing; however, the Proposed Action is not anticipated to adversely affect prehistoric or historic sites eligible for the National Register of Historic Places (NRHP) or sites of traditional religious and cultural importance. Based on survey results, three sites are recommended as eligible for the NRHP. These sites would be avoided by the Proposed Action and there would be no historic properties affected by munitions impacting the proposed impact area. Shockwave attenuation analysis has shown that physical attributes of these sites would not be affected because the level of force, vibration, and noise from munitions impact would not be sufficient to cause damage due to the distance from impact to the sites (see Appendix A). The analysis shows that the level of force, vibration, and noise falls below the "No damage" threshold and would be equivalent to a construction pile driver used 25 feet away. An additional 100-meter buffer has been added around the known resources to reduce the potential for impacts.

#### **Hazardous Materials and Wastes**

Use of regulated substances as a result of the Proposed Action would be limited to fuel consumption from vehicle use, operation of generators, and firing of munitions, and would be managed in accordance with applicable guidance and regulations. Leaks and spills of petroleum, oils, and lubricants would be minimized through implementation of best management practices (BMPs) such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area, if necessary; 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. Various munitions would be fired into the new impact area. Spent munitions and potential sources of munitions constituents of concern (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 DOD Instruction 4715.11. The Proposed Action would not result in increased and long-term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes.

#### **Health and Safety**

Preparation of the impact area may create short-term increased safety risks to workers. Workers would use appropriate protection and comply with appropriate safety standards. Once established, use of the new impact area would present common testing hazards. All tests would be scheduled in advance with range control and the range test scheduling system 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 surface danger zone (SDZ) or otherwise under adequate protective cover. YPG protocols related to safety during testing would be implemented to protect testing staff. 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 DOD Instruction 4715.11. With implementation of standard protection measures, less than significant intermittent impacts to health and safety would be expected during construction activities and operations.

Depending on the gun position used, the proposed line of fire and the associated SDZ could cross manned facilities within YPG, Highway 95, and Kofa National Wildlife Refuge (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. These SDZs can vary greatly in size and shape, dependent on the type of munition being utilized for the test. Some testing activities could potentially

result in temporary closures of a portion of Highway 95 and/or Kofa NWR; these types of temporary closures currently occur for other testing at YPG.

In general, any road closures would be conducted in accordance with Arizona Department of Transportation's road closure protocols. Traffic management personnel would be placed at both ends of the closure. Test firings would take place after the area has been cleared of all vehicles. Emergency access through the closed road segment would be coordinated between the YPG Public Safety Office and law enforcement or emergency responders on the scene.

YPG would closely coordinate with neighboring land managers in advance of scheduled test firings for any proposed SDZ that extends beyond YPG boundaries. YPG would take appropriate precautions to ensure that the public is not within an SDZ during testing. Prior to test firings, YPG would deploy aircraft and personnel along roads to monitor for the presence of people within the SDZ.

#### Land Use and Recreation

Implementation of the Proposed Action is aligned with intended land use and consistent with YPG management goals. Multiple impact areas already exist within Cibola Region, thus, the establishment of a new impact area would not conflict with existing land uses. Lines of fire and associated SDZs that are wholly contained within the boundary of YPG would not impact land use. However, overflights across Kofa NWR and Bureau of Reclamation (BOR) or other public lands and temporary closure of a stretch of Highway 95 that would be required for some tests, depending on gun position location, would temporarily affect land use. Use of the airspace would not result in a permanent conflict with existing land use within Kofa NWR and other lands.

Recreational opportunities that are available in the proposed impact area would change. Use of the new impact area would impact recreation since it is located within an authorized hunting area. The specific impact area would be off limits to public entry; however, the hunting unit as a whole would remain available when there is no active testing in the area. Use of the hunting area would be restricted if safety buffers overlap the area.

#### Water Resources

The area receives rain very infrequently; therefore, washes in the proposed impact area also flow infrequently. When the washes are actively flowing, the potential exists for them to transport sediment or MCOC off the range complex. Previous studies have concluded that MCOC were not migrating off site via the desert wash pathway; therefore, surface water does not represent a viable pathway for migration of MCOC off the range complex (Gutierrez Canales Engineering 2006). Based on estimated depth to water in the proposed impact area, lack of rainfall (average 3.5-inches annually), and high rate of evaporation (more than 100-inches annually), impacts to groundwater from the Proposed Action are not anticipated.

#### **Public Participation**

Scoping letters were mailed to interested parties on October 15, 2020, announcing the preparation of this EA and soliciting comments and concerns from interested stakeholders, agencies, and tribal governments on the proposed project. Information about the project was also made available on YPG's public website at https://ypg-environmental.com/nepa. Four comments were received during the scoping period and concerns identified were addressed in the EA, as applicable. A public notice announcing the availability of the EA and Draft Finding of No Significant Impact (FNSI) for review and comment was published in the Yuma Sun and the Desert Messenger in Quartzsite.

#### Conclusion

Based on the analysis presented in the EA for constructing and operating the Trigo North Impact Area on USAG YPG, the direct, indirect, and cumulative impacts were considered and it is determined that no significant environmental impacts are anticipated as a result of implementing the project as described under the Proposed Action. Therefore, preparation of an Environmental Impact Statement is not required and a FNSI is the appropriate decision document to conclude the NEPA process. I have read and concur with the findings and analyses documented in the EA and hereby approve the FNSI.

Ronny J.	James
Garrison	Manager

Date

Ben P. McFall, III COL, IN Commanding Date

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## **ACRONYMS AND ABBREVIATIONS**

APE	Area of Potential Effect		
AR	Army Regulation		
AZGFD	Arizona Game and Fish Department		
BLM	Bureau of Land Management		
BMP	Best Management Practice		
BOR	Bureau of Reclamation		
DNT	dinitrotoluene		
DOD	Department of Defense		
EA	Environmental Assessment		
EIS	Environmental Impact Statement		
EOD	Explosive Ordnance Disposal		
ESA	Endangered Species Act		
FNSI	Finding of No Significant Impact		
INRMP	Integrated Natural Resource Management Plan		
IPaC	Information for Planning and Conservation		
MBTA	Migratory Bird Treaty Act		
MCOC	Munitions Constituents of Concern		
NEPA	National Environmental Policy Act		
NHPA	National Historic Preservation Act		
NRHP	National Register of Historic Places		
NWR	National Wildlife Refuge		
NWRC	North Wind Resource Consulting		
OB/OD	Open Burn/Open Detonation		
PPV	Peak Particle Velocity		
RCRA	Resource Conservation and Recovery Act		
RDT&E	Research, Development, Testing, and Evaluation		
SDZ	Surface Danger Zone		
SGCN	Species of Greatest Conservation Need		
SHPO	State Historic Preservation Office		
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine		
USAG	U.S. Army Garrison		
USFWS	U.S. Fish and Wildlife Service		
UXO	Unexploded Ordnance		
YPG	Yuma Proving Ground		

## **1 PURPOSE OF AND NEED FOR ACTION**

## 1.1 Introduction

The primary mission of the United States Army Yuma Proving Ground (YPG) is to serve as a major Research, Development, Testing, and Evaluation (RDT&E) facility for the Department of Defense (DOD). YPG provides a flexible, responsive, innovative, and diverse set of testing capabilities and services in a desert environment to meet the current and future needs of the U.S. Armed Forces. YPG is proposing to establish an RDT&E impact area in the North Cibola Range of YPG. Similar types of impact areas that were authorized in the Impact Areas Expansion Environmental Assessment (EA; YPG 2010) and the Long Range Munitions Environmental Assessment (YPG 2013) are already present on YPG.

YPG has initiated this EA per the National Environmental Policy Act of 1969 (NEPA; 42 USC 4321 et seq.), to evaluate and document the potential for effects to the natural and human environment that could result from the Army's Proposed Action of establishing the Trigo North Impact Area, as described in detail in Chapter 2. This EA is being prepared to support the decision-making process pursuant to the updated Regulations Implementing the Procedural Provisions of NEPA (Title 40 CFR, parts 1500-1508), regulatory guidance per 32 CFR Part 651 (Army Regulation [AR] 200-2, Environmental Analysis of Army Actions), and 32 CFR Part 650 (AR 200-1, Environmental Protection and Enhancement).

NEPA allows tiering of analysis through incorporation by reference of information in previous NEPA analyses in order to allow subsequent documents to focus on the issues germane to the site-specific actions by referring to other readily available documents that cover similar issues (40 CFR 1508.28). The analysis in this EA is tiered to the Impact Areas Expansion Environmental Assessment (YPG 2010), the Long Range Munitions Environmental Assessment (YPG 2013), and the Programmatic Environmental Impact Statement for Activities and Operations at Yuma Proving Ground, Arizona (YPG 2016). Therefore, the subsequent analysis in this EA summarizes issues discussed in the original analysis and concentrates on the issues specific to the subsequent action.

## 1.2 Project Location

The proposed Trigo North Impact Area is located in the north Cibola Test Range of YPG (Figure 1). The impact area would be approximately 88 acres and is located within a larger area that has been surveyed for archaeological and biological resources.

## 1.3 Purpose of and Need for Action

The U.S. Army relies on YPG's advanced artillery test capability to develop and field any and all artillery ammunition and weapons. Current and future developments in artillery require longer ranges and wider safety buffers for tests conducted at YPG. The purpose of the Proposed Action is to designate a new impact area to provide additional space to accommodate the range and safety buffers associated with extended range artillery test activities. The Proposed Action is needed to accommodate the current and future requirements to test artillery systems at extended ranges and meet U.S. Army modernization priorities.

## **1.4 Decision to be Made**

Based on the results of the NEPA analysis, the Authorized Officer will determine if the action would have significant effects; if so, an Environmental Impact Statement (EIS) would be prepared. If the action would not have significant effects, a Finding of No Significant Impact (FNSI) and a decision document would be prepared, consistent with the regulations for implementing the procedural provisions of NEPA (40 CFR 1500-1508), and other relevant laws, regulations, or directives. The Authorized Officer will decide amongst the following: whether to select the Proposed Action, an alternative to the Proposed Action, or to take no action.



Figure 1. Project Location.

#### 1.5 Scoping and Issue Identification

YPG notified interested parties of the project on October 15, 2020, including letters submitted to potentially interested persons, organizations, federal, state, and local agencies, and tribal governments to inform and solicit input from the interested public and stakeholders. (See Chapter 4 for a list of individuals and groups contacted.) The U.S. Army believes that consideration of all interested persons' views and information provided promotes open communication and enables better decision-making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action are urged to participate in the decision-making process by providing comments about important issues and concerns to be considered in the analysis. During the scoping period, comments were received from the Fort Yuma Quechan Indian Tribe, the Hopi Tribe, Arizona Game and Fish Department (AZGFD), and the Bureau of Reclamation (BOR). A summary of their concerns is provided below.

The Fort Yuma Quechan Indian Tribe expressed concerns about direct, indirect, and cumulative impacts to cultural resources from the Proposed Action and stated these should be fully assessed in the EA. They also expressed concerns about effects to wildlife, native vegetation, and auditory and visual impacts in regard to the viewshed of Traditional Cultural Properties and other significant Tribal landmarks. These concerns are addressed in Section 3.3 Cultural Resources, Section 3.1 Resources and Uses Considered, and Appendix A – Shockwave Attenuation Analysis. The Hopi Tribe requested continuing consultation for any prehistoric cultural sites that would be adversely affected by the Proposed Action. Consultation for the Proposed Action is ongoing at this time.

AZGFD requested analysis of potential impacts to public and/or recreational access resulting from restrictions that may be required to maintain security and public safety during RDT&E activities. They also requested analysis of potential impacts to special status species that may be found in the vicinity of the proposed impact area, including Sonoran desert tortoise (*Gopherus morafkai*), as well as actions that would be taken to avoid/minimize impacts. They requested surveys for Sonoran desert tortoise and stated the Desert Tortoise Survey and Handling Guidelines should be followed, as appropriate. These concerns are addressed in Section 3.2 Biological Resources and Section 3.6 Land Use and Recreation.

The BOR informed YPG of the location of the Trigo Wash Quarry, which is located approximately 3 miles north and downstream of the proposed impact area. After discussion of the location of the quarry in relation to the proposed impact area, YPG and BOR concurred that operation of the quarry would have no effect on the Proposed Action. No changes to the EA were made based on this scoping comment.

As a result of both internal and public scoping, YPG identified the following resources that are present in the project vicinity that could be potentially affected by the proposed project:

- Biological Resources: The EA addresses whether special status species or habitats would be impacted. See Section 3.2 for the detailed analysis of impacts.
- Cultural Resources: The EA addresses whether the Proposed Action would impact National Register-eligible sites within the Area of Potential Effect (APE). See Section 3.3 for the detailed analysis of impacts.
- Hazardous Materials and Wastes: The EA addresses whether the Proposed Action would use hazardous materials or create hazardous wastes during operation that could impact resources. See Section 3.4 for the detailed analysis of impacts.
- Health and Safety: The EA addresses whether the Proposed Action would impact public health and safety. See Section 3.5 for the detailed analysis of impacts.
- Land Use and Recreation: The EA addresses whether the Proposed Action would impact existing land use, including recreation. See Section 3.6 for the detailed analysis of impacts.
- Water Resources: The EA addresses whether the Proposed Action would impact water resources. See Section 3.7 for the detailed analysis of impacts.

## 2 PROPOSED ACTION AND ALTERNATIVES

This chapter describes in detail the Proposed Action as well as the No Action Alternative. The No Action Alternative is analyzed to provide a baseline against which to compare the Proposed Action's potential environmental consequences.

### 2.1 Proposed Action

Under the Proposed Action, a new RDT&E impact area would be established. The North Trigo Impact Area would serve as an RDT&E impact area in the North Cibola Range of YPG. This impact area would accommodate current and future weapon's development associated with artillery test activities, by providing additional space for longer ranges and wider safety buffers from inhabited areas (such as Highway 95). The artillery range capability on YPG would be increased to a range of approximately 70 kilometers for ground-launched munitions.

The location of the proposed Trigo North Impact Area features relatively flat terrain, which allows for good observation of direct and indirect fire impacts and facilitates placement of target vehicles, target structures, and instrumentation to record and capture data during test events. The proposed impact area would be approximately 88 acres in size. Figure 2 shows a closer view of the proposed Trigo North Impact Area.

The proposed impact area would be used to support diverse test and training activities that require the firing of air-to-ground, ground-to-ground, ground-to-air, and air-to-air munitions. A variety of munitions would be fired from existing gun positions into and impact this area, including high explosive, illumination, obscurant, non-lethal, guided, and inert warheads. Expulsion rounds/submunitions would not be fired due to the increased unexploded ordnance (UXO) hazard; munitions used in the proposed impact area would be limited to those that can be removed or detonated at the conclusion of each test.

In general, the area of a high explosive munition impact is contained within 100 meters from the point of impact. The area of primary disturbance due to the impact and detonation of the projectile (e.g., "the crater") is less than 2 meters from the point of impact. The area of secondary disturbance due to projectile fragments or ground ejecta ("splash damage") is contained within 50 meters of the point of impact. The area of tertiary disturbance due to seismic vibrations from the detonation are contained within 100 meters of the point of impact (beyond 100 meters, vibrations may be detected, but are below the thresholds identified for possible damage to historic structures; see Appendix A for further analysis). The dimensions of the proposed impact area were established to ensure all munition damage is contained within the wash and away from the desert pavement. An additional 100-meter buffer was applied surrounding historic properties located near the proposed impact area to minimize the risk of damage.

A variety of targets would be used during testing or training, ranging from vehicles (stationary and/or moving) to targets 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. Some vegetation trimming or removal may be required as part of the Proposed Action for target placement to prevent accidental fires and to allow for an unobstructed view of targets.

Access to the proposed impact area would be via Cibola Lake Road and Ehrenberg Road. The existing access roads are graded, unimproved gravel, and maintained to minimize environmental concerns. Although existing roads or trails would be used as much as possible, sometimes off-road travel may be necessary. For example, YPG may occasionally need to emplace visual targets off roads due to test requirements (terrain, vegetation, distance to the target based on flight profiles, etc.). Instrumentation or calibration equipment may also need to be placed in off road areas to meet test parameters and to take measurements related to the activity. Equipment required for this may include but is not limited to GPS devices, flagging stakes, mobile antennas, high-speed cameras, or portable generators.



Figure 2. Proposed Trigo North Impact Area Location.

Additionally, demolition personnel may need to travel off-road to recover UXO or retrieve test items for further research and evaluation if the distance required is too great to be accomplished on foot, and/or the equipment needed cannot be safely packed in, set-up, or used without vehicle support. Demolition teams may have to use equipment such as a backhoe to excavate munitions or UXO. Prior to any excavation activities, the proper permits would be obtained to comply with environmental procedures at YPG. In order to mitigate safety risks and possible damage to natural and cultural resources, use of off-road vehicles would be kept to the absolute minimum necessary, and activities would be monitored to ensure degradation of resources does not occur. Off-road travel would follow YPG's off-road travel guidelines, as stated in YPG's Mission Support Requiring Off-Road Travel (YPG 2020).

Mitigation measures are included in the Proposed Action to reduce the potential for adverse effects on safety and natural and cultural resources. These measures are described in Chapter 3, as applicable, under specific resources. The proposed impact area would be located within an approved hunting area on YPG. Hunting access to the impact area would be restricted as necessary for safety and operational security.

#### 2.2 No Action Alternative

There would be no designation of a new impact area under the No Action Alternative, and YPG would continue to operate as it currently does. Without the addition of the new impact area in Trigo North, YPG would be unable to support Long Range Precision Fires and similar long-range artillery test missions. Additional space would not be available to accommodate the range and safety buffers associated with extended range artillery test activities to meet U.S. Army modernization priorities. This alternative is considered in the environmental consequences analysis to provide a baseline for comparing the Proposed Action's effects on current environmental conditions.

#### 2.3 Alternatives Considered but Eliminated

YPG reviewed numerous firing scenarios to identify potential existing gun positions and existing impact areas to support long range firing at 70 kilometers and beyond. Long-distance firing constraints include safety buffers, air space boundaries, and possible highway closures. Depending on the line of fire and type of munition used, the safety buffer for a particular shot using an existing gun position and impact area may extend beyond YPG land and airspace boundaries. Furthermore, these buffers may require temporary restrictions on Highway 95, or access limitations to non-YPG lands such as Kofa National Wildlife Refuge (NWR). YPG uses current land and airspace configurations to the maximum extent practical but strives to minimize highway closures or encroachment on neighboring lands.

#### Kofa Firing Range to Extended Range Cannon Artillery (ERCA) Impact

YPG considered firing from existing gun positions to the ERCA Impact Area on the Kofa Firing Range. This alternative provides adequate distance for testing, however, the safety buffer area for guided rounds would require closure of Highway 95 and would encroach on neighboring Refuge, BLM, State, and private lands. YPG currently conducts testing in this area, however use is limited due to safety buffer encroachment on neighboring lands. YPG eliminated this alternative from further consideration because it does not provide the necessary space to accommodate the range and safety buffers associated with long range firing at 70 kilometers and beyond.

#### Alternate Trigo North Site

Initially, YPG considered establishing a single use target at the area referenced in Figure 3. The target location would have supported firing at 70 kilometers, but would have been limited to an individual test with a limited target array. The target site was surveyed for cultural resources in October 2019 and a subsequent site visit was held with one of the consulting tribes where additional cultural sites were identified. Because of the possibility that these cultural sites may have been adversely affected by establishing this target area, YPG chose to eliminate this location from any further consideration and analysis.



Figure 3. Alternate Trigo North Target Location.

## **3** AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter presents the affected environment and environmental consequences related to implementation of the Proposed Action. The affected environment represents the baseline conditions against which the effects that may result from the Proposed Action are evaluated under each alternative. A number of resources were not carried forward for further analysis because the potential for environmental impacts to these resources was determined to be nonexistent, unlikely, or negligible (see Section 3.1); therefore, the analysis is focused on the resource areas where an impact is more likely to occur. In addition to a description of the affected resources, this chapter presents an analysis of the potential impacts to the human and natural environment likely to result from implementation of the alternatives described in Chapter 2. The description of the Proposed Action includes all known mitigation measures, and it assumes that the Proposed Action would be implemented as described, using accepted guidelines, standard operating procedures, and best management practices (BMPs) intended to reduce potential impacts.

## 3.1 Resources and Uses Considered

Table 1 outlines the resources considered by YPG, indicates whether the Proposed Action has the potential to result in a change in each, relative to existing conditions, and provides the rationale for eliminating or carrying each resource forward for further analysis. Those resources or uses determined not to be present, or that are present but would not be affected by the Proposed Action need not be evaluated in detail or discussed further. Only those resources identified as present in the proposed impact area and that may be affected may be carried forward in the document if there are issues which necessitate a detailed analysis. A brief rationale is provided explaining why some resources were dismissed from further analysis. Resources and resource uses that were determined to warrant detailed analysis are analyzed in sections 3.2 through 3.8.

RESOURCE/ USE	PRESENT YES/NO	MAY BE AFFECTED YES/NO	RATIONALE
Air Quality	Yes	No	The proposed impact area is currently in attainment for all National Ambient Air Quality Standards. Construction activities would result in temporary and short-term emission increases and would primarily result from fuel combustion for equipment used for preparing the impact area, as well as from fugitive dust emissions. Construction BMPs would be utilized during construction to reduce or eliminate fugitive dust emissions. Air emissions from operational activities would also be temporary and sporadic, associated with testing activities. Operational activities that would generate emissions include munitions testing within the impact area as well as vehicle travel to and from the area. The inherent isolation of an impact area through the development of safety zones ensures that non-persistent pollutants would not be transported offsite in the air in significant concentrations. This postulation is valid for short-term activities that are not analogous to persistent industrial type activity, such as munitions testing, and has been verified by a study performed in 1999 by the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). Overall, the levels of construction and operational emission increases would result in a negligible increase in local and regional baseline emissions; therefore, this resource is not carried forward for detailed analysis.
Cultural Resources	Yes	Yes	Impacts to Cultural Resources are analyzed in Section 3.3.

Table 1.	Resources	and Rat	ionale for	Elimination	or [	Detailed	Analy	/sis
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RESOURCE/ USE	PRESENT YES/NO	MAY BE AFFECTED YES/NO	RATIONALE
Environmental Justice	Yes	No	Executive Order 12898, <i>Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations</i> , requires federal agencies to analyze potential impacts to minority and low-income populations, including human health and environmental effects, resulting from their activities. The goal of Executive Order 12898 is to ensure activities that affect human health and the environment do not discriminate against minority or low-income populations. Executive Order 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i> , requires that federal agencies evaluate environmental health or safety risks that could disproportionately affect children. The Proposed Action would occur within YPG, on remote land that is restricted from the public. Only authorized personnel would be allowed in the impact area. Activities proposed would not disproportionately affect minority or low-income populations, and/or children through substantial degradation of air quality, water quality, or exposure to hazardous materials, substances, or waste. Therefore, this resource is not carried forward for detailed analysis.
Farmlands – Prime/Unique	No	No	The Farmland Protection Policy Act protects prime or unique farmlands from unnecessary and irreversible conversion to non- agricultural uses. YPG does not contain prime farmlands; therefore, no activities associated with the Proposed Action would affect any prime farmland and this resource is not carried forward for detailed analysis.
Floodplains	No	No	Executive Order 11988, <i>Floodplain Management</i> , restricts federal agencies from constructing in a floodplain. No construction or other modification of a floodplain area is proposed. This resource is not carried forward for analysis.
Hazardous Materials and Wastes	Yes	Yes	Impacts to Hazardous Materials and Wastes are analyzed in Section 3.4.
Health and Safety	Yes	Yes	Impacts to Health and Safety are analyzed in Section 3.5.
Land Use and Recreation	Yes	Yes	Impacts to Land Use and Recreation are analyzed in Section 3.6.
Noise	Yes	No	Noise levels would increase temporarily when personnel are in the area preparing for tests and during testing. Personnel would wear appropriate hearing protection and follow U.S. Army noise regulations (AR 200-1). Noise impacts during operation of the impact area would be intermittent and similar to current ongoing testing activities at YPG. Noise levels at the testing area would adhere to acoustical limits established by DOD standards, as described in AR 40-5 and associated noise level compatibility guidelines (Gutierrez-Palmenberg, Inc. and Jason Associates Corporation 2001). According to the guidelines used to assess noise and land use compatibility, the overall noise impact of YPG's current activities would be characterized as minimal due to the remote nature of the proving ground. There are no sensitive receptors within the vicinity of the proposed impact area that would perceive an increase in noise. An analysis of seismic and blast overpressure impact to the surroundings was performed (Appendix A) to evaluate the Peak Particle Velocity (PPV) and blast intensity as a function of distance and compared to commonly accepted threshold levels for damage to structures, including those important to Native American tribes. For the scenarios analyzed, the estimated PPV is significantly below the

RESOURCE/ USE	PRESENT YES/NO	MAY BE AFFECTED YES/NO	RATIONALE
			threshold for damage and auditory impacts to resources in the area are not anticipated. Noise impacts from the Proposed Action would be intermittent and less than significant; therefore, this issue is not carried forward for detailed analysis.
Socioeconomic Values	No	No	The Proposed Action does not represent 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 takes place entirely on YPG lands and would not have potential impacts associated with income, employment, conflicts with county and local plans, population growth, displacement of persons and businesses, or community disruption.
Soil Resources	Yes	No	Natural Resources Conservation Service data is incomplete for this location of YPG. The soil profile of the proposed impact area consists of Riverbend-Carrizo complex categorized by very deep, excessively drained soils that formed in stratified fan alluvium or mixed igneous alluvium. Riverbend soils exhibit the typical profile of extremely cobbly sandy loam from 0 to 2 inches, gravelly sandy loam from 2 to 7 inches and very gravelly coarse sand and very gravelly loamy coarse sand from 7 to 60 inches. Carrizo soils exhibit the typical profile of extremely gravelly loamy coarse sand from 0 to 4 inches, very gravelly coarse sand and very gravelly loamy coarse sand from 4 to 26 inches, very gravelly loamy sand from 26 to 48 inches, gravelly loamy coarse sand from 48 to 51 inches and gravely clay loam from 51 to 60 inches. The Riverbend-Carrizo complex soils are identified as rapidly permeable with very low water capacity. Runoff is generally categorized as slow with slight potential for water erosion (Natural Resources Conservation Service 2020, Soil Conservation Service 1991). Soil disturbance would occur in the proposed impact area and along access roads. Vegetation cover could be removed in the areas of soil disturbance and soil compaction. The potential for soil erosion would be limited by the relatively flat topography and small amount of ground disturbance anticipated. Impacts to local soils by activities would be minor and temporary in nature; therefore, this resource is dismissed from detailed analysis.
Transportation and Infrastructure	No	No	The Proposed Action would not result in long-term impacts to traffic levels and patterns. Existing operational areas and roads on YPG would be used. No permanent infrastructure would be added in the impact area. Mobile generators would provide power for support equipment at the impact area. No permanent utilities would be required for the proposed activities. Thus, no adverse impacts to installation utilities and infrastructure are anticipated and this issue is eliminated from detailed analysis.
Vegetation	Yes	Yes	Impacts to Vegetation are analyzed in Section 3.2.
Visual Resources	Yes	No	Due to the lack of population or development, it would be unlikely for the public to perceive a change from development and use of the impact area. The Proposed Action would not obstruct, damage, dominate, or substantially modify a scenic view from public viewing areas and would not have a substantial adverse effect on a scenic vista. Therefore, this resource is eliminated from detailed analysis.
Water Resources	Yes	Maybe	Impacts to Water Resources are analyzed in Section 3.7.
Wildlife	Yes	Yes	Impacts to Wildlife are analyzed in Section 3.2.

## 3.2 Biological Resources

## 3.2.1 Affected Environment

#### 3.2.1.1 Vegetation

Vegetation across YPG is in the Lower Colorado Valley Subdivision of the Sonoran Desert, the largest and most arid portion of the desert. The terrain consists of broad, flat valleys covered by a network of desert washes, and scattered mountain ranges of almost barren rock. Due to the extreme aridity of this region, vegetation is sparse and consists of drought-tolerant species of shrubs, grasses, and cacti. In open valleys, creosote bush (*Larrea tridentata*) is dominant, occurring in widespread stands, or mixed with combinations of ocotillo (*Fouquieria splendens*), teddy bear cholla (*Cylindropuntia bigelovii*), bursage (*Ambrosia* spp.), and paloverde (*Parkinsonia* spp.), depending on landform features (Turner and Brown 1994; Shreve and Wiggins 1964). Big galleta grass (*Pleuraphis rigida*) communities along with foothill paloverde trees (*Parkinsonia microphylla*), honey mesquite trees (*Prosopis glandulosa*), or bursage (*Ambrosia deltoidea*) are dominant in areas where more sand has accumulated. Desert washes can support less drought-tolerant trees and shrubs including blue paloverde (*Parkinsonia florida*), ironwood (*Olneya tesota*), smoke tree (*Psorothamnus spinosus*), mesquite (*Prosopis* spp.), and catclaw acacia (*Acacia greggii*). Foothills and mountains provide habitat for mixed shrubs such as brittlebush (*Enceliia farinosa*) in combination with other plants such as cacti, in particular, saguaro cactus (*Carnegiea gigantea*).

The survey area, which encompasses the proposed impact area, is situated on an alluvial fan covered with primarily desert wash and desert pavement. Elevation ranges from 700 to 800 feet. A biological survey was conducted on October 16, 2019 and October 13 through 16, 2020 (Steward, Memo to File, 2019 and Schlegel, Memo to File, 2020, respectively). The dominant species inhabiting the desert wash include creosote, paloverde, and ironwood. A mixture of forbs and grasses, mesquite, saguaro, and buckhorn cholla (*Cylindropuntia acanthocarpa*) are also present. Adjacent to the proposed impact area is an expanse of desert pavement, which is a surface layer of densely packed or cemented rock fragments created by erosive or constructive actions of wind, found on alluvial fans in arid regions (Basin and Range Watch 2010). Desert pavement is devoid of vegetation, but it serves an important role in the hydrologic system, providing water and nutrients to scattered vegetation (Wood *et.al.* 2005). Photos of typical vegetation and terrain in the survey area are shown in Table 2.



Table 2. Photos of Existing Vegetation and Conditions in the Survey Area.



The proposed impact area is located within the Cibola Range of YPG. A variety of other projects and activities take place in this region such as automotive testing, ground combat systems testing, drop zones, sensor testing, and impact areas. All existing projects have been analyzed under NEPA and no effects with the potential to contribute to substantial cumulative effects have been identified. All future activities would be subject to NEPA analysis to ensure environmental compliance with federal and state laws and regulations in addition to YPG's Integrated Natural Resource Management Plan (INRMP).

#### Sensitive Plant Species

Native Plants in Arizona are protected by the Arizona Native Plant Law (3.A.A.C. 3 Article 11). Under this statute many native plants including, but not limited to, agave, cacti, and ocotillo may be protected from destruction or salvage. Private and state agencies must provide a notice of intent to the Arizona Department of Agriculture to destroy or remove protected native plants. Federal agencies are not required to file notice of intent for removing protected plant species; however, if those plants are being transported outside federal lands, then specific permits or tags would be required for salvage.

Only one federally endangered plant species has been identified within YPG boundaries. The Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*) is a small, barrel cactus that is found on limestone-derived soils on alluvial fans or inclined terraces and saddles at elevations of approximately 3,200 to 3,800 feet. The cactus was documented on YPG land in 1995; however, subsequent surveys to relocate the cactus have been unsuccessful. The 1995 detection is believed to be an error due to lack of suitable habitat and the inability to relocate the cactus. The nearest confirmed location is in the Waterman Mountains in Pima County, greater than 150 miles away from the proposed impact area (Rebman 1996).

#### 3.2.1.2 Wildlife

Wildlife that have the potential to occur within the vicinity of the proposed impact area are predominantly associated with Sonoran Desert scrub habitats. Mammal, reptile, and bird species typical of Sonoran Desert scrub habitat likely to be found within or near the proposed impact area include:

- Large Mammals: Mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), wild horses and burros, and bobcat (*Lynx rufus*).
- Small Mammals: Rock pocket mouse (*Chaetodipus intermedius*), Merriam's kangaroo rat (*Dipodomys merriami*), blacktailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), woodrats (*Neotoma* spp.), round-tailed ground squirrel (*Spermophilus tereticaudus*), and multiple bat species.
- **Reptiles:** Western whiptail (*Aspidoscelis tigris*), side-blotched lizard (*Uta stansburiana*), sidewinder rattlesnake (*Crotalus cerastes*), western diamondback rattlesnake (*Crotalus atrox*), coachwhip (*Coluber flagellum*), and western shovel-nosed snake (*Chionactis occipitalis*).
- **Birds:** A wide variety of bird species are found 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 coronate*), black-tailed gnatcatcher (*Polioptila melanura*), blackthroated sparrow (*Amphispiza bilineata*), Brewer's sparrow (*Spizella breweri*), Eurasian collared dove (*Strepropelia decaocto*), Gambel's quail (*Callipepla 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*).

#### **Special Status Wildlife Species**

Special status wildlife species are subject to regulations under the authority of federal and state agencies. Special status species include those species that are listed by the U.S. Fish and Wildlife Service (USFWS) as federal endangered, threatened, proposed, or candidate species under the Endangered Species Act of 1973 (ESA), Section 4, as amended, and those that are ranked as Species of Greatest Conservation Need (SGCN) 1a and 1b listed by the AZGFD.

#### **Federally Listed Wildlife**

A review for potential occupancy by federally listed wildlife species was performed for the Trigo North Impact Area in the North Cibola Range. The list of species considered was derived from the USFWS Information for Planning and Conservation (IPaC) system (USFWS 2020), Consultation Code: 02EAAZ00-2020-SLI-1471. This list was updated in July 2021 to include new species (Consultation Code 02EAAZ00-2021-SLI-1034). This information provided a basis for species that might be present in the vicinity of the impact area. The federally listed species with potential to occur in the impact area are described in Appendix B. The following section describes those species with suitable habitat present within or adjacent to the proposed impact area. These species include the Sonoran pronghorn (*Antilocapra americana sonoriensis*), Sonoran desert tortoise (*Gopherus morafkai*), and monarch butterfly (*Danaus plexippus*).

**Sonoran Pronghorn.** The Sonoran pronghorn is a federally endangered subspecies of the pronghorn that inhabits a variety of Sonoran Desert habitats. Sonoran pronghorn have been released from pens in King Valley on the nearby Kofa NWR as part of a captive breeding program to increase the Sonoran pronghorn population. To facilitate conservation efforts, all Sonoran pronghorn found anywhere they may roam following release from the captive breeding pen, within a defined area bounded by Interstate 10 to the north and Interstate 8 to the south, are designated "nonessential, experimental" by the USFWS (Federal Register Vol. 76, pages 25593–25611). Protections for those species designated as "nonessential, experimental" under Rule 10(j) of the ESA are relaxed including the take prohibitions and consultation requirements of the ESA, easing regulatory burden associated with endangered species.

Since the Kofa pronghorn population has been established, there are now over 150 pronghorn occupying the refuge, YPG, and surrounding Bureau of Land Management (BLM) lands. Pronghorn are currently found along King Valley, Palomas, and La Paz Planes. As the population of pronghorn continue to increase, it is likely that pronghorn will occur in additional areas in the future.

Pronghorn rely on detecting and fleeing from predators. As such, this species prefers flat to gently rolling terrain with open sightlines. Pronghorn are typically nomadic, requiring large expanses of contiguous habitat to survive. The native habitat associated with the impact area represents potentially suitable habitat for Sonoran pronghorn. In 2020, two individual pronghorn were documented passing through an area near the proposed impact area. This one-time movement indicates it is possible for pronghorn to occupy the region in the future.

**Sonoran Desert Tortoise.** The Sonoran Desert tortoise was initially assessed as a candidate species on November 21, 1991 (USFWS 2020). The Candidate Conservation Agreement for the Sonoran Desert Tortoise (2015) identifies conservation initiatives among involved agencies including YPG. Sonoran Desert tortoise is most closely associated with the Arizona Upland and Lower Colorado River subdivisions of Sonoran Desert scrub and Mojave Desert scrub vegetation types. They most commonly inhabit rocky (predominantly granitic rock), steep slopes and bajadas and paloverde-mixed cacti associations. Zylstra and Steidl (2008) found that habitat selection by Sonoran Desert tortoise was most closely associated with topographic and geomorphologic influences rather than by vegetation type. Specifically, they found that the likelihood of observing Sonoran Desert tortoises increased with increasing slope, with east-facing slopes preferred over north-facing slopes.

As stated in the 2017 INRMP, Sonoran desert tortoise has been observed at the East Arm and the Cibola Region of YPG (Ough and deVos 1986; Palmer 1986; LaDuc 1992). The distribution of Sonoran Desert tortoise on YPG is very patchy. Within the Dome Rock and Trigo Mountains and Trigo Peaks, occupancy is limited to rocky hillsides and washes where adequate shelter can be found, and their movements are typical of the species throughout its range. They do not appear to be crossing the flats between ranges (Hoffman 2014). While the proposed project area lies in a low area along Trigo Wash and does not

resemble typical habitat, there have been tortoise documented in the nearby North Trigo Peaks and Trigo Mountains (Hoffman 2014). While tortoise have not been documented on site, it is possible that tortoise could be found near the proposed impact area.

**Monarch Butterfly.** The monarch butterfly (*Danaus plexippus*) was listed as a candidate species on December 27, 2020. Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.). There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months.

In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again (USFWS 2021).

Lower deserts of Arizona see more breeding monarchs in the fall, especially during September, than in spring. During the time of the spring migration in late March through June, there are small numbers of breeding monarchs migrating through the lower deserts. They leave the lower deserts by mid-May to mid-June, as temperatures soar over 100°F (Morris et al. 2015). Milkweed and flowering plants are needed for monarch habitat. Adult monarchs feed on the nectar of many flowers, but they only breed where there is milkweed. No milkweed was identified in the proposed impact area (Schlegel, Memo to File, 2020); however, habitat may still be present.

#### **Species of Greatest Conservation Need (SGCN)**

A report was generated for the project on October 21, 2020 (Project ID HGIS-12217), using the AZGFD Online Environmental Review Tool (AZGFD 2020). An updated report was run on July 7, 2021 (Project HGIS-13955; AZGFD 2021). The information was assessed to identify SGCN or other special status species that have the potential to occur within or adjacent to the proposed impact area. This data is used to identify design features that can be incorporated into the Proposed Action to lessen or eliminate any potential impacts to individuals caused by the actions being proposed. The potential presence of each species was determined by the ecology and habitat requirements of each special status species and the type of actions being proposed were analyzed to determine the potential effects of the project on individuals.

The Online Environmental Review Tool Report showed that there is the potential for an additional 21 SGCN classified as Tier 1A or 1B, which do not have an ESA-listed status (that are designated as AZGFD Tier 1A species) to occur within or have suitable habitat within or adjacent to the proposed impact area. These species are listed in Appendix B with general habitat requirements. Some of these species are listed as potentially occurring in broad geographic areas; however, when analyzed at the scale of the proposed impact area, habitat present within or adjacent to the proposed impact area is marginally suitable. There were three individual species documented by AZGFD as occurring within 5 miles of the proposed impact area (AZGFD 2020). These are the Sonoran desert tortoise (*Gopherus morafkai*), California leaf-nosed bat (*Macrotus claifornicus*), and Mohave fringe-toed lizard (*Uma scoparia*). There is no suitable habitat for the Mohave fringe-toed lizard within the proposed impact area.

The list of SGCN for Arizona was categorized into tiers reflecting AZGFD's management commitments and priorities; tiers are as follows:

Tier 1A: Scored "1" for Vulnerability in at least one of the eight categories and matches at least one of the following:

- Federally listed as endangered or threatened under the ESA.
- Candidate species under ESA.
- Specifically covered under a signed conservation agreement or a signed conservation agreement with assurances.
- Recently removed from ESA and currently requires post-delisting monitoring.
- Closed season species (i.e., no take permitted) as identified in Arizona Game and Fish Commission Orders 40, 41, 42 or 43.

Tier 1B: Scored "1" for Vulnerability in at least one of the eight categories, but match none of the above criteria.

One SGCN Tier 1A species and 20 SGCN Tier 1B species have been documented as potentially having suitable habitat within 1 mile of the proposed impact area based on the online mapping tool provided by AZGFD (AZGFD 2020). After evaluating habitat requirements for each of the Tier 1A and 1B species, there is marginally suitable habitat within the proposed impact area boundaries for 14 SGCN. These species are listed in Appendix B.

Gila monster, a SGCN Tier 1A species, has suitable habitat within 1 mile of the proposed impact area (Appendix B; AZGFD 2020). In southern Arizona, the Gila monster is more abundant in wetter and rockier paloverde-saguaro desert than in drier and sandier creosote-bursage desert, where it occurs mainly in or near rocky buttes or mountains (Lowe et al. 1986).

Appendix B also identifies four Tier 1B bird species and nine mammal species (including six bats) with the potential to occur within 1 mile of the proposed impact area. The Tier 1B bird species that have the potential to occur within the proposed impact area are identified as migratory bird species and are discussed in the migratory bird section below.

Kit fox, Harris' antelope squirrel, and little pocket mouse typically inhabit desert shrub communities similar to those found within and surrounding the proposed impact area. Both the Harris' antelope squirrel and little pocket mouse live in burrow systems that are commonly dug in loose or sandy soils. Suitable foraging and roosting habitat for the bat species listed in Appendix B can also be found within the impact area. Due to the lack of water present it is anticipated that use of the area is limited to foraging; however, the trees and cactus in the area may provide temporary daytime roost sites for birds.

#### **Migratory Birds**

Certain birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 and the Bald and Golden Eagle Protection Act of 1940. The MBTA prohibits taking (i.e., harming, harassing, or pursuing), killing, possessing, transporting, or importing migratory birds, their eggs, parts, and nests except when specifically authorized by the U.S. Department of the Interior. Species protected by the act include most native, non-game species. Violations of the MBTA associated with projects often occur as a result of destruction of active nests. Federal law prohibits the destruction of a nest that is occupied with eggs, nestlings, or young birds that are still dependent on the nest for survival.

Several species of migratory birds have a high potential to use the proposed impact area. Use of habitat within the proposed impact area could include nesting, wintering, foraging, and transient use. There are four AZGFD SGCN Tier 1B bird species that are also listed as migratory species which have the potential to occur within the proposed impact area. These include burrowing owl, gilded flicker, Gila woodpecker, and Le Conte's thrasher. The habitats used by these species are similar to many other migratory species that also have the potential to occur in the impact area.

The burrowing owl is primarily restricted to the western United States and Mexico. Habitat for burrowing owl includes dry, open, short-grass areas often associated with burrowing mammals (Haug et al. 1993).

Urbanization has greatly reduced the amount of suitable habitat for this species. Other contributions to the decline of this species include the poisoning of squirrels and prairie dogs, and collisions with automobiles. The open native desert habitat within the proposed impact area (especially creosotebush – white bursage habitats) represents suitable habitat for this species.

Gilded flicker, Gila woodpecker, and Le Conte's thrasher all occur in Sonoran Desert habitat, which is present within the proposed impact area. Both the wash habitat and scrub/shrub habitats associated with the Sonoran Desert ecosystem are commonly used for foraging and nesting by these and other migratory bird species. However, the habitat within the proposed impact area is limited due to the dispersed nature of shrub species within the proposed impact area. The gilded flicker and Gila woodpecker rely heavily on large cacti and trees such as saguaro cactus for nesting while Le Conte's thrasher often uses shrubs and trees such as creosote, mesquite and ocotillo for foraging and nesting. However, Le Conte's thrasher habitat is generally very sparse on flat sandy areas.

Perch sites and or trees substantial enough to support large raptor nests are limited within and adjacent to the impact area; therefore, it is anticipated that no bald or golden eagles nest within or adjacent to the impact area.

#### 3.2.2 Environmental Consequences

#### 3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed North Trigo Impact Area would not be designated, and the U.S. Army would not conduct long-range testing on 88 acres of land in the North Cibola Range of YPG. Thus, there would be no impacts to vegetation resources caused by activities associated with extended range artillery testing within the proposed impact area. Likewise, there would be no disturbances to wildlife or wildlife habitat within the proposed impact area. Therefore, the No Action Alternative would result in no change from the existing conditions of vegetation and wildlife resources. Other activities at YPG would continue under previously authorized programs on existing facilities. Thus, potential impacts to vegetation and wildlife associated with on-going training and testing missions would remain.

#### 3.2.2.2 Proposed Action

#### Vegetation

The primary impact to vegetation resources under the Proposed Action would be a decrease in representative native plant cover as a result of leveling and trimming vegetation to facilitate projectile recovery, pruning to create a clear line of site to targets from existing gun positions, and damage to or removal of vegetation caused by ordnance delivery or demolition such as explosions or fire. Crushing of vegetation and ground disturbance is possible if vehicles are used to access target areas and recover rounds. There would be negligible impacts to vegetation at the gun positions since existing gun positions would be used.

Loss of native plant cover can cause a variety of impacts to vegetation resources which are reasonably foreseeable. Plants that are heavily and repeatedly trimmed or pruned can experience reduced health and vigor (Lovich and Bainbridge 1999). However, in some instances, pruning decadent foliage can promote new growth (Gibson *et al.* 2004). Increased bare ground can alter hydrologic flow and soil infiltration regimes, generate dust – having adverse effects on plant productivity, and increase the potential for non-native and invasive species colonization (Middleton 2017; Kade and Warren 2002). More frequent human and equipment traffic can accelerate the spread of invasive weeds.

Numerous studies have indicated that desert pavement is important for its effects on infiltration and runoff (Pietrasiak *et al.* 2014). Due to poor infiltration on pavement surfaces, surface water can flow laterally, delivering additional water and nutrients to adjacent plant communities (Kaseke *et al.* 2012; Meadows *et al.* 2008; Pietrasiak *et al.* 2014). The proposed impact area is not anticipated to impact desert pavement and alteration of surface hydrology and the deposition of nutrients in soil would not be expected to lead to more adverse effects on surrounding vegetation (Graham *et al.* 2008).

Some adverse impacts to vegetation resources are expected to occur from vegetation management and ground disturbance associated with extended range artillery testing. Desert pavement features would be avoided when testing in this area. The relative location and size of the proposed impact area in conjunction with mitigation measures, would reduce the impacts to below the threshold for significance.

The size of the proposed impact area is small relative to the larger landscape. The amount of native vegetation that could be lost would not be enough to contribute to the extirpation of any species. Further, no threatened or endangered plant species exist within or near the impact area; therefore, no impacts to threatened or endangered plant species would occur. From an ecological perspective, the magnitude of the direct and indirect impacts would not be substantial enough to affect ecosystem integrity.

Vegetation 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. In order to keep non-native, invasive plants under control, YPG implements invasive species management through the INRMP. This integrative plan includes cooperation with other agencies, education, detection, and appropriate action. YPG's invasive species management program would mitigate the establishment and spread of non-native, invasive plants within the proposed impact area.

The risk of fire would increase beyond that already present within the proposed impact area due to the absence of current activity in the area. However, the scarcity of vegetation makes the risk of any fire spreading minimal. The spread of invasive plants can be a concern because it increases the threat of wildfire; if invasive species are present in high densities, they can carry a wildfire, and they recover from fire more readily than native species, thereby choking out the native plants. To reduce the risk and extent of potential wildfires, fire suppression teams would be available during testing, enabling a rapid response to any ignitions that may occur.

The Arizona Native Plant Law was enacted to protect rare plant species and other species subject to over harvesting. A variety of cacti such as saguaro and other species such as paloverde and ironwood are protected by the Arizona Native Plant Law. In the proposed impact area, plants would be salvaged in accordance with the Arizona Native Plant Law, if necessary.

#### Wildlife

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, 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.

Use of the impact area would result in the temporary and permanent disturbance of wildlife habitat that is within or immediately adjacent to the impact area. Testing activities could temporarily or permanently displace wildlife in the area. Vibration, noise, and presence of visual forms during tests would temporarily scatter wildlife from the area into the surrounding area. Mobile animals such as mule deer, foxes, and birds can avoid the activities. Animals may abandon nests or dens in the immediate area of human activities, including abandonment of young. Smaller, less mobile species, such as lizards and snakes, may become injured or killed by vehicles or equipment operating in the proposed impact area. These types of impacts can be minimized by conducting tests outside of the reproductive period, but avoidance of this type may not be practicable for all 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 adjusted to increased human activity. Thus, the potential for nest/den abandonment would be minor.

Potential for direct impacts to wildlife from munition or debris strikes within the impact area 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 because they are not present within the proposed impact area). Furthermore, given the open space within the impact area, 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 species is unlikely. Furthermore, similar activities have not resulted in any appreciable loss of species richness anywhere else on the range.

Construction-related impacts would be temporary and short-term and may include the temporary loss of habitat and displacement of resident wildlife species, temporary impacts on wildlife movement, and noise-related disturbance. However, there is the potential for long term impacts in the form of possible injury or death of small burrowing reptiles or mammals during ground-disturbing activities (including impacts and excavation of UXOs). The likelihood of long-term impact as a result of direct impact to individuals is low. With implementation of proposed measures, impacts on wildlife associated with the project would be short-term and minor during periodic testing activities.

In the long term, some vegetation within the impact area would be altered through impact or excavation which would impact habitat; however, there is similar habitat surrounding the proposed impact area that could be used by wildlife displaced during testing. If necessary, any tree trimming or other vegetation removal would occur outside of migratory bird breeding season. If use of the impact area occurs during the breeding season for migratory birds (approximately February 1 to August 31), a pre-construction nest survey would be conducted seven days prior to active testing by a qualified biologist. If active nests cannot be avoided, an appropriate avoidance buffer would be established (per USFWS guidelines) and impact testing would not occur within that buffer until the nest becomes inactive.

Overall, testing activities would result in short-term impacts to wildlife and long-term impacts to associated habitat. No habitat necessary for all or part of the life cycle of a species would be lost as a result of the project. Ecological processes would not be damaged to the extent that the ecosystem is no longer sustainable or biodiversity is impaired. There would be no extirpation of a regional or local species.

#### Federally Listed Wildlife

**Sonoran Pronghorn** – Individual Sonoran pronghorn from the nonessential experimental population on Kofa NWR are present within Kofa and occasionally the Cibola Regions on YPG. Due to its distance from current pronghorn populations, proposed activities at the Trigo North Impact Area on the Cibola Range would not affect the Sonoran pronghorn. Currently, individuals are anticipated to be transient in nature moving through the area on occasion. Though unlikely, individuals dispersing from the Kofa Region could be injured or killed by munitions strike or explosions from live ordnance on the ground during test firings. Vehicle strikes along roads leading to the impact area is possible. Noise from incoming munitions as well as noise from detonation of high explosive munitions would result in 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 or short-term loss of forage due to fire, however there is little wildland fire fuel within the proposed project area.

The Kofa Sonoran pronghorn population is a nonessential experimental population, established under section 10(j) of the ESA. By definition, it is not essential to the continued existence of the species; therefore, the effects of the Proposed Action would not jeopardize its continued existence.

**Sonoran Desert Tortoise** – Habitat present within the proposed impact area is not identified as containing probable or modeled tortoise habitat (YPG 2017). In the unlikely event that an individual occurs within the proposed impact area during testing, there is the potential for loss or take of that individual through direct impact or wildfire. However, no individuals or sign have been identified within

the boundary of the proposed impact area; therefore, the potential for the Proposed Action to have significant impacts on the Sonoran Desert tortoise is low.

**Monarch Butterfly** – The Proposed Action would have minimal impact on vegetation including milkweed or flowering plants used by monarchs. Impacts would be limited to target or instrumentation placement and munitions impact at the target area and recovery of rounds or debris. Surface disturbance would be very small in relation to the vast expanse of surrounding desert habitat. No herbicide or insecticide application is proposed for operation of this impact area. Potential breeding habitat and forage would continue to be present on site as well as surrounding region to support Monarch migration through the area.

#### **Species of Greatest Conservation Need**

Fourteen AZGFD SGCN have the potential to occur in the proposed impact area (six bat species, three mammals, four migratory birds, and one reptile). Environmental consequences for sensitive species would be the same as those discussed for general wildlife species. Roosting or maternal roost habitat for bat species in or near the proposed impact area is limited to a few tree species present within Trigo Wash. Foraging habitat within or adjacent to the impact area is also limited. The limited roost sites and foraging habitat, coupled with the use of the impact area most likely not occurring at dusk or dawn (typical foraging periods), reduces the risk of any potential impacts to bat species within the proposed impact area.

Burrowing owl, kit fox, or banded Gila monster were not observed during a survey within the impact area. However, they are known within the general region. Burrows and foraging habitat could potentially be impacted. Testing-related impacts such as excavation, impact (explosions), and increased human activity would be short term and may include temporary loss of habitat and displacement of individuals, temporary impacts on foraging behaviors, and noise-related and other disturbance. Long-term impacts to individuals could result from possible injury or death during ground-disturbing activities. Burrow surveys would be conducted prior to creation of the proposed impact area to identify potential burrows for these species. Burrows would be avoided or excavated per species-specific requirements if they cannot be avoided.

Very little foraging habitat for special status migratory birds would have the potential to be altered during impact testing. If testing or planned activities in the impact area occurs during the nesting season, a pretesting survey would be conducted seven days prior to testing to ensure that any active nests are avoided. If active nests cannot be avoided, an appropriate avoidance buffer would be established (per USFWS guidelines) and impact testing would not occur within that buffer until the nest becomes inactive. If burrowing owl exists within the impact area, they could be relocated per AZGFD guidance by an approved permit holder and rehabilitation center. Therefore, any impacts on special status migratory birds associated with the project would be short term and minor.

#### 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 and Sonoran Desert tortoise. The briefings would cover the status of the species, the importance of reducing impacts to the species, and any mitigation measures the users must comply with while on the range.
- Bio-3: Establish a field contact representative to monitor for the presence of special status species during setup and testing at the impact area. The monitor must report their observations to environmental sciences at the end of each test event.
- Bio-4: Biological monitoring would include taking GPS coordinates for any animal burros, caliche cave, or similar potential shelter site to determine if tortoise is present. If a tortoise is

found, it would be moved from harm's way prior to testing in accordance with the Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects (AZGFD 2007).

- Bio-5: All vehicles are restricted to designated roads except as required by Explosive Ordnance Disposal (EOD), maintenance, emergency response, and environmental sciences personnel including authorized contractors while conducting required mission support activities. Vehicles would stay within pre-existing EOD clearance areas.
- Bio-6: Minimize surface disturbance and restore the area to the previous condition when restoration is practicable.
- Bio-7: Dispose all discarded matter (including but not limited to human waste, trash, garbage, and chemicals) in a manner consistent with federal and State of Arizona regulations. Maintain work sites in a sanitary condition.
- Bio-8: Place temporary containment such as drip pans under vehicles or stationary equipment from which hazardous materials may be spilled or leaked.
- Bio-9: Dispose of hazardous or toxic materials in a manner consistent with federal and State of Arizona guidelines.
- Bio-10: Implement applicable management measures for biological resources pursuant to YPG INRMP.
- Bio-11: Inspect and clean vehicles subsequent to working in or traveling through weed-infested areas.

#### 3.3 Cultural Resources

#### 3.3.1 Affected Environment

Cultural resources consist of prehistoric and historic 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 and sites of traditional religious and cultural importance 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); and sacred sites as defined in Executive Order 13007, *Indian Sacred Sites*, May 24, 1996.

Section 106 of the NHPA requires that federal agencies with jurisdiction over a proposed federal project take into account the effect of an undertaking on historic properties listed, or eligible for listing, on the National Register of Historic Places (NRHP), and afford the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation an opportunity to comment with regard to the undertaking. The statute also requires consultation with Native American Tribes that claim cultural affiliation to the area. Cultural resources at YPG are managed in accordance with the YPG Integrated Cultural Resources Management Plan, Fiscal Years 2017-2021 (Versar Inc. 2016) and the Programmatic Agreement between the Arizona SHPO and the Advisory Council on Historic Preservation (2016).

The APE for the proposal encompasses the 88-acre impact area. The APE lies within the Basin and Range Physiographic Province of southwestern Arizona, characterized by rugged northwest-southeast trending fault block mountain ranges punctuated by broad flat alluvial valleys and vegetation consistent with the Lower Colorado River Valley Subdivision of the Sonoran Desert (Brown 1994; Hendricks 1985). Elevations range from 740 feet in the bottom of Trigo Wash to 805 feet on the terrace.

In support of the Proposed Action, and in compliance with Section 106 of the NHPA, North Wind Resource Consulting (NWRC) prepared a report identifying previously conducted cultural resource

surveys and previously recorded cultural resource sites within 1 mile of the 265-acre survey area with the potential to be impacted by the Proposed Action. The literature review conducted on September 23, 2020 was used to generate expectations about the types and frequencies of cultural resources that might be encountered during the field survey. This Class I records review revealed four previously conducted cultural resource surveys, none of which occur within the APE. Two surveys, conducted in support of U.S. Army Garrison (USAG)-YPG projects, consist of block surveys of the facility's various ranges and test areas (YPG-R-033 and YPG-R-256). One project consists of a linear survey associated with the Desert Storm Road Rally (YPG-R-183). A fourth project consists of the original Trigo Wash survey conducted by YPG in 2019 (YPG-R-289). Archaeological survey conducted for this project proved unsatisfactory (i.e., failure to accurately identify cultural resources), and at the request of the Fort Yuma Quechan Tribe, the APE was shifted to the current project area pending new survey of this area. Cursory observations conducted during a field visit by representatives of the Fort Yuma Quechan Tribe, YPG, and NWRC in the fall of 2019 revealed a number of cultural resources just outside of the current project area. These resources, located some 300 to 400 meters east and northeast of the APE, consist of cleared circles, a trail, pot drops, and rock alignments.

The Class I records review revealed 12 previously documented cultural resource sites (all prehistoric) within the 1-mile review area. Site types consist of lithic scatters, trails, cleared areas/circles, and rock features. Of these sites, two have been recommended eligible for listing on the NRHP, two are recommended not eligible for listing, and eight remain unevaluated pending further investigation to determine NRHP status. Only one of these sites occurs within the survey area, but it is not within the 88-acre APE.

A Class III pedestrian survey of 265 acres, including the 88-acre impact area, was conducted from October 13 to October 22, 2020. The survey identified a total of five cultural resource sites, consisting of one previously recorded site and four newly recorded sites. All observed cultural resources were evaluated for NRHP eligibility based on their integrity and significance under the four criteria outlined in 36 CFR 60 and per guidelines presented in National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation.* Of the identified sites, three are recommended eligible for listing on the NRHP, while two sites have been recommended not eligible for NRHP and do not qualify as historic properties. In addition to the five cultural sites, the survey also identified 15 isolated occurrences. These isolated materials do not qualify as sites and are recommended not eligible for listing on the NRHP.

#### **3.3.2** Environmental Consequences

#### No Action

The proposed 88-acre impact area in the northern section of the Cibola Region would not be established under this alternative. Thus, there would be no munitions-related surface disturbances in the impact area. Furthermore, there would be no surface disturbances associated with target placement or round recovery. Therefore, there would be no impacts to cultural resources from the No Action Alternative.

#### **Proposed Action**

The three sites recommended as eligible would be avoided by the Proposed Action and there would be no historic properties affected by munitions impacting the proposed impact area. Shockwave attenuation analysis has shown that physical attributes of these sites would not be affected because the level of force, vibration, and noise from munitions impact would not be sufficient to cause damage due to the distance from impact to the sites (see Appendix A). The analysis shows that the level of force, vibration, and noise falls below the "No damage" threshold and would be the equivalent of a construction pile driver used 25 feet away. An additional 100-meter buffer has been added around the known resources to reduce the potential for impacts.

No further work is recommended for non-eligible sites. Consultation under Section 106 of the NHPA is ongoing; however, the Proposed Action is not anticipated to adversely affect prehistoric or historic sites eligible for the NRHP or Native American religious or other cultural activity areas. YPG will not issue a

final decision document until the Section 106 consultation process is completed and any required mitigation is implemented.

#### Avoidance, Minimization, and Mitigation Measures

To avoid disturbance of known and previously undiscovered or undocumented cultural resources or remains, the following measures would be taken.

- Cultural-1: Construction equipment and traffic will use existing roads or marked routes to access project sites. "No parking/no pull-off" signs will be placed along the road with a 50-foot buffer on either side to prevent additional damage to the western site.
- Cultural-2: Grading and smoothing of surface soils (if required) will be confined to the delineated boundaries for the impact area.
- Cultural-3: If a projectile functions within 100 meters of a known historic property, the YPG Cultural Resources Manager will be notified. An archaeologist will then visit the cultural sites within two weeks to assess any potential damage from vibrations or falling fragments.
- Cultural-4: If any unanticipated discoveries of archaeological remains are made, all activities in the area of the discovery would be stopped, and the YPG Cultural Resources Manager would be notified immediately in accordance with the Native American Graves Protection and Repatriation Act and Standard Operating Procedure 9 in the Integrated Cultural Resources Management Plan (Versar Inc. 2016).
- Cultural-5: 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, and the Cultural Resources Manager and the Emergency Services Directorate will be notified immediately.
- Cultural 6: YPG will conduct annual monitoring of the historic properties next to the impact area for the first five years of operation. If the historic properties are found to be affected, annual monitoring will continue for the life of the impact area. A report will be sent to the SHPO and the consulting Tribes. The report will outline the damage to the sites, if any. If no effects are found to the sites as a result of the impact area, annual monitoring will not continue after five years and monitoring will only take place in the event of a projectile landing with 100 meters of a historic property (Cultural-3 above).

#### 3.4 Hazardous Materials and Wastes

#### 3.4.1 Affected Environment

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 hazardous waste management.

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 are to 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 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.

**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, and 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 munitions, targets, and small arms ammunition. These hazardous constituents may include: carbon, manganese, phosphorus, sulfur, copper, nickel, chromium, molybdenum, vanadium, columbium, or titanium.

MCOC within YPG are routinely assessed pursuant to Department of Defense Directive 4715.11 (DOD Instruction 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.

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 occurs within both Kofa and Cibola regions, the majority of munitions testing occurs within the Kofa Region. Cibola Region also includes drop zones and other weapon test 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 includes 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-launched weapons.

Though spent munitions are present within various firing ranges, off-range migration of MCOC is considered unlikely due to the lack of 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 (YPG 2017). 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 DOD Instruction 4715.11 including the 2015 revaluation of MCOC concluded insufficient evidence of MCOC migration off-range (EA Engineering, Science, and Technology, Inc., 2015). Thus, no complete MCOC exposure pathways to off-reservation human and ecological potential exist in the vicinity of YPG.

#### 3.4.2 Environmental Consequences

#### **No Action**

Under the No Action Alternative, the proposed 88-acre impact area would not be established. Existing gun positions would continue to be used for other types of test firings into existing impact areas. Continued transport, use, and disposal of hazardous materials associated with on-going operations would be managed in compliance with RCRA. Migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors would continue to be unlikely based on MCOC assessments conducted pursuant to DOD Instruction 4715.11.

#### **Proposed Action**

The new impact area would function as a multi-purpose, multi-use impact area for multiple test missions. Use of regulated substances as a result of the Proposed Action would be limited to fuel consumption from vehicle use, operation of generators, and firing of munitions, and would be managed in accordance with applicable guidance and regulations. Use of vehicles and supporting equipment such as generators may result in spills or leaks of petroleum, oils, and lubricants. Use of vehicles as targets may also occur; vehicles would be drained of all fluids and decommissioned prior to setting as targets within the impact area. Leaks and spills of petroleum, oils, and lubricants would be minimized through implementation of BMPs such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area, if necessary; 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.

Various munitions mentioned in Section 2.1 could be fired into the new impact area. 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 would remain unlikely based on MCOC assessments conducted pursuant to DOD Instruction 4715.11. Based on the above, the Proposed Action would not result in increased and long-term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes.

## 3.5 Health and Safety

#### 3.5.1 Affected Environment

Military operations and weapons testing on YPG pose some level of hazard to both airspace and ground users by their very nature. YPG operates ranges for testing and training where the types of spent munitions include artillery shells, mines, rockets, bombs, missiles, and projectiles. As a result, unexploded ordnance represents a ground-based hazard. There is the potential for the presence of unexploded ordnance within the proposed impact area due to historical uses of YPG for testing and training.

Numerous unpaved roads traverse the ranges creating ground-based hazards such as poor road conditions and military vehicle use. 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.

Standard protocols are followed on YPG to avoid and minimize safety hazards, including the following:

- Public access to lands managed by YPG 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 operations on the installation. Range safety training is required for authorized personnel.
- All military operation on active ranges are coordinated through YPG Range Control.

In addition, YPG implements specific safety protocols for military operations including:

- 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 YPG.
- 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 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. In 2005, the King Valley Fire burned 3,000 acres on YPG and 26,000 acres on Kofa NWR (YPG 2015). The size was attributed to the heavy winter rains that year. Other than the King Valley Fire, there have been approximately 25 small wildfire events on YPG that burned a total of 170 acres from 2003 to 2015 (YPG 2015).

#### 3.5.2 Environmental Consequences

#### No Action

Under the No Action Alternative, the proposed 88-acre impact area on the northern end of Cibola Region would not be established. Existing gun positions would be used for other types of test firings into existing

impact areas. All existing safety protocols and regulations would continue to be implemented for ongoing military operations and public uses on YPG. There would be no substantial increases in health and safety risks for public and military personnel.

#### **Proposed Action**

Preparation of the impact area may create short-term increased safety risks to workers. Workers would have the potential for accidents as a result of routine job exposure to heavy equipment during vegetation trimming and preparation of the impact area, including setting up targets. Workers would also be exposed to elevated noise levels from construction equipment. Workers would use appropriate protection and comply with appropriate safety standards.

Once established, use of the new impact area would present common testing hazards. All tests would be scheduled in advance with the range operations 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 safety danger zone (SDZ) or otherwise under adequate protective cover. YPG protocols related to safety during testing would be implemented to protect testing staff. Testing activities within the project area would be controlled and monitored. With implementation of these measures, less than significant intermittent impacts to health and safety would be expected during construction activities and operations.

Depending on the gun position used, the proposed line of fire and the associated SDZ could cross manned facilities within YPG, Highway 95, and adjacent public lands or wildlife refuges. 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. These SDZs can vary greatly in size and shape, dependent on the type of munition being utilized for the test. Some testing activities would require temporary closure of Highway 95. In general, any road closures would be conducted in accordance with Arizona Department of Transportation's road closure protocols. Traffic management personnel would be placed at both ends of the closure. Test firings would take place after the area has been cleared of all vehicles. Emergency access through the closed road segment would be coordinated between the YPG Safety Office and law enforcement or emergency responders on the scene.

There may be a potential impact to public access areas (BLM, Kofa NWR, BOR) due to temporary closures for public safety reasons. YPG would closely coordinate with neighboring land managers in advance of scheduled test firings for any proposed SDZ that extends beyond YPG boundaries. YPG would take appropriate precautions to ensure that the public is not within the SDZ during testing. Tests would be scheduled to avoid high visitation periods for the refuge. Prior to test firings, YPG would deploy aircraft and personnel along roads to monitor for the presence of visitors within the SDZ.

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 DOD Instruction 4715.11 (See Section 3.6 for more information).

Establishment and use 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. Additionally, the proposed impact area is not adjacent to or within the vicinity of the general population and is buffered by public lands managed by the BLM. Thus, potential hazards to the general public and military personnel would be minimal.

#### Avoidance, Minimization, and Mitigation Measures

- Safety-1: Coordinate with Kofa NWR, Cibola NWR, BLM or any other land manager as appropriate 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.
- Safety-2: Schedule test firing to coincide with periods of low traffic on Highway 95 and low visitation periods on neighboring lands to the extent practicable.
- Safety-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.
- Safety-4: Coordinate all scheduled tests with YPG Range Control.
- Safety-5: Coordinate with Arizona Department of Transportation for temporary closure of Highway 95 during times of active testing.

#### 3.6 Land Use and Recreation

#### 3.6.1 Affected Environment

Land uses surrounding YPG are primarily undeveloped open space and sparsely populated areas. Most of the land is owned by the federal government, primarily under the control of 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 of YPG. The Gila River Valley is adjacent to the southern border of YPG. Private lands used for agriculture, lands managed by the BLM and BOR, 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 YPG, at the confluence of the Colorado River and the Gila River.

Land within the boundary of YPG is comprised of withdrawn public land and a small quantity of nonpublic land designated for use by the Department of the Army for military purposes and devoted to functions that are compatible with the current mission of the installation (YPG 2017). Because the land base of YPG is dedicated to military testing and evaluation, most of the land is reserved for firing ranges, impact areas, drop zones, mobility test courses, and other mission-related support facilities. Large open areas with associated safety and buffer areas are required for many of these activities and facilities; thus, there are vast open spaces at YPG with scattered developed areas. The project area is in the Cibola Region, which 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, most of the area is designated as a testing range and consists of open space.

General public access to YPG is authorized in designated areas. There are no recreational facilities, programs, or other amenities for the general public on lands where public access is authorized. Most lands from the center of Cibola Region extending eastward are restricted. Publicly accessible lands on YPG are primarily used for hunting and hunting-associated activities such as camping in support of a hunt, and are limited to western and northern areas of Cibola Region where lands are contiguous with BLM-managed lands. Test ranges are officially closed to civilian use, except for specifically designated public hunting areas. The proposed impact area is in an area currently designated for hunting. YPG, in cooperation and coordination with AZGFD, has administered hunting in some parts of the installation since 1979. Hunting on the installation currently is administered under USAYPG Regulation No. 210-11 (2015) and in accordance with 10 U.S.C 2671; Ars 200-1, 210-21, and 385-63; 32 CFR 190; DoD D 4715.11; DoD 6055.9STD; DA PAM 420-7; TM-5-633; DA Memoranda SFIM-SW-Z (May 6, 2003) and SFIM-OP-P (March 13, 2003); and other related guidance. The proposed impact area is in the Mohave Hunting Area within Game Management Unit 43A (Figure 4). YPG, in cooperation with AZGFD, is responsible for proper warning of danger areas and conditions to hunters. Posting of installation boundary signs is also

the responsibility of YPG. There may be a potential impact to public access areas (BLM, Kofa NWR, BOR) due to temporary closures for public safety reasons.

#### 3.6.2 Environmental Consequences

#### No Action

Under the No Action Alternative, the proposed 88-acre impact area would not be established. Existing military operations on YPG would continue in accordance with existing land uses and may result in periodic disruptions to recreation activities.

#### **Proposed Action**

Implementation of the Proposed Action is aligned with intended land use and consistent with YPG management goals. The new impact area would function as a multi-purpose, multi-use impact area for YPG test missions. Projectiles would be fired from existing gun positions on YPG directed toward the proposed 88-acre impact area. Use of existing gun positions would not conflict with existing land uses within YPG. Multiple impact areas already exist within Cibola Region; thus, establishment of a new impact area would not conflict with existing land uses.

Lines of fire and associated SDZs that are wholly contained within the boundary of YPG would not impact land use. However, overflights across Kofa NWR, Imperial NWR, Cibola NWR, BOR, or other public lands and temporary closure of a stretch of Highway 95 that would be required for some tests, depending on gun position location, would temporarily affect public access. Use of the airspace would not result in permanent conflict with existing land uses.

The proposed impact area is in an area of YPG that is restricted to the extent necessary to safeguard public health and safety, to provide for national security and the military mission of YPG, and to preserve environmental quality and other natural and cultural resource values. The area would remain inaccessible to the general public and recreational opportunities that are available in the area would change. There may be potential impacts to public and/or recreational access resulting from closure of the roads in the vicinity such as Cibola Lake Road and/or the Ehrenberg Road that may be required to maintain security and public safety during RDT&E activities.

Use of the new impact area would impact recreational hunting on YPG because it is located within a designated hunting area. The proposed 88-acre impact area would be off-limits to hunters, but the surrounding hunt unit would remain open for hunting access when the area in not actively being used for mission activity. Use of the YPG Cibola Range hunting areas overlapped by SDZs would be temporarily restricted when firing into the impact area. When prudent, YPG would consider hunt season dates when scheduling closures for testing and make closures known to the public as early as possible to help mitigate the potential effects to constituents. Closures would be announced to recreational users through YPG Range Control (when they call in for a clearance), or through the YPG hunt program, (https://yuma.isportsman.net), where recreational users obtain YPG hunting permits.

The line of fire and associated SDZs could cross portions of the Cibola or Kofa NWR or other public lands. Therefore, recreational activities and public access could be temporarily impacted within the area that overlaps with the safety buffer footprint. Impacts would be less than significant.



Figure 4. YPG Recreational Hunting Areas.

#### 3.7 Water Resources

#### 3.7.1 Affected Environment

YPG is located within the Colorado/Lower Gila watershed. Principal drainages near the APE consist of the Colorado River, located approximately 8.75 miles to the west, and the lower Gila River, located approximately 48 miles to the south. There are no perennial lakes, streams, or mountain springs within the boundaries of YPG, and no permanent surface water developments or natural water holes are found on or near the proposed impact area; however, ephemeral streams or washes occur throughout. The largest of these, Trigo Wash, encompasses the entire project area, and drains northwest to the Colorado River. There are no designated wetlands or permanent surface waters identified by the USFWS National Wetlands Inventory within the proposed impact area (USFWS 2019).

Desert ephemeral washes are a prevalent feature of the YPG landscape and surface hydrology. They are produced by localized high intensity thunderstorms resulting in rapid surface runoff and flash floods. The proposed impact area is encompassed by Trigo Wash and Pete's Wash is located just south of the area. Both of these washes are dry most of the year as a result of infrequent rainfall, characteristic of Sonoran Desert precipitation patterns. Average rainfall for YPG is 3.5 inches per year, and the pan evaporation rate is 107 inches per year (YPG 2017). The combination of low precipitation and high evaporation reduces surface water build-up and/or infiltration into the soil minimizing the risk of surface water contamination from actions occurring at YPG.

The Colorado and Gila rivers replenish groundwater for the Yuma region. Information concerning groundwater resources is limited because most of the groundwater production wells located across YPG are located within the developed areas, but there are also some that were constructed in more remote areas. The closest well to the proposed impact area is the North Cibola Well, which is located about 12 miles southeast, with a depth to groundwater reading of approximately 880 feet below ground surface. Groundwater depth at the proposed impact area is estimated to be approximately 450-500 feet below ground surface or 300-350 feet above mean seal level based on elevation of the Colorado River and groundwater gradients on YPG (Glover 2020). Isotopic composition and general chemistry from 15 of the wells were investigated in 2019 to determine the age of groundwater and better understand the origin, flow, and recharge of the aquifer system beneath YPG (NWRC 2019). The results of the investigation were used to evaluate the potential for contaminant migration from past and/or present surface activities at YPG to local groundwater supplies in the subsurface. Based on historical and recent depth to groundwater data, all wells sampled in the study penetrate the deeper water table aquifer. The large depth to groundwater in most areas, low precipitation, and high evaporation rates are all great assets in preventing the migration of possible surface contaminants to the subsurface.

#### 3.7.2 Environmental Consequences

#### No Action

Under the No Action Alternative, the Trigo North Impact Area would not be created. There would be no effect to surface water or groundwater resources.

#### **Proposed Action**

This action could impact plant cover, the soil surface, and the natural drainage system. Soil surfaces that lose their protective rock and vegetative cover can increase stormwater runoff velocity and promote accelerated erosion. Because the area receives rain very infrequently, it is equally infrequent that the washes are flowing. However, when the washes are actively flowing, the potential to transport sediment or MCOC off the range complex does exist. MCOC are defined as munitions constituents with 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 (DOD Instruction 4715.14, 30 November 2005).

An evaluation of the "Explosive and Metal Concentrations in Washes Downgradient of the Open Burn/Open Detonation (OB/OD) Facility" located on the Kofa Range was conducted in 2006. Even though this facility is located east of the Cibola Range, the area has the same geological features as the Cibola Range. The 2006 study investigated the possibility for MCOCs to migrate off the OB/OD Facility. During this investigation, a total of 88 soil and sediment samples were collected in the washes downgradient of the OB/OD Facility. These samples were collected from biased locations intended to clearly indicate whether or not MCOC were present in the site soil or were migrating off site in washes. The study concluded that MCOC were not migrating off site via the desert wash pathway. Based on the results of this investigation, surface water does not represent a viable pathway for migration of MCOC off the range complex (Gutierrez Canales Engineering 2006).

Potential impacts inside of ephemeral washes would be conducted in accordance with Section 404 of the Clean Water Act, Nationwide Permit No. 18, and the Navigable Waters Protection Rule by the U.S. Environmental Protection Agency. Under the Navigable Waters Protection Rule, the U.S. Environmental Protection Agency defines "Waters of the United States" and excludes ephemeral features defined by those that flow only in direct response to precipitation, which includes ephemeral streams, swales, gullies, rills, washes, and pools.

Based on the estimated depth to water in the proposed impact area, the lack of rainfall (average 3.5-inches annually), and the high rate of evaporation (more than 100-inches annually), impacts to groundwater from the Proposed Action are not anticipated.

The proposed impact area lies within a desert wash which may flow during heavy rain events. Lightweight materials such as wood or fabric could be washed downstream during flash floods. Heavy materials like steel or concrete may become buried. Because of the risk of flooding within the wash, there would be no long-term staging of targets or materials on site.

#### Avoidance, Minimization, and Mitigation Measures

- Water-1: Target materials and instrumentation would not be staged within the impact area long-term.
- Water-2: All lightweight target materials or debris would be removed immediately after test events.

## **4** COORDINATION AND PREPARATION

TRIBE/AGENCY/ORGANIZATION				
Ak-Chin Indian Community	Hopi Tribe			
Chemehuevi Indian Tribe	Fort Yuma-Quechan Tribe			
Cocopah Indian Tribe	San Carlos Apache Tribe			
Colorado River Indian Tribes	Salt River Pima-Maricopa Indian Community			
Fort Mojave Indian Tribe	Tohono O'odham Nation			
Fort McDowell Yavapai Nation	Yavapai-Apache Nation			
Gila River Indian Community	Yavapai-Prescott Indian Tribe			
US Bureau of Reclamation	US Fish and Wildlife Service			
US Army Corps of Engineers	US Environmental Protection Agency			
Natural Resources Conservation District	US Bureau of Land Management			
U.S. Customs and Border Protection	US Bureau of Indian Affairs			
Marine Corps Air Station Yuma	Arizona Department of Transportation			
Arizona Game and Fish Department	Arizona Department of Environmental Quality			
Arizona Department of Agriculture	La Paz County			
Yuma County	City of Yuma			
Yuma Metropolitan Planning Organization	Yuma Chamber of Commerce			
Greater Yuma Economic Development Corp	Yuma County Chamber of Commerce			
Western Arizona Council of Governments	Sierra Club			
Arizona Wilderness Coalition	Arizona Historical Society			
Arizona Desert Bighorn Sheep Society	Arizona Deer Association			
Yuma Audubon Society	Center for Biological Diversity			
Yuma Valley Rod and Gun Club				

Tribes, agencies, or organizations contacted during scoping are listed below.

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#### **APPENDIX A – SHOCKWAVE ATTENUATION ANALYSIS**

An analysis of seismic and blast overpressure impact to the surroundings was performed to evaluate the Peak Particle Velocity (PPV) and blast intensity as a function of distance and compared to commonly accepted threshold levels for damage to structures. The mathematical models used correlate explosive charge weight and distance, along with factors describing the attenuation effects of the atmospheric or geological conditions on the blast, to predict the intensity of the blast (Mohamed and Mohamed 2013).

Equation 1:

$$PPV = K \left(\frac{D}{\sqrt{W}}\right)^{-\alpha}$$

Equation 2:

Air Blast (dB) = 
$$m \left(\frac{D}{\sqrt{W}}\right)^{-a}$$

Where:

PPV = Peak Particle Value (mm/s) dB = Decibels K = Site Factor (seismic) D = Distance to Blast Site (m) W = Charge Weight (kg)  $\alpha = Decay Factor$  m = Site Factor (air blast)a = Decay Factor

The explosive weight of the M795 155mm artillery shell, 10.8 kg, was used in the calculations, as it is the largest munition that is expected to be used in the proposed impact area.

The majority of impacts would be at the primary aim point, approximately 300-400 meters from the nearest site of interest. A secondary scenario is included, where the munition impacts are just within the identified impact area, with a minimum of a 100-m buffer between the impact area and the archaeological site.

Table A-1 summarizes the results of the PPV and blast intensity analyses and compares them to thresholds for damage (Virginia Vibration Limits for Historic Buildings). For all three scenarios, the estimated PPV is substantially below the threshold for minor damage (2 in/s), and for all but the 100m scenario the estimated PPV is well under the threshold for no appreciable damage (0.5 in/s). It should be noted that even at 100m, the estimated PPV of 0.513 only narrowly exceeds the 0.5 in/s threshold, and is well below the 2 in/s threshold for minor detectable damage (e.g., hairline cracks in plaster, etc.). As these sites are not standing structures, they are likely to be far less sensitive to vibration. Figures A-1 and A-2 show the attenuation of the ground and air blast intensity as a function of distance.

TABLE A-1: Estimates of Ground and Air Blast Effects						
Scenario	PPV (in/s)*	Air Blast (dB)*	Remarks**			
400m to site	0.094	122	Below 0.5 in/s "No Damage" limit			
300m to site	0.133	125	Below 0.5 in/s "No Damage" limit			
100m to site	0.514	135	Just above 0.5 in/s "No Damage" limit			
LEGEND: PPV – Peak Particle Velocity in/s – Inches per Second dB – Decibels m – meters						
NOTES: * Calculations after Mohamed and Mohamed ** Limits recommended by Virginia Vibration Limits for Historic Buildings and Art Collections						



FIGURE A-1: Ground Blast Intensity as a Function of Distance



FIGURE A-2: Air Blast Intensity as a Function of Distance

Table A-2 describes threshold values for PPV corresponding to potential damage to historical structures and artwork collections, derived from Virginia Vibration Limits for Historic Buildings and Art Collections (Johnson and Hannen 2015).

TABLE A-2: Vibration Thresholds for Damage to Structures or Artworks					
Damage Types (Structures)	Peak Particle Velocity (in/s)				
Threshold (hairline cracking in plaster, opening old cracks, etc.)	2-3; never at <0.5				
Minor damage (hairline cracking in masonry, breaking windows)	4-5, never at <1.0				
Major structural damage	>5				
Damage Types (Artworks)					
Shipment	1.5-3 in/s				
Evidence of damage to very fragile art objects	0.6-1.8 in/s				
Conservative recommendation (paintings "walk" on wall hanging hardware), used as limits for museum construction projects.	<0.1 in/s				
LEGEND:					
PPV – Peak Particle Velocity					
in/s – Inches/second					

For comparison purposes, the following table from the Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual (Volpe 2018) contains vibration source levels for construction equipment.

Equipment		PPV at 25	Approximate
		ft, in/sec	Lv <sup>°</sup> at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.17	93
Clam shovel drop (sluri	y wall)	0.202	94
Hydromill (slurry	in soil	0.008	66
wall)	in rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

\* RMS velocity in decibels, VdB re 1 micro-in/sec

# APPENDIX B – USFWS AND AZGFD SPECIES WITH POTENTIAL TO OCCUR IN THE PROPOSED IMPACT AREA

## Summary of Federally Listed Species Identified by the IPaC System and Their Potential to Occur within the Proposed Impact Area

Species Name	Status	Habitat Requirements	Potential to Occur within the Proposed Impact Area
Mammal Species			
Sonoran Pronghorn Antilocapra americana sonoriensis	Exp	Found exclusively in the Lower Colorado River Valley and the Arizona Upland subdivisions of the Sonoran Desert Scrub Biome and currently occur in southwestern Arizona and northwestern Sonora, Mexico.	Nonessential experimental population released from Kofa NWR. More than 150 pronghorn now occupy the refuge and portions of YPG's Kofa Range. There is occasional pronghorn movement onto YPG north Cibola ranges.
Bird Species			
Yuma Ridgway's (clapper) Rail Rallus obsoletus yumanensis	Е	This species is associated with dense emergent riparian vegetation. Requires wet substrate (mudflat, sandbar) with dense herbaceous or woody vegetation for nesting and foraging. Fresh-water marshes dominated by cattail or bulrush are preferred habitat.	No suitable habitat within or adjacent to the proposed impact area.
Yellow-billed Cuckoo Coccyzus americanus	Т	Riparian cottonwood-willow galleries and to a lesser extent willows or isolated cottonwoods with tall mesquites.	No suitable habitat within or adjacent to the proposed impact area.
Reptiles and Amphibians			L
Northern Mexican Gartersnake Thamnophis eques megalops	Т	Riparian obligate found in wetlands, stock tanks, riparian woodlands, and streamside gallery forests.	No suitable habitat within or adjacent to the proposed impact area.
Sonoran Desert Tortoise Gopherus morafkai	С	Most closely associated with the Arizona Upland and Lower Colorado River subdivisions of Sonoran Desert scrub and Mojave Desert-scrub vegetation types. They occur most commonly on rocky, steep slopes and bajadas, and in paloverde-mixed cacti associations.	Potentially occur on the mountains and foothills to the east of the proposed impact area.
Fish	1		
Razorback Sucker <i>Xyrauchen texanus</i>	E	Endemic to the warm-water portions of the Colorado River basin of the southwestern United States. Common in low-velocity habitats such as backwaters, floodplains, flatwater river reaches, and reservoirs.	No suitable habitat within or adjacent to the proposed impact area.

Species Name	Status	Habitat Requirements	Potential to Occur within the Proposed Impact
			Area
Roundtail Chub	С	Cool to warm water over a wide range of	No suitable habitat within
Gila robusta		elevations in rivers and streams	or adjacent to the proposed
Lower Colorado River		throughout the Colorado River basin,	impact area.
Basin DPS		often in open areas of the deepest pools	
		and eddies of mid-sized to larger streams.	
Insects			
Monarch Butterfly	С	Fields, roadside areas, open areas wet	Potential habitat within the
Danaus plexippus		areas, or urban gardens; milkweed and	proposed impact area.
		flowering plants are needed for monarch	
		habitat.	
* E = Federally listed as Endangered under the ESA; T = Federally listed as Threatened under the ESA; C=			
Federally listed as Candidate under the ESA; Exp = Experimental, Non-Essential Population			

## AZGFD Tier 1A and 1B Species with the Potential to Occur within Habitat Types Present in the Proposed Impact Area.

Name	AZGFD	Habitat Type	
D' 1	lier		
Birds			
Western Burrowing Owl	1B	Open grassland, prairies, farmland, airfields. Favors areas of flat	
Athene cunicularia hypugaea		open ground with very short grass or bare soil. Marginally suitable	
		habitat present.	
Gilded Flicker	1B	Common in Sonoran Desert habitat for nesting and foraging.	
Colaptes chrysoides			
Gila Woodpecker	1B	Desert washes, saguaros, river groves, cottonwoods. Suitable	
Melanerpes uropygialis		habitat in proposed impact area.	
Lincoln's Sparrow	1B	Common in riparian and streamside bogs. No suitable habitat within	
Melospiza lincolnii		the proposed impact area.	
Le Conte's Thrasher	1B	Desert flats with sparse growth of saltbush and on creosote bush	
Toxostoma lecontei		flats: mainly where there are larger mesquites or cholla cactus.	
		Suitable habitat in proposed impact area.	
Mammals			
Harris' Antelope Squirrel	1B	Saltbush-creosote bush-bursage, usually in areas with rocky soil or	
Ammospermophilus harrisii		rocky slopes, but in sandy areas in some regions. Suitable habitat	
· ·		occurs within proposed impact area.	
Pale Townsend's Big-eared Bat	1B	Occur in forested regions and buildings, and in areas with a mosaic	
Corynorhinus townsendii		of woodland, grassland, and/or shrubland. No suitable habitat	
pallescens		occurs within the proposed impact area.	
Spotted Bat	1B	Occurs in various habitats from desert to montane coniferous	
Euderma maculatum		stands, including open ponderosa pine, pinyon-juniper woodland,	
		canyon bottoms, riparian and river corridors, meadows, open	
		pasture, and havfields. Marginal habitat for roosting and foraging	
		occurs within the proposed impact area.	
Greater Western Mastiff Bat aka	1B	Roosts are in caves, cliff crevices, bridges, buildings, and tunnels,	
Greater Western Bonneted Bat		and forages in open areas. Marginal habitat for roosting and	
Eumops perotis californicus		foraging occurs within the proposed impact area.	
Western Yellow Bat	1B	Found in riparian woodlands in arid regions. No suitable habitat	
Lasiumus vanthinus		· · · · · · · · · · · · · · · · · · ·	

Name	AZGFD	Habitat Type
California Leaf-nosed Bat Macrotus californicus	1B	Roosts are in caves, cliff crevices, bridges, buildings, and tunnels, and forages in open areas. Marginal habitat for roosting and foraging occurs within the proposed impact area. Documented within 5 miles of proposed impact area.
Cave Myotis Myotis velifer	1B	This species generally inhabits evergreen or pine-oak forest and pine forest at mid and high elevations, and riparian habitats near desert scrub at lower elevations. No suitable habitat present in the proposed impact area.
Yuma Myotis Myotis yumanensis	1B	Roosts are in caves, cliff crevices, bridges, buildings, and tunnels, and forages over water and open areas. Marginal habitat for roosting and foraging occurs within the proposed impact area.
Pocketed Free-tailed Bat Nyctinomops femorosaccus	1B	Occur in rugged canyons, high cliffs, and rock outcroppings in semiarid landscapes. Marginal habitat for roosting and foraging occurs within the proposed impact area.
Little Pocket Mouse Perognathus longimembris	1B	Occurs in sagebrush, creosote bush, and cactus communities in Lower and Upper Sonoran life zones. Habitat is present in proposed impact area.
Colorado River Cotton Rat Sigmodon arizonae plenus	1B	Restricted to grassy habitats, including edges of ponds, along drainages, in riparian habitats, adjoining agricultural fields, and in arid grassy patches. No suitable habitat occurs within the proposed impact area.
Mexican (or Brazilian) Free- tailed Bat <i>Tadarida brasiliensis</i>	1B	Habitat ranges from lowland deserts, shrublands, woodlands, and forests to high mountains. Suitable habitat for roosting and foraging occurs within the proposed impact area.
Kit Fox Vulpes macrotis	1B	Occurs in desert, shrubland/chaparral. Suitable habitat exists in the proposed impact area.
Mexican Desert Bighorn Sheep Ovis canadensis mexicana	1B	Inhabit remote mountain and desert regions, restricted to semi-open, precipitous terrain with rocky slopes, ridges, and cliffs or rugged canyons. They rarely stray far from the base of a mountain. Unlikely to be found in the proposed impact area except as possible occasional movement through the area.
Reptile	T	
Gila Monster Heloderma suspectum	1A	Occurs in Mohave and Sonoran Desert scrub. Suitable habitat exists in the proposed impact area.
Amphibian		
Sonoran Desert Toad Incilius alvarius	1B	Occurs in close proximity to open water. No suitable habitat exists in the proposed impact area.