DRAFT

ENVIRONMENTAL ASSESSMENT
ADDRESSING PROPOSED TACTICAL INFRASTRUCTURE MAINTENANCE AND REPAIR ALONG THE U.S./MEXICO INTERNATIONAL BORDER IN ARIZONA

Department of Homeland Security
U.S. Customs and Border Protection
U.S. Border Patrol

SEPTEMBER 2011

ABBREVIATIONS AND ACRONYMS

$\mu g/m^3$	micrograms per cubic meter
ACM	asbestos-containing material
ADEQ	Arizona Department of Environmental Quality
AIRFA	American Indian Religious Freedom Act
AMA	Active Management Area
AQCR	air quality control region
ARHA	Archeological and Historic Preservation Act
ARPA	Archaeological Resources Protection Act
AST	aboveground storage tank
AZGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BMP	Best Management Practice
BMTF	Borderland Management Task Force
BPFTI	Border Patrol Facilities and Tactical Infrastructure
CAA	Clean Air Act
CBP	U.S. Customs and Border Protection
CBVs	cross-border violators
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
dBA	a-weighted decibel
DBH	diameter at breast height
DHS	Department of Homeland Security
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DVD	digital video disc
EA	Environmental Assessment
ECSO	Engineering and Construction Support Office
EIA	Energy Information Agency
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESCP	erosion-and-sediment control-plan
ESP	Environmental Stewardship Plan
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIRM	Flood Insurance Rate Map
FM&E	Facilities Management and Engineering
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FR	Federal Register
FY	Fiscal Year
GHG	greenhouse gas
HAP	hazardous air pollutant
IIRIRA	Illegal Immigration Reform and Immigrant Responsibility Act
LBP	lead-based paint
MD	Management Directive

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mg/m^3	milligrams per cubic meter
mi^2	square mile
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
mph	miles per hour
MYIAQCR	Mojave-Yuma Intrastate AQCR
NAAQS	National Ambient Air Quality Standards
NOA	Notice of Availability
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O_3	ozone
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
Pb	lead
PCB	polychlorinated biphenyl
percent g	percentage of the force of gravity
PIAQCR	Pima Intrastate AQCR
PM_{10}	particulate matter equal to or less than 10 microns in diameter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PMO	project management office
POE	Port of Entry
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
RVSS	Remote Video Surveillance System
SEAIAQCR	Southeast Arizona AQCR
SHPO	State Historic Preservation Office
SME	Subject Matter Expert
SO_x	sulfur oxides
SSPP	Strategic Sustainability Performance Plan
tpy	tons per year
TSCA	Toxic Substances Control Act
U.S.C.	United States Code
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USBP	U.S. Border Patrol
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USIBWC	United States Section International Boundary and Water Commission
UST	underground storage tank
VOC	volatile organic compound

COVER SHEET

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ALONG THE U.S./MEXICO INTERNATIONAL BORDER IN ARIZONA

DEPARTMENT OF HOMELAND SECURITY,
U.S. CUSTOMS AND BORDER PROTECTION,
U.S. BORDER PATROL

Responsible Agencies: Department of Homeland Security (DHS), U.S. Customs and Border Protection (CBP), U.S. Border Patrol (USBP).

Affected Location: U.S./Mexico international border in Arizona.

Proposed Action: CBP proposes to maintain and repair existing tactical infrastructure along the U.S./Mexico international border in Arizona, which is maintained by two USBP sectors: Tucson and Yuma. The Tucson Sector is entirely within Arizona, and the western portion of the Yuma Sector is in Arizona.

Report Designation: Draft Environmental Assessment (EA).

Abstract: CBP proposes to maintain and repair existing tactical infrastructure along the U.S./Mexico international border in Arizona. The existing tactical infrastructure includes fences and gates, roads and bridges/crossovers, drainage structures and grates, open observation zones, boat ramps, lighting and ancillary power systems, and Remote Video Surveillance System components. The existing tactical infrastructure occurs in the Yuma and Tucson USBP sectors in Arizona.

The EA analyzes and documents potential environmental consequences associated with the Proposed Action. The analyses presented in the EA indicate that implementation of the Proposed Action would not result in significant environmental or socioeconomic impacts, and a Finding of No Significant Impact (FONSI) has been prepared. If potential environmental concerns arise that cannot be mitigated to a level of insignificance, a Notice of Intent to prepare an Environmental Impact Statement (EIS) would be required.

Throughout the National Environmental Policy Act (NEPA) process, the public may obtain information concerning the status and progress of the Proposed Action and the EA via the project Web site at *http://cbp.gov/xp/cgov/border_security/ti/ti_docs/timr/*, by emailing AZcomments@TIMR-NEPA.com, or by written request to Mr. Charles McGregor, Jr., Environmental Manager, U.S. Army Corps of Engineers, Fort Worth District, Engineering and Construction Support Office (ECSO), 819 Taylor Street, Room 3B10, Fort Worth, Texas 76102; or by Fax: 817-886-6404.

Comments may be submitted to CBP by contacting the SBI*net*, Tactical Infrastructure Program Office. To avoid duplication, please use only one of the following methods:

(a) Electronically through the Web site at *http://cbp.gov/xp/cgov/border_security/ti/ti_docs/timr/*

(b) By email to AZcomments@TIMR-NEPA.com

(c) By mail to Arizona Tactical Infrastructure Maintenance and Repair EA, c/o HDR, 2600 Park Tower Drive, Suite 100, Vienna, Virginia 22180

(d) By fax to 240-554-2511.

Privacy Notice

Your comments on this document are requested. Public comments will be duly considered as the EA is developed and will be made publicly available along with other documentation related to this project. Any personal information included in comments will therefore be publicly available.

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EXECUTIVE SUMMARY

INTRODUCTION

The Department of Homeland Security (DHS) and U.S. Customs and Border Protection (CBP), propose to maintain and repair certain existing tactical infrastructure along the U.S./Mexico international border in the State of Arizona. The tactical infrastructure proposed to be maintained and repaired consists of fences and gates, roads and bridges/crossovers, drainage structures and grates, open observation zones, boat ramps, lighting and ancillary power systems, and Remote Video Surveillance System (RVSS) components. The existing tactical infrastructure occurs in two U.S. Border Patrol (USBP) sectors: Tucson and Yuma.

The tactical infrastructure included in this analysis crosses multiple privately owned land parcels, Tribal lands, and public lands managed by the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), U.S. National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), and U.S. Department of Defense (DOD). The CBP Facilities Management and Engineering (FM&E) Office is responsible for maintenance and repair of tactical infrastructure (e.g., fences, roads, lights, RVSSs, and drainage structures) to support CBP border security requirements.

This Environmental Assessment (EA) addresses the maintenance and repair of existing tactical infrastructure. Tactical infrastructure included in this EA is found in both USBP Sectors along the U.S./Mexico international border in Arizona. However, the maintenance and repair of tactical infrastructure assets that are already addressed in previous National Environmental Policy Act (NEPA) documents will not be included within the scope of this EA. In addition, tactical infrastructure assets that are covered by a waiver issued by the Secretary of Homeland Security (the Secretary) are also excluded from the scope of this EA.

This EA has been prepared through coordination with Federal and state agencies to identify and assess the potential impacts associated with the proposed maintenance and repair of tactical infrastructure. This EA is also being prepared to fulfill the requirements of the NEPA.

PURPOSE AND NEED

The purpose of the Proposed Action is to ensure that the physical integrity of the existing tactical infrastructure and associated supporting elements continue to perform as intended and assist the USBP in securing the U.S./Mexico international border in Arizona. In many areas, tactical infrastructure is a critical element of border security, which contributes as a force multiplier for controlling and preventing illegal border intrusion. To achieve effective control of our nation's borders, CBP is developing a combination of personnel, technology, and infrastructure; mobilizing and rapidly deploying highly trained USBP agents; placing tactical infrastructure strategically; and fostering partnerships with other law enforcement agencies.

The need for the Proposed Action is to ensure that the effective level of border security provided by the installed tactical infrastructure is not compromised by acts of sabotage, acts of nature, or a concession in integrity due to a lack of maintenance and repair. CBP must ensure that tactical infrastructure functions as it is intended, which assists CBP with its mission requirements.

Tactical infrastructure would be maintained to ensure USBP agent safety by preventing potential vehicular accidents by minimizing and eliminating hazardous driving conditions.

PUBLIC INVOLVEMENT

CBP notified relevant Federal, state, and local agencies of the Proposed Action and requested input regarding environmental concerns they might have. As part of the NEPA process, CBP coordinated with the U.S. Environmental Protection Agency (USEPA); USFWS; Arizona Office of Historic Preservation; and other Federal, state, and local agencies. Input from agency responses has been incorporated into the analysis of potential environmental impacts.

A Notice of Availability (NOA) for this EA and Draft Finding of No Significant Impact (FONSI) will be published in the *Yuma Sun*, *Tucson Citizen*, and *Arizona Daily Star*. This is done to solicit comments on the Proposed Action and involve the local community in the decisionmaking process. Comments from the public and other Federal, state, and local agencies will be incorporated into the Final EA.

During the 30-day public review and comment period for the Draft EA, CBP will accept comment submissions by fax, by email, through the project-specific Web site, and by mail from the public; Federal and state agencies; Federal, state, and local elected officials; stakeholder organizations; and businesses.

DESCRIPTION OF THE PROPOSED ACTION

CBP proposes to maintain and repair existing tactical infrastructure consisting of fences and gates, roads and bridges/crossovers, drainage structures and grates, open observation zones, boat ramps, lighting and ancillary power systems, and RVSS components. The maintenance and repair activities are necessary to repair damages due to normal deterioration due to wear and tear, natural disasters, and intentional destruction or sabotage. The existing tactical infrastructure is found along the U.S./Mexico international border in Arizona and cuts across multiple land ownership categories including lands under CBP ownership, lands managed by other Federal agencies, tribal lands, and private property. Most of the maintenance and repair activities associated with the Proposed Action would occur within 25 miles of the U.S./Mexico international border in Arizona. CBP will develop a comprehensive protocol for coordinating the necessary maintenance and repair activities within the different classes of land ownership. The maintenance and repair of tactical infrastructure assets that are already addressed in previous NEPA documents will not be included. In addition, tactical infrastructure assets that are covered by a waiver issued by the Secretary of Homeland Security will not be included.

The USBP sectors along the U.S./Mexico international border in Arizona have identified a need for tactical infrastructure maintenance and repair to ensure their continued utility in securing the border. All maintenance and repair activities would be coordinated by the CBP FM&E Sector Coordinator in close coordination with the sector and managed by the Project Management Office's Maintenance and Repair Supervisor. CBP proposes to conduct tactical infrastructure maintenance and repair, as described in the following paragraphs.

Fences and Gates

Maintenance and repair of fences and gates would consist of welding of metal fence components, replacement of damaged or structurally compromised members, reinforcing or bracing of foundations, repairing burrowing activities under fences and gates, repairing weather-related damages, and the removal of vegetation and accumulated debris. The Proposed Action would also include the repair or replacement of gate-operating equipment (e.g., locks, opening/closing devices, motors, and power supplies). There are approximately 250 miles of fence on non-tribal lands in Arizona. The fencing consists of primary border fencing and a variety of perimeter security fencing for protecting sensitive infrastructure. Approximately 5 percent of the total is analyzed in this EA.

Roads and Integrated Bridges/Crossovers

Maintenance and repair activities would consist of regrading road surfaces, implementing improved water drainage measures (e.g., ensure road crowns shed water and runoff flows to established drainage ditches, culverts, or other water-control features as needed to control runoff and prevent deterioration to existing infrastructure or surrounding land), adding lost road surface material to reestablish intended surface elevation needed for adequate drainage, applying soil stabilization agents, controlling vegetation and debris, and filling in potholes. CBP currently uses approximately 1,200 miles of road within the region of analysis, which represents an estimated 17.5 percent of all local roads within the area. Approximately 700 miles (11 percent) of local roadways within 25 miles of the U.S./Mexico international border in Arizona consequently have not been subject to analysis after deducting the roads that have been analyzed in previous NEPA documents or waived from analysis (i.e., out of scope of this document).

Drainage Management Structures

Maintenance and repair of drainage systems would consist of cleaning blocked culverts and grates of trash and general debris and repairing or replacing nonfunctional or damaged drainages when necessary. There are an estimated 250 drainage management structures associated with the tactical infrastructure that is to be maintained and repaired in Arizona; 20 percent is analyzed in this EA.

Vegetation Control to Maintain Road Visibility and Open Observation Zones

A continuous, clear line of sight along various designated locations within sectors is needed by USBP agents for rapid detection and accurate characterization of potential threats. Continuous maintenance of vegetation is necessary to remove concealment opportunities and to assist in identifying, classifying, and apprehending cross-border violators (CBVs). Control would be achieved by mowing and the application of selective herbicides. Vegetation clearing would not be conducted in designated critical habitat, suitable habitat, or in areas where threatened or endangered species occur unless a survey is conducted to ensure that the species are not present. If threatened and endangered species are present, consultation with the USFWS would be required.

Boat Ramps

The maintenance and repair of boat ramps would include repairing and restoring boat ramp surfaces, conducting vegetation control to maintain unencumbered access, and implementation of erosion-control measures.

Lighting and Ancillary Power Systems

The maintenance and repair of lighting and ancillary power systems would consist of the replacement of burned out light bulbs, restoring or replacement of damaged power lines or onsite power-generating systems (e.g., generators, fuel cells, wind turbine generators, and photovoltaic arrays), repair and replacement of associated electrical components and, where necessary, vegetation control and debris removal. Approximately 12 percent of the estimated 550 lighting and ancillary power systems associated with tactical infrastructure in Arizona is subject to analysis in this EA.

Remote Video Surveillance Systems

RVSSs in the region of analysis along the U.S./Mexico international border in Arizona include a combination of monopoles, water towers, radio towers, telephone poles, and buildings. The physical structures of the RVSSs would be repaired and maintained (e.g., painting or welding to maintain existing metal towers), as necessary. Between 50 and 60 of the towers used by CBP (or approximately 75 percent) are analyzed in this EA.

Each of the RVSSs has a small footprint; none exceeds 10,000 square feet. For all water towers and radio towers, the total amount of disturbance would not exceed 13.5 acres, and all maintenance and repair activities would occur within the existing RVSS footprint. Access roads to the RVSSs are included in the road mileage previously discussed.

ALTERNATIVES ANALYSIS

Alternatives Considered

Alternative 1: Proposed Action. Under this alternative, maintenance and repair would be performed as described in **Section 2.2**. A comprehensive set of BMPs would be incorporated as part of the proposed maintenance and repair activities to minimize potential impacts. Maintenance and repair would occur via a periodic work plan based on anticipated situations within each sector and funding availability. Although centrally managed by FM&E, prioritization of projects based upon evolving local requirements within each sector would determine maintenance and repair schedules. This alternative would accommodate for changes in tactical infrastructure maintenance and repair requirements. Maintenance and repair requirements could change over time based on changes in usage or location, but would not exceed the scope of the EA. If the scope of the EA is exceeded, new NEPA analysis would be required. Using such an approach, FM&E and sector managers would still be committed to a preventative maintenance strategy and performing repairs to specified standards where necessary, but would not be subject to applying all standards to all tactical infrastructures on a

fixed schedule. FM&E and the sectors would ensure the sustainability of tactical infrastructure to support mission requirements.

Alternative 2: No Action Alternative. Under the No Action Alternative, the tactical infrastructure along the U.S./Mexico international border in Arizona would be maintained on an as-needed basis and would be considered primarily reactive maintenance. This approach would lack centralized standardization of maintenance and repair activities, and all best management practices (BMPs) intended to reduce impacts might not be implemented. Such ad-hoc maintenance would not address the overall maintenance requirements for tactical infrastructure and would not be considered sustainable in quality, resulting in the gradual degradation of the tactical infrastructure. Maintenance and repair activities planned on an ad hoc basis without uniform application of centralized standards would likely lead to inconsistent outcomes and greater risk if no BMPs could be implemented. The No Action Alternative would not meet CBP mission needs and does not address the Congressional mandates for gaining effective control of the U.S./Mexico international border in California. However, inclusion of the No Action Alternative is prescribed by the Council on Environmental Quality (CEQ) regulations and has been carried forward for analysis in the EA. The No Action Alternative also serves as a baseline against which to evaluate the impacts of the Proposed Action.

SUMMARY OF ENVIRONMENTAL IMPACTS

Table ES-1 provides an overview of potential impacts anticipated under each alternative considered, broken down by resource area. **Section 3** of this EA addresses these impacts in more detail.

1 **Table ES-1. Summary of Anticipated Environmental Impacts by Alternative**

Resource Area	Alternative 1: Proposed Action	Alternative 2: No Action Alternative
Land Use	No new construction would occur; therefore, no effects on land use plans or policies would be expected.	The No Action Alternative would result in continuation of existing land uses. No effects on land use would be expected.
Geology and Soils	Short- and long-term, minor, adverse effects on soils, primarily from the control of vegetation and use of herbicides would be expected. Erosion-and-sediment-control plans (ESCPs) and best management practices (BMPs) would be implemented to reduce the potential for adverse effects associated with erosion and sedimentation. No prime farmland soils exist within the region of analysis, therefore, no impacts on prime farmland soils would occur.	Short- and long-term, minor, direct and indirect, adverse effects on soils would be expected under this alternative. CBP would continue current maintenance and repair activities and tactical infrastructure would be maintained on an as-needed basis.
Vegetation	Short- and long-term, negligible to moderate, direct, adverse effects on terrestrial and aquatic vegetation would occur. BMPs would be used to avoid or minimize these effects. In-water maintenance and repair activities could result in direct and indirect impacts on aquatic plants and their habitat.	Short- and long-term, minor to moderate, direct, adverse effects on terrestrial and aquatic vegetation could occur from the No Action Alternative. In-water maintenance and repair activities could result in direct and indirect impacts on aquatic plants and their habitat.
Terrestrial and Aquatic Wildlife Resources	Short- and long-term, negligible to minor, direct and indirect, adverse effects on terrestrial and aquatic species could occur due to habitat degradation. These activities would result in temporary noise effects and displacement of terrestrial species. Near- and in-water maintenance activities could result in direct and indirect impacts on aquatic species and their habitat from increases in erosion, turbidity, and sedimentation.	Short- and long-term, minor to moderate, direct and indirect, adverse effects on terrestrial and aquatic species could occur from the No Action Alternative. Adverse effects on terrestrial species could occur due to habitat degradation associated with vegetation-control activities. Near- and in-water maintenance activities could result in direct and indirect impacts on aquatic species and their habitat from increases in erosion, turbidity, and sedimentation.

Resource Area	Alternative 1: Proposed Action	Alternative 2: No Action Alternative
Threatened and Endangered Species	Short- and long-term, negligible, direct and indirect, adverse effects on terrestrial and aquatic threatened and endangered species would be expected. Appropriate BMPs would be implemented and adverse effects from the maintenance activities would be avoided or minimized.	Based on implementation of proscribed BMPs, direct and indirect impacts on listed species would be negligible.
Hydrology and Groundwater	Short- to long-term, minor, adverse and beneficial impacts on groundwater and hydrology would be expected. Vegetation control within the road setback might cause short- to long-term, negligible to minor, adverse impacts on groundwater and hydrology by increasing erosion into wetlands, surface waters, and other groundwater recharge areas. Herbicides would result in long-term, minor, direct, adverse effects on groundwater if spills were to occur.	Short- and long-term, minor to moderate, direct and indirect, adverse impacts on hydrology and groundwater would be expected. Degrading infrastructure, particularly eroding roads, might lead to increased sediments, nutrients, and contaminants in wetland, streams and other groundwater recharge areas, and blocked drainage structures could increase flood risk.
Surface Waters and Waters of the United States	Short- and long-term, negligible to minor, indirect, adverse impacts could occur on surface water resources from vegetation and debris removal, and the grading of roadways, which could cause the deposition of fill materials or increased sedimentation into wetlands, arroyos, or other surface water or drainage features.	Short- and long-term, minor to major, direct and indirect, adverse impacts on surface waters might occur. Degrading infrastructure, particularly eroding roads, could lead to increased sediments, nutrients, and contaminants in wetlands, streams, arroyos, and other water-related features, and blocked drainage structures could increase flood risk.
Floodplains	Short-term, negligible to minor, indirect, adverse impacts could occur on floodplain areas from vegetation and debris removal, which could cause increased sedimentation into floodplains and drainage structures. Short-term, minor, adverse impacts would result from the introduction of fill material during grading. Long-term, minor, beneficial impacts on floodplains could occur by minimizing erosion of road material into floodplain areas.	Short- and long-term, minor to moderate, direct and indirect, adverse impacts could occur on floodplains. Degrading infrastructure, particularly eroding roads, might lead to increased sediments and other fill materials in the floodplain, and blocked drainage structures impair flow, which could increase flood risk.

Resource Area	Alternative 1: Proposed Action	Alternative 2: No Action Alternative
Air Quality	Air pollutant emissions would be generated as a result of grading, filling, compacting, trenching, and maintenance and repair operations, but these emissions would be temporary and would not be expected to generate any offsite effects. No significant effects on regional or local air quality would occur, and a negligible contribution towards statewide greenhouse gas inventories would be anticipated.	No direct or indirect adverse impacts would be expected on local or regional air quality from implementation of the No Action Alternative. CBP would continue current maintenance and repair activities and tactical infrastructure would be maintained on an as-needed basis.
Noise	Long-term, periodic, negligible to minor, adverse effects on the ambient noise environment would occur. Populations within 1,000 feet of the proposed maintenance and repair activities would have the potential to be exposed to a greater adverse effect than that described for the No Action Alternative.	Long-term, periodic, negligible to minor, adverse effects on the ambient noise environment would occur. CBP would continue current maintenance and repair activities and tactical infrastructure would be maintained on an as-needed basis.
Cultural Resources	No adverse effects on cultural resources would be expected. Ground-disturbing activities would be confined to the existing footprint of tactical infrastructure. As a result, these activities have minimal or no potential to affect historic properties.	Minimal or no potential to impact historic properties or cultural resources would be expected. There would be no Programmatic Agreement under the No Action Alternative. As a result, undertakings with the potential to cause effects on historic properties would follow the review and mitigation procedures set forth in Section 106 of the National Historic Preservation Act (NHPA). Unanticipated find procedures would be identical to those of the Proposed Action. Less ground-disturbing activities would take place and unanticipated finds would therefore be less likely.

Resource Area	Alternative 1: Proposed Action	Alternative 2: No Action Alternative
Roadways and Traffic	Short-term, negligible to minor, adverse effects on transportation would be expected from short-term roadway closures and detours while work is underway. Long-term, minor to moderate, beneficial effects on transportation would allow for faster, safer, and more efficient responses by the USBP to threats.	Most roadway repairs would be reactive to immediate issues affecting these roadways and would not address the long-term maintenance requirements. As-needed repairs would not be considered sustainable in quality because it would result in gradual degradation of these roadways.
Hazardous Materials	Long-term, negligible to minor, adverse impacts on hazardous substances, petroleum products, hazardous and petroleum wastes, and pesticides would be expected. Due to the nature and age of the tactical infrastructure, it is not anticipated to contain ACMs, LBPs, PCBs, or solid waste, and therefore no impacts on these resources would be expected.	Long-term, negligible to minor, adverse impacts on solid waste would be expected due to the deterioration of tactical infrastructure over time. No impacts on hazardous substances, petroleum products, hazardous and petroleum wastes, pesticides, asbestos-containing materials (ACMs), lead-based paints (LBPs), and polychlorinated biphenyls (PCBs). Due to the nature and age of the tactical infrastructure, it is not anticipated to contain ACMs, LBPs, PCBs, or solid waste.
Socioeconomic Resources, Environmental Justice, and Protection of Children	Short-term, minor, beneficial effects would result from increases to payroll earnings and taxes and the purchase of materials required for maintenance and repair. Short- to long-term, indirect, beneficial impacts on the protection of children in the areas along the U.S./Mexico international border would occur.	Under the No Action Alternative, there would be no change from the baseline conditions; therefore, no impacts would be expected.
Sustainability and Greening	Negligible.	Negligible.
Aesthetics and Visual Resources	Negligible.	Negligible.
Climate Change	Negligible.	Negligible.
Human Health and Safety	Negligible.	Negligible.
Utilities and Infrastructure	Negligible.	Negligible.

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1. INTRODUCTION

The Department of Homeland Security (DHS) and U.S. Customs and Border Protection (CBP), propose to maintain and repair certain existing tactical infrastructure along the U.S./Mexico international border in Arizona. The existing tactical infrastructure proposed to be maintained and repaired consists of fences and gates, roads and bridges/crossovers, drainage structures and grates, observation zones, boat ramps, lighting and ancillary power systems, and Remote Video Surveillance System (RVSS) components along the U.S./Mexico international border in Arizona. **Figure 1-1** depicts the geographic areas in which these tactical infrastructure components would be found. The existing tactical infrastructure in Arizona occurs in two U.S. Border Patrol (USBP) sectors: Yuma and Tucson. The Tucson Sector is entirely within Arizona and a portion of the Yuma Sector is in Arizona.

The existing tactical infrastructure included in this analysis crosses multiple privately owned land parcels, Tribal lands, and public lands managed by the U.S. Bureau of Land Management (BLM), U.S. Department of the Interior (DOI), National Park Service (NPS), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and U.S. Department of Defense (DOD). The CBP Facilities Management and Engineering (FM&E) Office is responsible for maintenance and repair of tactical infrastructure (e.g., fences and gates, roads and bridges/crossovers, drainage structures and grates, open observation zones, boat ramps, lighting and ancillary power systems, and RVSS components) to support CBP border security requirements.

This Environmental Assessment (EA) will address the maintenance and repair of existing tactical infrastructure. However, the maintenance and repair of tactical infrastructure assets that are already covered in previous National Environmental Policy Act (NEPA) documents will not be included within the scope of this EA. In addition, tactical infrastructure assets that are covered by a waiver issued by the Secretary of Homeland Security (the Secretary) are also excluded from the scope of this EA.

The Secretary's waiver authority is derived from Section 102 of the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996, as amended. Under Section 102 of IIRIRA, the U.S. Congress gave the Secretary the authority to waive such legal requirements if the Secretary deems it necessary to ensure the expeditious construction of tactical infrastructure. Since 2005, the Secretary has issued five separate waivers: San Diego Border Infrastructure System waiver (70 Federal Register [FR] 55622), the Barry M, Goldwater Range waiver (72 FR 2535), the San Pedro National Riparian Conservation Area (72 FR 60870) waiver, and the April 1, 2008, waivers for construction of international border pedestrian fence (73 FR 19077) and vehicular fence (73 FR 19078). Although the Secretary's waivers meant that CBP no longer had any specific legal obligation under the laws that were included in the waivers, both DHS and CBP remained committed to responsible environmental stewardship. For example, for the tactical infrastructure that was constructed under the April 1, 2008, waivers, CBP prepared Environmental Stewardship Plans (ESPs) in lieu of NEPA documents. In preparing the ESPs, CBP coordinated with various stakeholder groups, including state and local governments, Federal and state land managers and resource agencies, and the interested public.

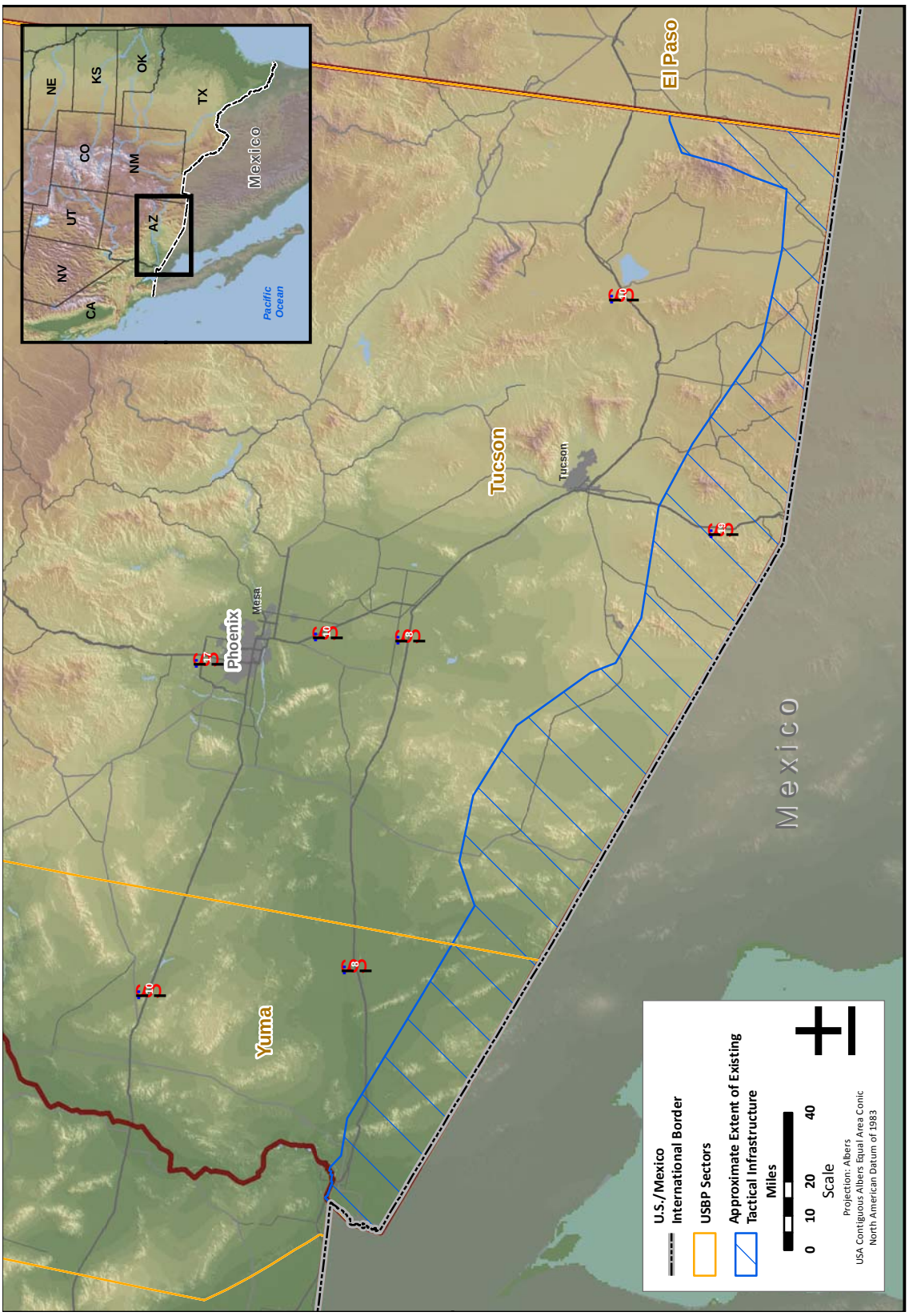


Figure 1-1. Region of Analysis for Proposed Tactical Infrastructure Maintenance and Repair Activities in Arizona

1

The ESPs analyzed the potential environmental impacts associated with the construction and maintenance of such tactical infrastructure and discussed mitigation measures that would be implemented by CBP. ESPs are available on the Internet at:

http://www.cbp.gov/xp/cgov/border_security/ti/ti_docs/sector.

Further to Secretary's commitment to environmental stewardship, CBP continues to work in a collaborative manner with local government, state, and Federal land managers and the interested public to identify environmentally sensitive resources and develop appropriate best management practices (BMPs) to avoid or minimize adverse impacts resulting from the fencing projects. This EA addresses the cumulative impacts of all maintenance and repair activities including the tactical infrastructure analyzed in previous NEPA documents or ESPs. This comprehensive and integrated environmental impacts analysis of all tactical infrastructure assets reflects CBP's environmental stewardship by better understanding the cumulative impacts and affirming its commitments to minimize the potential negative impacts. The EA will discuss tactical infrastructure maintenance and repair activities and their attributes that would enhance positive environmental benefits.

This EA is divided into six sections plus appendices. **Section 1** provides background information on USBP missions, identifies the purpose of and need for the Proposed Action, describes the area in which the Proposed Action would occur, and explains the public involvement process. **Section 2** provides a detailed description of the Proposed Action and alternatives considered, including the No Action Alternative. **Section 3** describes existing environmental conditions in the areas where the Proposed Action would occur, and identifies potential environmental impacts that could occur within each resource area under the alternatives evaluated in detail. **Section 4** discusses potential cumulative impacts and other impacts that might result from implementation of the Proposed Action, combined with foreseeable future actions. **Section 5** provides the references for the EA and **Section 6** provides a list of preparers and references for the EA.

1.1 USBP BACKGROUND

USBP has multiple missions (CBP 2010a), including the following:

- Apprehend terrorists and terrorist weapons illegally entering the United States
- Deter illegal entries through improved enforcement
- Detect, apprehend, and deter smugglers of humans, drugs, and other contraband.

USBP's new and traditional missions complement one another. USBP has nine administrative sectors along the U.S./Mexico international border within the states of California, Arizona, New Mexico, and Texas. The sectors are San Diego, El Centro, Yuma, Tucson, El Paso, Marfa, Del Rio, Laredo, and Rio Grande Valley.

This EA will examine the maintenance and repair of existing tactical infrastructure along the U.S./Mexico international border in Arizona maintained by the Yuma and Tucson sectors. There are approximately 270 miles of pedestrian and vehicle fence along the 373-mile U.S./Mexico international border in Arizona.

1.2 PURPOSE AND NEED

The purpose of the Proposed Action is to ensure that the physical integrity of the existing tactical infrastructure and associated supporting elements continue to perform as intended and assist the USBP in securing the U.S./Mexico international border in Arizona. In many areas, tactical infrastructure is a critical element of border security, which contributes as a force multiplier controlling and preventing illegal border intrusion. To achieve effective control of our nation's borders, CBP is developing a combination of personnel, technology, and infrastructure; mobilizing and rapidly deploying highly trained USBP agents; placing tactical infrastructure strategically; and fostering partnerships with other law enforcement agencies.

The need for the Proposed Action is to ensure that the effective level of border security provided by the installed tactical infrastructure is not compromised by impacts occurring through acts of sabotage, acts of nature, or a lack of maintenance and repair. CBP must ensure that tactical infrastructure functions as it is intended, which assists CBP with its mission requirements.

Tactical infrastructure would be maintained to ensure USBP agent safety by preventing potential vehicular accidents by minimizing and eliminating hazardous driving conditions.

1.3 FRAMEWORK FOR ANALYSIS

NEPA is a Federal statute requiring the identification and analysis of potential environmental impacts of proposed Federal actions before those actions are taken. The Council on Environmental Quality (CEQ) is the principal Federal agency responsible for the administration of NEPA. CEQ regulations mandate that all Federal agencies use a systematic, interdisciplinary approach to environmental planning and the evaluation of actions that might affect the environment. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions.

The process for implementing NEPA is codified in 40 Code of Federal Regulations (CFR) 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, and DHS Management Directive (MD) 023-01 *Environmental Planning Program*, and CBP policies and procedures. The CEQ was established under NEPA to implement and oversee Federal policy in this process. CEQ regulations specify the following when preparing an EA:

- Briefly provide evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI)
- Aid in an agency's compliance with NEPA when an EIS is unnecessary
- Facilitate preparation of an EIS when one is necessary.

To comply with NEPA, the planning and decisionmaking process for actions proposed by Federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or

EIS, which enables the decisionmaker to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively."

Within the framework of environmental impact analysis under NEPA, additional authorities that might be applicable include the Clean Air Act (CAA), Clean Water Act (CWA) (including a National Pollutant Discharge Elimination System [NPDES] storm water discharge permit and Section 404 permit), Section 10 of the Rivers and Harbors Act of 1899, Noise Control Act, Endangered Species Act (ESA), Migratory Bird Treaty Act, National Historic Preservation Act, Archaeological Resources Protection Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and various Executive Orders (EOs). A summary of laws, regulations, and EOs that might be applicable to the Proposed Action is presented in **Appendix A.**

1.4 PUBLIC INVOLVEMENT

Agency and public involvement in the NEPA process promotes open communication between the public and the government and enhances the decisionmaking process. All persons or organizations having a potential interest in the Proposed Action are encouraged to submit input into the decisionmaking process.

NEPA and implementing regulations from the CEQ and DHS direct agencies to make their EAs and EISs available to the public during the decisionmaking process and prior to actions being taken. The premise of NEPA is that the quality of Federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process.

Through the public involvement process, CBP notified relevant Federal, state, and local agencies of the Proposed Action and requested input on environmental concerns they might have regarding the Proposed Action. The public involvement process provides CBP with the opportunity to cooperate with and consider state and local views in its decision regarding implementing this Federal proposal. As part of the EA process, CBP has coordinated with agencies such as the U.S. Environmental Protection Agency (USEPA) Region 9; USFWS Southwest Region; Arizona Game and Fish Department (AZGFD); Arizona State Historic Preservation Office (SHPO); appropriate Native American Tribes and Nations; and other Federal, state, and local agencies. Agency responses will be incorporated into the analysis of potential environmental impacts. The following is a list of Federal and state agencies and stakeholder groups that will be coordinated with during the NEPA process.

- **Federal Agencies:**
  - USEPA Region 9
  - USFWS Southwest Region
  - USFS – Coronado National Forest
  - NPS – Coronado National Memorial and Organ Pipe Cactus National Monument
  - U.S. Army Corps of Engineers (USACE) Los Angeles District

- DOD – Barry M. Goldwater Range
- BLM Arizona State Office
- BLM Yuma Field Office
- BLM Lower Sonoran Field Office
- BLM Tucson Field Office
- BLM Safford Field Office
- United States Section, International Boundary and Water Commission (USIBWC)

- **State Agencies:**
  - Arizona Department of Environmental Quality (ADEQ)
  - Arizona Department of Transportation
  - AZGFD
  - Arizona SHPO
- **Stakeholders:**
  - Federally Recognized Native American Tribes and Nations.

A Notice of Availability (NOA) for the EA and draft FONSI will be published in representative newspapers of regional distribution. This is done to solicit comments on the Proposed Action and alternatives and involve the local community in the decisionmaking process. Comments from the public and Federal, state, and local agencies will be incorporated into the Final EA and included in **Appendix B**. The following is a list of newspapers that will be used for publishing the NOA.

- *Yuma Sun*
- *Arizona Daily Star*.

Hard copies of the Draft EA can be reviewed at the following libraries: Yuma Public Library, Wellton Branch Library, Mission Branch Public Library, Rio Rico Public Library, Sierra Vista Public Library, and the Ajo Public Library. Throughout the NEPA process, the public may obtain information concerning the status and progress of the EA via the project Web site at *http://cbp.gov/xp/cgov/border_security/ti/ti_docs/timr/*.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This section describes the Proposed Action and the alternatives considered. As discussed in **Section 1.3**, the NEPA process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. Reasonable alternatives must satisfy the purpose of and need for a proposed action, which are defined in **Section 1.2**. CEQ regulations specify the inclusion of a No Action Alternative against which potential effects can be compared.

2.2 SCREENING CRITERIA TO DEVELOP THE PROPOSED ACTION AND ALTERNATIVES

Each action alternative to the Proposed Action considered in the EA must be reasonable and meet CBP's purpose and need (as described in **Section 1.2**). The maintenance and repair of tactical infrastructure should be conducted in such a manner as to minimize impacts on environmental and cultural resources to the extent practical. Alternatives must also meet requirements to ensure that each is practical, environmentally sound, economically viable, and complies with applicable standards and regulations. CBP uses an optimal mix of tactical infrastructure development, application of remote surveillance technologies, and deployment of USBP agents to achieve border security objectives. The following screening criteria were used to develop the Proposed Action and evaluate potential alternatives.

- ***Protecting Persistent Impedance Requirements.*** Tactical infrastructure must support CBP mission needs by its capability to hinder or delay individuals illegally crossing the U.S./Mexico international border in Arizona, either on foot or by vehicle traffic. The continuous maintenance and repair of the fences and gates, roads and bridges/crossovers, drainage structures and grates, observation zones, boat ramps, lighting and ancillary power systems, and RVSS components are imperative to the safe and rapid response capabilities of USBP agents.
- ***Maintain Remote Surveillance Capability.*** Ensure RVSS tower infrastructure sites are accessible to perform the appropriate maintenance and repair activities on an as-needed basis and ensure continued functionality of the supporting components, foundation footers/pads, perimeter fencing, tower structures, and designated work/storage areas.
- ***Minimize Potential Negative Environmental Impacts.*** Proposed maintenance and repair activities will be evaluated for their potential environmental impacts and BMPs will be planned or implemented in proportion to the risk in consultation with the appropriate regulatory and resources agencies. Particular management focus would be devoted to protecting the following sensitive environmental resources:
    - *Threatened or Endangered Species and Critical Habitat*. The maintenance and repair of tactical infrastructure should be conducted in such a manner as to have minimal impacts on threatened or endangered species and their critical habitat. Best management practices (BMPs) would be implemented so that a determination of No

Effect, or at most, a determination of May Affect, but Not Likely to Adversely Affect, would be achieved. Any maintenance and repair activities that could not be mitigated to a determination of May Affect, but Not Likely to Adversely Affect using BMPs would not be addressed as part of the Proposed Action and would require separate Section 7 consultation. CBP would consult as needed with the USFWS to identify potential avoidance, minimization, and conservation measures.

- *Wetlands and Floodplains*. The maintenance and repair of tactical infrastructure should be conducted in such a manner as to have minimal impacts on wetlands, surface waters of the United States, and floodplain resources to the maximum extent practical. CBP would consult with the USACE districts to minimize wetland and floodplain impacts and identify potential avoidance, minimization, and conservation measures.
- *Cultural and Historic Resources*. The maintenance and repair of tactical infrastructure should be conducted in such a manner as to have minimal impacts on cultural and historic resources to the maximum extent practical. CBP is in the process of consulting with the Arizona SHPO to develop a Programmatic Agreement (PA). Under the Proposed Action, undertakings with the potential to cause effects on historic properties would be covered by a PA between CBP, the Advisory Council on Historic Properties (ACHP), the Arizona SHPO, and BLM. If the activity or project is not covered under the PA, CBP would be required to conduct the applicable Section 106 review for those activities that are not listed. Therefore, CBP is required to comply with Section 106 of the NHPA of 1966, as amended, and its implementing regulations (36 CFR 800) before conducting maintenance and repair activities.

Section 2.3 presents Alternative 1: Proposed Action, **Section 2.4** presents Alternative 2: No Action Alternative, and **Section 2.5** discusses alternatives considered but eliminated from further detailed analysis.

2.3 ALTERNATIVE 1: PROPOSED ACTION

Under the Proposed Action, the scope of the tactical infrastructure maintenance and repair program would include reactive maintenance and repair activities (e.g., resolving damage from intentional sabotage or severe weather events) and preventive/scheduled maintenance and repair activities designed to ensure environmental sustainability (e.g., culvert replacement, drainage and grate cleaning, preventive soil erosion measures). Maintenance and repair would occur via a periodic work plan based on anticipated situations within each sector and funding availability. Although centrally managed by FM&E, prioritization of projects based upon evolving local requirements within each sector would determine maintenance and repair schedules. This alternative would accommodate for changes in tactical infrastructure maintenance and repair requirements. Maintenance and repair requirements could change over time based on changes in usage or location, but would not exceed the scope of the EA. If the scope of the EA is exceeded, new NEPA analysis would be required.

The USBP sectors along the U.S./Mexico international border in Arizona have identified a need for tactical infrastructure maintenance and repair to ensure their continued utility in securing the border. All maintenance and repair activities would be coordinated by the CBP FM&E Sector

Coordinator and managed by the Project Management Office's Maintenance and Repair Supervisor. Most of the maintenance and repair activities associated with the Proposed Action would occur within 25 miles of the U.S./Mexico international border in Arizona.

2.3.1 Tactical Infrastructure Assets

CBP proposes to maintain and repair existing tactical infrastructure consisting of fences and gates, roads and bridges/crossovers, drainage structures and grates, observation zones, boat ramps, lighting and ancillary power systems, and RVSS components not directly associated with the tactical infrastructure covered by the Secretary's waiver and prior NEPA documentation. Maintenance and repair standards are shown in **Appendix C**. The following paragraphs describe the types of tactical infrastructure CBP proposes to maintain and repair.

Fences and Gates. Maintenance and repair of fences and gates would consist of welding metal fence components, replacing damaged or structurally compromised members, reinforcing or bracing foundations, repairing burrowing activities under fences and gates, repairing weather-related damages, and removing vegetation and accumulated debris. The Proposed Action would also include the repair or replacement of gate-operating equipment (e.g., locks, opening/closing devices, motors, and power supplies). There are approximately 250 miles of fence on non-tribal lands in Arizona. The fencing consists of primary border fencing and a variety of perimeter security fencing for protecting sensitive infrastructure. Approximately 5 percent of the total is analyzed in this EA.

Roads and Integrated Bridges/Crossovers. Maintenance and repair activities would consist of filling in potholes, regrading road surfaces, implementing improved water drainage measures (i.e., ensure road crowns shed water and runoff flows to established drainage ditches, culverts, or other water-control features as needed to control runoff and prevent deterioration to existing infrastructure or surrounding land), applying soil stabilization agents, controlling vegetation and debris, and adding lost road surface material to reestablish intended surface elevation needed for adequate drainage.

CBP currently uses approximately 1,200 miles of road within the region of analysis, which represents an estimated 17.5 percent of all local roads within the area. Approximately 700 miles (11 percent) of local roadways within 25 miles of the U.S./Mexico international border in Arizona consequently have not been subject to analysis after deducting the roads analyzed in previous NEPA documents or waived for analysis (i.e., out of scope of this document). The exact number of miles of roads within Arizona could change over time to accommodate CBP needs. Therefore, the number of miles of roads associated within the Proposed Action should be considered somewhat flexible and not constrained by a fixed quantifiable number. Future actions, such as major changes to roadway networks and major upgrades to existing roadways, would require separate NEPA analysis.

Maintenance of the existing roads would be in accordance with proven maintenance and repair standards. All of the standards CBP would adopt are developed based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resource agencies. These maintenance and repair standards are described in **Appendix C**. Bridges would be inspected on a routine basis and their structural integrity maintained.

Drainage Management Structures. Maintenance and repair of drainage systems would consist of cleaning blocked culverts and grates (e.g., cattle guards) of trash and general debris and repairing or replacing nonfunctional or damaged drainages when necessary. Resizing and replacement or repair to culverts or flow structures would occur as necessary to maintain proper functionality. During the planning process for such activities, appropriate coordination with the U.S. Corps of Engineers will occur and appropriate permits will be acquired if necessary. In addition, maintenance and repair of riprap to maintain proper functionality is proposed, as is the necessary maintenance to low-water crossings. Maintenance and repair requirements would consist of restoring or replacing damaged or displaced riprap. All debris and trash removed from culverts and grates would be taken to an appropriate disposal facility.

Low-water crossings consist of riprap or concrete at waterway edges and articulated matting or similar hardened material in the middle. The function of the riprap or concrete is to protect the articulated matting or similar hardened material from being washed away and enhances its stability and longevity. Maintenance and repair requirements would consist of restoring damaged or displaced ripraps. Articulated matting or similar hardened material would be restored, replaced, or strengthened to maintain its functionality. The removal of any accumulated debris to create a sustainable, efficient low-water crossing could also occur. There are an estimated 250 drainage management structures associated with the tactical infrastructure to be maintained and repaired in Arizona; 20 percent is analyzed in this EA.

Vegetation Control to Maintain Road Visibility and Open Observation Zones. A continuous, clear line of sight along various designated locations within Yuma and Tucson sectors has been developed by USBP agents for rapid detection and accurate characterization of potential threats. Continuous maintenance of vegetation in these locations is needed to remove concealment opportunities and to assist in identifying, classifying, and apprehending any cross-border violators (CBVs). Suppression of vegetation has been determined by USBP to be necessary to ensure officer safety and enable the detection of illicit CBVs and contraband within the Yuma and Tucson sectors. In addition, clearing of vegetation where it currently is not controlled could be required in newly identified areas of high traffic to provide a clear line of sight and to deny hiding places. Control and clearing of vegetation would be achieved by mowing and application of selective herbicides and would be kept to the minimum requirement to meet objectives. CBP would adopt all necessary BMPs to minimize impacts on resources. Vegetation clearing would not be conducted in designated critical habitat, suitable habitat, or in areas where threatened or endangered species could occur unless a survey is conducted to determine that the species are not present. CBP would conduct surveys for nests and nesting migratory birds if maintenance occurred during the nesting season. If CBP determined that particular vegetation-removal actions could not be undertaken without minimal impacts on resources, separate NEPA documentation would be prepared.

Vegetation occurring within and immediately adjacent to roads and bridges would be maintained to ensure visibility and to sustain safe driving conditions for USBP agents during travel. These overhead heights would be maintained for the entire width of the travel way. In areas deemed too difficult to mow, such as under guardrails, within riprap, and immediately adjacent to bodies of water within the proposed setbacks, herbicides would be used if appropriate. Appropriate BMPs would be followed for all herbicide use (see Appendix E). Herbicides safe for aquatic use would be used within aquatic systems. Application of terrestrial and aquatic herbicide would be

made with products approved by the USEPA and relevant Federal land-management agency. Certified USBP sector or contract support personnel would use all herbicides in accordance with label requirements. Herbicide use would be part of an integrated approach that uses minimal quantities of herbicide. Heavy equipment needed would include mowers and trimmers. BMPs would be used to stabilize the work areas and avoid impacts on biological resources (see Appendix E). Any vegetation-clearing activities would only be undertaken with the permission of the landowner. Any new vegetation clearing on lands administered by another federal agency must be approved in advance by that agency and any new vegetation clearing on lands administered by CBP would be preceded by the appropriate environmental compliance. All vegetation clearing activities would be avoided in areas of known occurrences and designated critical habitat for threatened and endangered species. If a threatened or endangered species or primary constituent elements of critical habitat are observed within a project area, consultation with the USFWS would be required.

Boat Ramps. The maintenance and repair of boat ramps would include repairing and restoring boat ramp surfaces, conducting vegetation control to maintain unencumbered access, and implementation of erosion-control measures.

Lighting and Ancillary Power Systems. The maintenance and repair of lighting and ancillary power systems would consist of the replacement of burned-out light bulbs, restoring or replacement of damaged power lines or onsite power-generating systems (e.g., generators, fuel cells, wind turbine generators, and photovoltaic arrays), repair and replacement of associated electrical components, and, where necessary, vegetation control and debris removal. Approximately 12 percent of the estimated 550 lighting and ancillary power systems associated with tactical infrastructure is subject to the analysis in this EA.

Remote Video Surveillance Systems. RVSSs include a combination of monopoles, water towers, radio towers, telephone poles, and buildings. The physical structures of the RVSSs would be repaired and maintained (e.g., painting or welding to maintain existing metal towers), as necessary. Maintenance and repair of secondary power-generation systems would consist of the repair and replacement of associated electrical components, replacement of burned-out light bulbs, restoration or replacement of damaged power lines, and, where necessary, vegetation control and debris removal. Between 50 and 60 of the towers used by CBP (or approximately 75 percent) are analyzed in this EA.

Each of the RVSSs has a small footprint, and none exceeds 10,000 square feet. For all water towers and radio towers, the total amount of disturbance would not exceed 13.5 acres. Access roads to the RVSSs are included in the road mileage previously discussed.

Equipment Storage. The maintenance and repair of the existing tactical infrastructure as previously described requires the use of various types of equipment and support vehicles. Such equipment could include graders, backhoes, tractor mowers, dump trucks, and pick-up trucks. When assigned to an activity, the equipment would be stored within the existing footprint of the maintenance and repair location or at a staging area previously designated for such purposes by CBP. The analysis of staging areas occurred in previous NEPA documents or was exempt under the Secretary's waiver.

2.3.2 Location of Tactical Infrastructure to be Maintained and Repaired

The existing tactical infrastructure found along the U.S./Mexico international border in Arizona cuts across multiple landownership categories including lands under CBP ownership, lands managed by other Federal agencies, Tribal lands, and private property. CBP would develop a comprehensive protocol for coordinating the necessary maintenance and repair activities within the different classes of landownership.

CBP-owned Tactical Infrastructure: Tactical infrastructure plays an important role in CBP's border enforcement strategy. CBP would undertake necessary maintenance and repair activities to ensure the continuity of the intended functionality of the tactical infrastructure and to protect invested resources as responsible stewards of Federal resources entrusted to CBP.

Tactical Infrastructure Assets on Land Managed by Other Federal Agencies: These tactical infrastructure assets are on public lands managed by the BLM, DOI, NPS, USFS, USFWS, and DOD. CBP would establish mutually agreed-upon processes for performing maintenance and repair activities on tactical infrastructure on lands owned by these agencies. CBP is committed to work through the appropriate permit-granting authority established within these agencies to ensure that CBP-proposed maintenance and repair activities would be accomplished in a manner that is mutually beneficial to all agencies. As an example of this commitment, CBP actively participates in the Borderland Management Task Force (BMTF) working committee to further coordinate these activities on a regular basis.

Tactical Infrastructure Assets on Tribal Land: CBP would formally seek consultations with the representatives of federally recognized Native American tribes to undertake the necessary maintenance and repair of tactical infrastructure assets on tribal land. CBP would seek the appropriate resolutions and abide by the internal governing rules and regulations for obtaining the necessary permits to perform the maintenance and repair.

Tactical Infrastructure Assets on Private Land: CBP would conduct maintenance and repair activities on privately held properties in voluntary cooperation with owners. No maintenance and repair would occur without a consent agreement in place between CBP and cooperating landowners.

The blue hatched area depicted on **Figure 1-1** is the geographic area where CBP tactical infrastructure would be found, and represents the limits of analysis for this EA. If additional maintenance and repair activities outside of the blue hatched areas are necessary, a separate environmental impact analysis would be completed.

Additional detailed maps of the tactical infrastructure along the U.S./Mexico international border in Arizona are provided in **Appendix D**, which accompanies this EA as a digital video disc (DVD). In addition to displaying existing tactical infrastructure, the maps display zones within the area of analysis where the potential exists for impacts on specific environmental resources.

The maps delineate sensitivity zones based strictly on characteristics of the threatened and endangered species, including designated critical habitat, extent of suitable habitat, and documented sightings of the species in the area. Wilderness or other special use designations and land management agency practices are considered in maintenance and repair planning and coordination and designation of appropriate BMPs. CBP would coordinate all maintenance

activities with the respective Federal land managers. The maps contained in **Appendix D** are not intended to be used as an implementation tool for maintenance and repair activities, but instead represent a method to emphasize sensitivity awareness to potential threatened and endangered species. The sensitivity zones within each area of maintenance and repair are color-coded in the following manner:

- *Green* – Indicates the least sensitive areas. Maintenance and repair personnel would apply appropriate BMPs, including applicable species-specific BMPs, from **Appendix E** based upon activity.
- *Amber* – Indicates area requiring heightened awareness. Maintenance and repair personnel would check with appropriate CBP representatives regarding possible need for species-specific BMPs.
- *Purple* – Indicates the most sensitive areas. CBP would engage environmental subject matter experts prior to maintenance and repair activities.

Depending on the number and nature of resources that could be impacted, a graduated series of BMPs would be identified to reduce impacts to less than significant levels. The BMPs are presented in **Appendix E** along with the affected resources. The combination of the informative maps and the relevant BMPs will provide CBP with a visual framework for applying appropriate maintenance and repair solutions in sensitive areas.

2.3.3 Maintenance and Repair Program

As part of the Proposed Action, fences and gates would be inspected on a routine basis to ensure gate mechanisms operate correctly and fence components are in good working condition. Maintenance and repair of fences and gates would occur as required. As part of preventative maintenance and repair of roads, the inspection, maintenance, and repair activity would occur approximately every 3 months and reactive maintenance and repair would occur following intentional sabotages or weather events. During maintenance and repair of roads, integrated bridges/crossovers and boat ramps would be inspected, maintained, and repaired as required. Drainage management structures would be inspected regularly during the rainy season and preventative maintenance and repair would occur to ensure operability. After weather events, reactive maintenance and repair would occur to ensure the structures are clear of debris and blockages. Preventative maintenance and repair of light systems would occur approximately every 2 to 3 years and all lights would be replaced. Maintenance and repair of RVSSs would occur on an as-needed basis following regular inspections. Maintenance and repair of ancillary power systems would occur according to manufacturer specifications. Maintenance and repair and vegetation-control activities associated with observation zones would occur twice a year and would be scheduled to avoid migratory bird nesting seasons. If work occurs during the migratory bird nesting season, surveys would be conducted to determine if bird nests are present that must be avoided.

Under the Proposed Action, centralized maintenance and repair planning would be conducted by FM&E. In addition, FM&E would have complete program management responsibility for implementing maintenance and repair activities. For example, FM&E would formulate standard design specifications, which would consider BMPs and the environmental conditions of the tactical infrastructure to determine the priority and type of maintenance and repair needed.

As a part of FM&E's centralized maintenance and repair planning, CBP interdisciplinary maintenance and repair technical staff, including environmental staff, would participate in reviewing and approving a maintenance and repair Work Plan. The process for developing the maintenance and repair Work Plan would involve the following steps:

- ***Step 1.*** USBP Sectors and Border Patrol Facilities and Tactical Infrastructure (BPFTI) field maintenance and repair representatives identify maintenance and repair needs.
- ***Step 2.*** A team of CBP Project Management Office (PMO) interdisciplinary SME, including environmental staff, would decide on the best technical approach for ensuring desired specifications and standards and applicable BMPs are implemented.
- ***Step 3.*** A cost estimate for the proposed maintenance and repair Work Plan would be prepared and submitted to the CBP chain-of-command for approval. Maintenance and repair actions are prioritized in coordination with USBP Sector management.
- ***Step 4.*** Coordination with appropriate landowners and regulatory agencies would occur on an as-needed basis. Portions of this step might be accomplished informally before Step 3.
- ***Step 5.*** Work Plan maintenance and repair activities would be performed by fully trained and qualified personnel (both CBP in-house and contractor personnel) and their work progress would be monitored by trained and experienced CBP personnel.
- ***Step 6.*** CBP representatives would review the completed maintenance and repair work and ensure it was completed to the prescribed specifications and standards and the corresponding BMPs were followed.
- ***Step 7.*** CBP and contractor personnel would provide suggestions for future Work Plans based on the execution and outcomes of tactical infrastructure maintenance and repair and would support the interdisciplinary technical team in developing improved maintenance and repair solutions in the future.

Appropriate environmental training is a prerequisite for personnel actively engaged in tactical infrastructure maintenance and repair. These personnel would receive ongoing environmental training appropriate to their role in tactical infrastructure maintenance and repair. This approach fully incorporates CBP's efforts to integrate the NEPA process with their Environmental Management System in accordance with CEQ guidance (CEQ 2007).

2.4 ALTERNATIVE 2: NO ACTION ALTERNATIVE (STATUS QUO OPTION)

The No Action Alternative would maintain the status quo. It is not a proposal to eliminate maintenance and repair activities. Under the No Action Alternative, CBP would continue to perform the required maintenance and repair of tactical infrastructure; however, maintenance and repair would be conducted on an as-needed basis, using a largely reactive approach. There would be no centralized planning process for maintenance and repair. Rather, individual USBP sectors within Arizona would request that FM&E conduct a particular maintenance and repair activity and FM&E would be responsible for executing the request. In addition, there would be no established design or performance specifications, which could mean that as-needed repairs are

required more often and evaluation of potential environmental impacts would occur on a case-by-case basis.

Under the No Action Alternative, there would be no systematic approach to preventative maintenance. Thus, tactical infrastructure breakdowns that have already occurred or are imminent would likely be given the highest priority for maintenance and repair. Examples include: the foundation of fencing eroding to the point of imminent failure, roads becoming impassable due to severe rutting, or uncontrolled vegetation growth impeding storm water drainage flow. Preventative maintenance and repair would be limited to those situations where a USBP Sector identifies a potential trouble spot and makes a specific request for some type of preventative maintenance and repair.

The No Action Alternative would continue to meet minimum CBP mission needs, but the lack of a centralized planning effort, established performance specifications, and a preventative maintenance plan would make it far more difficult for CBP to prevent the gradual degradation of tactical infrastructure. In addition, it is possible that not all BMPs would be implemented during emergency maintenance and repair scenarios. The No Action Alternative serves as a baseline against which an evaluation of the impacts of the Proposed Action can be made. **Table 2-1** provides an overview of the alternatives for analysis in the EA.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER DETAILED ANALYSIS

2.5.1 Upgrade All Existing Unpaved Roads to FC-2 All-Weather Roads

Under this alternative, all existing roads would be upgraded to the FC-2 (all-weather roads) classification. Adopting this alternative would be cost-prohibitive and cause significant environmental impacts. This alternative would greatly enhance CBP's capability to improve border security, but for the aforementioned reasons, this alternative was eliminated from further detailed study in the EA.

2.5.2 No Maintenance and Repair of Tactical Infrastructure

Under this alternative, tactical infrastructure would not be maintained or repaired. This alternative would allow tactical infrastructure to degrade until breakdown of the infrastructure occurred and the initial functional intent would no longer exist. This alternative would lead to the deterioration of tactical infrastructure over time, creating safety hazards, uncontrolled erosion, and other associated environmental concerns, and the abandonment of foreign materials within an environmental setting. In addition, because this alternative would result in the degradation and disrepair of tactical infrastructure, it would not meet the purpose and need as stated in **Section 1.2** or comply with USBP mission objectives. For these reasons, this alternative was eliminated from further detailed analysis in the EA.

Table 2-1. Summary of Alternatives Identified

Management Approaches	Alternative 1: Proposed Action	Alternative 2: No Action Alternative
Maintenance and Repair Activities and Environmental Impacts	Preventative and reactive maintenance and repair activities to minimize environmental impacts.	Reactive maintenance and repair when infrastructure breaks down.
Design and Performance Specifications	Establish design specifications and a subsequent maintenance and repair approach.	None.
Maintenance and Repair Organizational Approach	Central maintenance and repair planning and decentralized execution. In-house environmental staff expertise used to minimize potential environmental impacts. Coordinated environmental planning to make most efficient use of staff resources and minimize delays in critical maintenance and repair actions.	Ad hoc and decentralized planning and execution without coordinated environmental staff support resulting in inefficiencies complying with NEPA and other environmental requirements.

2.5.3 Maintenance and Repair Program Using Only Mandatory BMPs

Under this alternative, the scope of the tactical infrastructure maintenance and repair program would be same as the Proposed Action, but only mandatory BMPs would be implemented in the planning and execution of maintenance and repair (i.e., BMPs developed by CBP to promote environmental stewardship would not be used). Work Plans for scheduled and reactive maintenance and repair would be formulated by analyzing the lowest cost and the minimum acceptable design standards and specifications. FM&E would still have program management responsibility for implementing maintenance and repair to design specifications; however, only mandatory BMPs would be factored into the maintenance and repair Work Plan or the life-cycle costs of maintaining and repairing tactical infrastructure. In addition, environmental planning would be limited to compliance with applicable minimum requirements. This alternative would not meet CBP's commitment to environmental stewardship and would not minimize potential negative environmental effects; therefore, this alternative was eliminated from further detailed analysis in the EA.

2.6 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

CBP has identified its Preferred Alternative as Alternative 1. Implementation of Alternative 1 would best meet CBP's purpose and need as described in **Section 1.2**. Alternative 1 also is preferred because it would be in line with the current tactical infrastructure maintenance and repair methodology covered by the Secretary's waiver and other NEPA documents.

3. AFFECTED ENVIRONMENT AND CONSEQUENCES

This section provides a characterization of the affected environment and an analysis of the potential direct and indirect effects each alternative would have on the affected environment. Each alternative was evaluated for its potential to affect physical, biological, and socioeconomic resources. Cumulative and other effects are discussed in **Section 4**. All potentially relevant resource areas were initially considered in this EA. Some were eliminated from detailed examination because of their inapplicability to this Proposed Action. General descriptions of the eliminated resources and the basis for elimination are described in **Section 3.1**.

The following discussion elaborates on the nature of the characteristics that might relate to impacts on resources.

- *Short-term or long-term.* These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term effects are those that would occur only with respect to a particular activity or for a finite period or only during the time required for maintenance and repair activities. Long-term effects are those that are more likely to be persistent and chronic.
- *Direct or indirect.* A direct effect is caused by and occurs contemporaneously at or near the location of the action. An indirect effect is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct effect of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.
- *Negligible, minor, moderate, or major.* These relative terms are used to characterize the magnitude or intensity of an impact. Negligible effects are generally those that might be perceptible but are at the lower level of detection. A minor effect is slight, but detectable. A moderate effect is readily apparent. A major effect is one that is severely adverse or exceptionally beneficial.
- *Adverse or beneficial.* An adverse effect is one having unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial effect is one having positive outcomes on the man-made or natural environment. A single act might result in adverse effects on one environmental resource and beneficial effects on another resource.
- *Significance.* Significant effects are those that, in their context and due to their intensity (severity), meet the thresholds for significance set forth in CEQ regulations (40 CFR Part 1508.27).
- *Context.* The context of an effect can be localized or more widespread (e.g., regional).
- *Intensity.* The intensity of an effect is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historical resources, ecologically critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Effects are also considered in terms of their potential for violation of Federal, state, or

local environmental law; their controversial nature; the degree of uncertainty or unknown effects, or unique or unknown risks; if there are precedent-setting effects; and their cumulative effects (see **Section 4**).

3.1 PRELIMINARY IMPACT SCOPING

This section presents the characteristics of the affected environment and an analysis of the potential direct and indirect impacts each alternative would have on the affected environment. Cumulative and other impacts are discussed in **Section 4**. All potentially relevant resource areas were initially considered in this EA. In accordance with NEPA, CEQ regulations, and DHS Directive 023-01, the following evaluation of environmental effects focuses on those resources and conditions potentially subject to effects, on potentially significant environmental issues deserving of study, and deemphasizes insignificant issues. Some environmental resources and issues that are often analyzed in an EA have been omitted from detailed analysis. The following provides the basis for such exclusions.

Aesthetics and Visual Resources

The maintenance and repair of tactical infrastructure would not have a significant effect on aesthetics or visual resources, as existing infrastructure would be maintained or repaired and no additional infrastructure would be installed. Therefore, the appearance of tactical infrastructure would not change and impacts on aesthetic and visual resources would not be expected.

Climate Change

On September 22, 2009, the USEPA issued a final rule for mandatory greenhouse gas (GHG) reporting from large GHG emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on carbon dioxide (CO_2) and other GHG emissions that can be used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons or more of CO_2 equivalent per year. The first emissions report is due in 2011 for 2010 emissions. Although GHGs are not currently regulated under the CAA, the USEPA has clearly indicated that GHG emissions and climate change are issues that need to be considered in future planning. GHGs are produced by the burning of fossil fuels and through industrial and biological processes.

Total estimated GHG emissions from maintenance and repair of tactical infrastructure would not exceed the reporting threshold and therefore would not be expected to affect climate. Emissions and their impact on air quality are discussed in **Section 3.10**.

Human Health and Safety

Maintenance and repair site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. Occupational Safety and Health Administration (OSHA) and the USEPA issue standards that specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits with respect to workplace stressors.

Personnel are exposed to safety risks from the inherent dangers at any maintenance and repair site. Contractors would be required to establish and maintain safety programs at the maintenance and repair sites. The proposed maintenance and repair would not expose members of the public to increased safety risks. Therefore, because the Proposed Action would not introduce new or unusual safety risks, and assuming appropriate protocols are followed and implemented, detailed examination of safety is not included in this EA.

Additionally, due to the remote location of the project corridor, the likelihood of this project impacting the health and safety of humans other than USBP agents and contractors or USBP personnel performing the road improvements is extremely low. However, minor, beneficial impacts on safety could occur from public use of improved roads.

All occupational safety standards and BMPs, as outlined in **Appendix E** of this document, would be implemented.

Sustainability and Greening

NEPA identifies the need to "encourage [the] productive and enjoyable harmony between man and his environment" as a primary purpose (42 United States Code [U.S.C.] § 4321). The traditional definition of sustainability calls for policies and strategies that meet society's present needs without compromising the ability of future generations to meet their own needs.

A number of policies, statutes, EOs, and supplemental agency policies and guidance exist to shape the Federal government's policies on sustainability. EO 13423 (January 24, 2007), *Strengthening Federal Environmental, Energy, and Transportation Management*, promotes environmental practices, including acquisition of bio-based, environmentally preferable, energy-efficient, water-efficient, and recycled-content products; and maintenance of cost-effective waste prevention and recycling programs in their facilities. EO 13514 (October 5, 2009), *Federal Leadership in Environmental, Energy, and Economic Performance*, sets sustainability goals for Federal agencies and focuses on making improvements in their environmental, energy, and economic performance. EO 13514 does not rescind or eliminate the requirements of EO 13423. Instead, it expands on the energy reduction and environmental performance requirements for Federal agencies identified in EO 13423 (FedCenter 2010). In addition to these EOs, DHS Directive 025-01, *Sustainable Practices for Environmental, Energy and Transportation Management*, establishes a policy to develop and implement sustainable practices and programs to help ensure that operations and actions are carried out in an environmentally, economically, and fiscally sound manner.

Implementation of the Proposed Action would use minimal amounts of resources. Therefore, beneficial effects on sustainability and greening would be expected.

Utilities and Infrastructure

The proposed maintenance and repair of tactical infrastructure along the U.S./Mexico international border in Arizona would occur in remote areas far from utilities. USBP and its contractors would not use existing utilities and infrastructure to complete maintenance and repair activities. Due to the remote location of the project corridor, impacts on utilities and

infrastructure would not be expected. Therefore, analysis of this resource area has been omitted from further detailed analysis.

3.2 LAND USE

3.2.1 Definition of the Resource

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel of land. In many cases, land use descriptions are codified in local zoning laws. However, there is no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meaning of various land use descriptions, "labels," and definitions vary among jurisdictions. For example, natural conditions of property can be described or categorized as vacant and undeveloped, recreational and open space, and Federal land. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational.

Two main objectives of land use planning are to (1) ensure orderly growth and (2) ensure compatible uses among adjacent property parcels or areas. Compatibility among land uses fosters the societal interest of obtaining the highest and best uses of real property. Tools supporting land use planning include written master plans/management plans and zoning regulations. In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on the proposed project corridor and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use in the proposed project corridor, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its permanence.

3.2.2 Affected Environment

Land uses in and adjacent to the region of analysis in Arizona, include rural, residential, private, and commercial, with the primary land use designated as Federal land (CCAPD 2010). Part of the region of analysis is within the Federal government's 60-foot Roosevelt Reservation along the U.S./Mexico international border, the Cabeza Prieta National Wildlife Refuge (NWR), the Coronado National Memorial, and the San Bernardino NWR. Additional special land uses within the region of analysis include Organ Pipe Cactus National Monument, Buenos Aires NWR, the Coronado National Forest, and BLM lands. The private lands within the impact corridor are primarily undeveloped desert and used for cattle grazing. Tribal lands within the region of analysis include the Tohono O'odham Indian Reservation and the Fort Yuma-Quechan Reservation.

Roosevelt Reservation. The Roosevelt Reservation is within 60 feet of the international boundary between the United States and Mexico within the states of California, Arizona, and New Mexico and is managed by CBP. The reservation was set aside in 1907 by President Theodore Roosevelt as a protection against the smuggling of goods between the United States and Mexico. Land use for the Roosevelt Reservation is designated for border enforcement (CBP 2007). In addition to CBP managing the land, the mission of the USIBWC is to ensure

that any construction along the U.S./Mexico international border does not adversely affect International Boundary Monuments or substantially impede floodwater conveyance within international drainages.

Cabeza Prieta National Wildlife Refuge. The 640,000-acre Cabeza Prieta NWR plays a critical role in the recovery and protection of rare and sensitive species such as the federally endangered Sonoran pronghorn and the desert bighorn sheep, and the conservation of a diversity of desert wildlife representative of the Sonoran Desert (USFWS 2006a). It is located in Pima County in the Tucson Sector and shares 56 miles of the U.S./Mexico international border with Sonora, Mexico. This NWR covers approximately 445,588 acres within the region of analysis.

Title III of the Arizona Desert Wilderness Act of 1990 designated approximately 93 percent (803,418 acres) of the Cabeza Prieta NWR as a wilderness in accordance with the Wilderness Act of 1964. This designation requires additional restrictions such as the prohibition of permanent or temporary roads, use of motorized vehicles or equipment, landing of aircraft, and structures and installations, except as minimally required to manage the area as wilderness. The Act specifically states that designation of wilderness lands within the Cabeza Prieta NWR will not preclude or otherwise affect continued border operations by DHS (USFWS 2006a). According to the Yuma County, Arizona Zoning Ordinance, the Cabeza Prieta NWR is zoned as an Open Space, Recreation, and Resources Zoning District, which provides for recreational opportunities and space for public and private recreational parks, resorts, and similar facilities (YCDDS 2006).

San Bernardino National Wildlife Refuge. The primary land use of the San Bernardino NWR is for the protection of wildlife and habitat within the refuge. The San Bernardino NWR was a 2,309-acre ranch that was acquired by the USFWS in 1982 to protect the water resources and provide habitat for endangered native fishes of the Yaqui River. The San Bernardino NWR is open to visitors for activities such as bird watching; photography; hiking; and dove, quail, and cottontail rabbit hunting in season (USFWS undated a). It is located in Cochise County, Arizona, along the U.S./Mexico international border.

Organ Pipe Cactus National Monument. This national monument along the U.S./Mexico international border is south of Ajo, west of Tucson, and east of Yuma in Arizona. The monument was created to preserve a representative area of the Sonoran Desert. It is also the site of cultural resources that reflect long, widespread, and diverse occupations by American Indian, Mexican, and European groups (NPS 2009). Organ Pipe Cactus National Monument is approximately 330,000 acres in the region of analysis.

Buenos Aires National Wildlife Refuge. The Buenos Aires NWR is grassland flanked by mountains and riparian areas along the U.S./Mexico international border southwest of Tucson. It contains approximately 118,000 acres that is habitat for threatened and endangered plants and animals such as reintroduced masked bobwhite (*Colinus virginianus ridgwayi*), quail, and Sonoran pronghorn (*Antilocapra americana sonoriensis*). In addition, wetland areas are present along Arivaca Cienega and Creek and attract an abundance of birds (USFWS undated b).

Coronado National Forest. The Coronado National Forest is 1,780,000 acres in southeastern Arizona and southwestern New Mexico, mainly along the U.S./Mexico international border. It

contains scattered mountain ranges that support a diverse type of plant communities (USFS undated).

Tohono O'odham Indian Reservation. The Tohono O'odham Indian Reservation is within the Sonoran Desert in south-central Arizona along the U.S./Mexico international border. Land within the Reservation consists of a wide desert valley interspersed with plains and mountains. The reservation is approximately 2.7 million acres in the region of analysis.

Fort Yuma-Quechan Reservation. The Fort Yuma-Quechan Reservation is along both sides of the Colorado River near Yuma, Arizona. The reservation borders Arizona, California, and Mexico. Measuring 45,000 acres, the reservation is bisected on the south by Interstate 8.

Bureau of Land Management-Administered Lands. The BLM is responsible for managing public lands and resources for multiple uses. In Arizona, the BLM administers 12.2 million surface acres of public lands, including national monuments, national conservation areas, and recreation areas. BLM lands in the region of analysis include 48,369 acres.

3.2.3 Environmental Consequences

3.2.3.1 Alternative 1: Proposed Action

No new construction or change in land use would occur under the Proposed Action; therefore, no effects on land use plans or policies would be expected. The Proposed Action would result in the continuation of the existing land uses as only maintenance and repair of tactical infrastructure would occur within the region of analysis. This alternative would be compatible with the existing land use categories in the region of analysis and, therefore, would not result in any changes in land use.

3.2.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, tactical infrastructure maintenance and repair activities along the U.S./Mexico international border in Arizona would continue and tactical infrastructure would be maintained and repaired on an as-needed basis. The No Action Alternative would result in continuation of existing land uses. No effects on land use would be expected as a result of the No Action Alternative.

3.3 GEOLOGY AND SOILS

3.3.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography and physiography, geology, soils, and, where applicable, geologic hazards and paleontology. Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features. Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Prime farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The soil qualities, growing season, and moisture supply are needed for a well-managed soil to produce a sustained high yield of crops in an economic manner. The land could be cropland, pasture, rangeland, or other land, but not urban developed land or water. The intent of the FPPA is to minimize the extent that Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. The Act also ensures that Federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies to protect farmland.

The implementing procedures of the FPPA and Natural Resources Conservation Service (NRCS) require Federal agencies to evaluate the adverse effects (direct and indirect) of their activities on prime and unique farmland, and farmland of statewide and local importance, and to consider alternative actions that could avoid adverse effects. Determination of whether an area is considered prime or unique farmland and potential impacts associated with a proposed action is based on preparation of the farmland conversion impact rating form AD-1006 for areas where prime farmland soils occur and by applying criteria established at Section 658.5 of the FPPA (7 CFR 658). The NRCS is responsible for overseeing compliance with the FPPA and has developed the rules and regulations for implementation of the Act (see 7 CFR Part 658, 5 July 1984).

3.3.2 Affected Environment

Regional Geology. The region of analysis along the U.S./Mexico international border in Arizona is located within the Basin and Range Physiographic Province, which is characterized by intensely deformed and intruded strata within elevated and depressed land. The province has more than 400 mountain ranges including the remains of crustal rocks that were uplifted by faulting along north-south lines. Eroded materials from the ranges moved downslope into the basins (U.S. Army 2001).

The valleys or basins begin downslope from the base of the rock outcrops. The weathered and transported materials become finer and the slopes decrease as the centers of the basins are approached. Vegetation is sparse and wind erosion is active and produces large sand dune areas in several locations (U.S. Army 2001).

Topography. The Basin and Range topography includes numerous roughly parallel fault-block mountain ranges trending north-south separated by nearly flat desert basins (U.S. Army 2001). Hilly areas are found throughout the region of analysis; however, mountains are most prevalent in the east (USACE 1994b). The mountains rise abruptly 2,000 to 5,000 feet above the

intermountain desert basin (U.S. Army 2001). Mountain ranges along the U.S./Mexico international border in Arizona include the Atascosa Highlands and the Patagonia Mountains. The highest mountain peaks in the region of analysis are found in eastern Arizona.

Soils. There are 14 soil associations within the region of analysis. Susceptibility to erosion varies according to location and steepness of slope. High erosion potential is associated with mountain and upland/foothill areas, and, therefore, the potential would be greater in eastern Arizona. Shrink-swell potential tends to be highest in depositional areas, such as valley slopes and alluvial fan/valley floors where soils tend to consist of higher clay contents (USACE 1994a). Shrink-swell soils exist sporadically throughout Nogales and Yuma (AGS 2002).

The mountainside soils are shallow; steep; and, where sufficient soil is present, well-drained. Soils formed on uplands/foothills are transitional and show a variety of features that reflect local topography. They are shallow to deep, gently to steeply sloping, and well-drained. The surface can be deeply dissected, and rock outcrops might be exposed (USACE 1994b). Soils mapped within the tactical infrastructure maintenance and repair region of analysis are presented in **Appendix F**.

Prime Farmland. Of the 14 soil associations, one (McAllister) would be considered a prime farmland if irrigated, and one (Guest) would be considered a prime farmland if irrigated and protected from flooding. The soils classified as farmland soils if irrigated are not currently irrigated, and would not be irrigated under the Proposed Action and, therefore, would not be considered prime farmland soils as defined by the FPPA (NRCS 2003).

Geologic Hazards. Although seismic hazard is fairly low in much of Arizona, it is relatively high in the Yuma area. The Yuma area has experienced repeated damage from earthquakes that occurred in southern California or northern Mexico (AGS 2002). No earthquakes in Arizona have ruptured the surface in historic time; however, surface ruptures from earth fissures caused by subsidence do occur (AGS 2002). Approximately 12 faults have been identified within 30 miles of the U.S./Mexico international border in Arizona. Only one fault, the Algodones Fault in Yuma County, experienced a major rupture (seismic event with a magnitude of 6 or greater on the Richter scale) within the past 15,000 years, with an estimated major interval rupture of 5,000 to 10,000 years (AGS 1998). In addition to earthquakes in the Yuma area, there is also the potential for liquefaction (i.e., the flow of water-saturated sediments). The liquefaction potential in Yuma is increasing as urban development in low-lying areas adjacent to the Colorado and Gila rivers increases.

The U.S. Geological Survey (USGS) 2008 Arizona Seismic Hazard Map shows the seismic hazard rating for Arizona along the U.S./Mexico international border ranging from 6 to 40 percentage of the force of gravity (percent g), with the lowest rating between Nogales and Sasabe, Arizona, and the highest rating at San Luis (USGS 2008).

Other geologic hazards in southern Arizona include debris flows, landslides, and rock falls. These hazards typically occur along the steep slopes of the ranges; however, sediments can be transported to valley floors and are frequently deposited at the base of slopes and canyon mouths. These hazards can be triggered by intense precipitation or earthquakes. Only minor landslides (causing less than $2,500 in damages) since 1975 have occurred within the study area, all in

Cochise County (State of Arizona 2007). It is possible that tactical infrastructure maintenance and repair activities could occur more frequently in areas subject to these hazards, such as the Huachuca Mountains in the Coronado National Memorial, which are inherently unstable and experience debris flows.

3.3.3 Environmental Consequences

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential effects of a proposed action on geological resources. Generally, adverse effects can be avoided or minimized if proper techniques, erosion-control measures, and structural engineering design are incorporated into project development.

Effects on geology and soils would be significant if they would alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure, or function within the environment.

3.3.3.1 Alternative 1: Proposed Action

Tactical infrastructure maintenance and repair activities along the U.S./Mexico international border in Arizona would be expected to result in short- and long-term, minor adverse and beneficial effects on soils, primarily from the control of vegetation and use of herbicides and removal of vegetation blocking drainages. Control of vegetation would increase erosion and sedimentation potential. Erosion-and-sediment-control plans (ESCPs) would be developed and implemented both during and following site development to contain soil and runoff on site, and would reduce potential for adverse effects associated with erosion and sedimentation and transport of sediments in runoff.

The maintenance and repair of roads classified as FC-3, FC-4, and FC-5 would have the greatest potential for erosion. Grading activities would result in short-term, minor, adverse impacts on soil resulting from erosion and sedimentation. Grading activities in terrain that is more rugged could result in greater potential for soil erosion and sedimentation than in flat terrain. Therefore, mountainous areas would be more susceptible to soil erosion and sedimentation during grading. Maintenance of the 700 miles of local roads would reduce the effects incurred from negligence, such as rutting, washout, and long-term soil erosion. This potential for erosion and sedimentation would be greatest during storm events prior to the completion of grading activities. Once grading activities have subsided and soils have once again compacted under vehicle weight, soil erosion and sedimentation into nearby water bodies would be much less likely to occur. Therefore, maintenance of roads would result in long-term, beneficial impacts on soils.

Maintenance and repair of FC-4 roads would result in short- and long-term, minor, adverse impacts on soil from removal of vegetation and rock, which could result in increased erosion and sedimentation. This would be expected to be a minor effect.

Any maintenance and repair to the RVSSs would be anticipated to result in a short-term, negligible impact from erosion of soils due to potential ground disturbance for repairs or replacement of equipment. This would be a localized impact. A short- to long-term, beneficial impact on soil could occur due to clearing blockages from drainage structures and low water crossings if blockages have caused water to back up onto normally dry soils, which could result in soil erosion and sedimentation. In addition, erosion and downstream sedimentation could occur from rerouting of drainage channels to avoid blockages or during flow back-up.

Geological hazards are prevalent throughout the U.S./Mexico international border in the form of seismic events, landslides, debris flows, and rock falls. Continued maintenance and repair of the tactical infrastructure would be beneficial to repair infrastructure and remove debris from a geological event. No impacts on geology would be expected from implementing the Proposed Action. No prime farmland soils exist within the region of analysis; therefore, no impacts on these soils would be expected to occur.

Control of vegetation could also result in a short- to long-term, minor, adverse increase in erosion and sedimentation. Herbicides could impact soil depending on the type of herbicide used. Application of herbicides to soil could result in leaching of chemicals. For example, glyphosate is a chemical found in commonly used herbicides, and is strongly adsorbed onto soil particles, with low potential to move through soil to contaminate groundwater. Timing of application contributes to the effectiveness of an herbicide on target plants and on nontarget plants and features such as soil. Therefore, application of a highly soluble herbicide during a dry period presents a far different hazard to soil than during a rainy season. The same contrast occurs between clear versus rainy days, and calm versus windy days (Neary and Michael undated).

Short-term, minor, direct, adverse impacts on soil would occur from herbicide applications, as some chemicals adsorb strongly to soil, so the soil chemistry would be altered temporarily until the chemicals have adequately degraded from microbial action. Short-term, negligible impacts could occur after weedy vegetation has died but before other vegetation has become established. Soil could locally be more susceptible to erosion and sedimentation before vegetation is established. BMPs would be implemented and an ESCP followed to minimize any adverse impacts on soils.

BMPs would be implemented to minimize soil erosion and sedimentation. BMPs could include installing silt fencing and sediment traps, applying water to disturbed soil, and revegetating disturbed areas as soon as possible after disturbance, as appropriate. Soil erosion- and sediment-control measures, such as silt fencing or curtains, would be implemented in areas where erosion and sedimentation are anticipated to result from maintenance and repair activities. Erosion and sediment-control measures would be included in site plans to minimize long-term erosion and sediment production at each site. Use of storm water-control measures that favor reinfiltration would minimize the potential for erosion and sediment production as a result of future storm events (see **Sections 3.7** and **3.8** for an evaluation of impacts on water resources). However, much of the area along the U.S./Mexico international border in Arizona is only sparsely vegetated; therefore, it would be expected that control of vegetation would have a long-term, minor impact on soil erosion and sedimentation, specifically during storm events.

3.3.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, tactical infrastructure maintenance and repair activities along the U.S./Mexico international border in Arizona would continue and maintenance activities would occur on an as-needed basis. There is a potential for short- and long-term, minor, direct and indirect adverse impacts on soils due to soil disturbance from grading and other ground-disturbing maintenance activities. By completing maintenance and repair work as described in the Proposed Action on an as-needed basis and not periodically, the potential exists for an increased impact on soils from emergency activities, such as repair of a road after washout. Therefore, it is possible that greater impacts would occur under the No Action Alternative than the Proposed Action as the potential for erosion and sedimentation would be greater because a proactive approach to maintenance and repair would not occur.

3.4 VEGETATION

3.4.1 Definition of the Resource

Vegetation resources include all plants that are found within the region of analysis. This section describes the affected environment for vegetation to support discussion of environmental consequences for vegetation. Bailey's multi-tiered classification of ecoregions contained in the *Descriptions of the Ecoregions of the United States* was used to provide general descriptions of the ecology within the region of analysis (Bailey 1995). An ecoregion contains geographically distinct environmental communities and conditions. Because ecoregions are defined by their shared biotic and abiotic characteristics, they represent practical units on which to base conservation planning. Domains are defined by climate and split into divisions, which are defined according to climate and vegetation. Divisions are subsequently split into provinces that are typically defined by their major plant formations (USFS 2010).

The USGS's Gap Analysis Program mapping of the United States was used to achieve a finer resolution of the vegetative communities within the region of analysis (USGS 2007). NatureServe (2010a) defines ecological systems as representing recurring groups of biological communities that are found in similar physical environments and are influenced by similar ecological processes such as fire or flooding. Ecological systems represent classification units that are readily identifiable by conservation and resource managers in the field. Ecological systems describe groups that are "taxonomically" broader than alliances and associations.

3.4.2 Affected Environment

The vegetation of Arizona has been broadly classified under the Dry Domain ecoregion, the key attribute is that annual losses of water through evaporation at the earth's surface exceed annual water gains from precipitation. The vegetation of southern Arizona is further classified under the Dry Domain/Temperate Desert Division (Bailey 1995). The temperate deserts of continental regions have low rainfall and strong temperature contrasts between summer and winter.

Within the region of analysis, Bailey's Temperate Desert Division is bisected into the American Semidesert and Desert Province, which spans the western portion of the region of analysis, and the Chihuahuan Desert Province encompasses the eastern portion. The American Semidesert

includes the Mojave, Colorado, and Sonoran deserts, although only the Sonoran Desert exists in the region of analysis. Giant saguaros and chollas dominate the vegetation communities of the Sonoran Desert (AGFD 2006). The portion of the Chihuahuan Desert within the region of analysis is commonly referred to as the Madrean sky island. Sky islands are mountain ranges separated by valleys, in which mountain ecosystems are isolated from each other and species can develop in parallel. The Madrean sky island region is world-renowned for its unique plant and animal diversity, with a mixture of species from the Nearctic and Neotropic regions (BLM 2007, DeBano et al. 1995).

There are approximately 35 ecological systems in the region of analysis (NatureServe 2010a) (see **Appendix D**). The 11 largest ecological systems account for more than 95 percent of the land cover and are described in the following paragraphs and in **Table 3-1** (NatureServe 2010a).

Sonora-Mojave Creosote Bush-White Bursage Desert Scrub. This ecological system forms a vegetation matrix in broad valleys, lower bajadas (lower slopes of mountains characterized by loose alluvial sediments and poor soil development), plains, and low hills in the Sonoran Desert. The system has a sparse to moderately dense layer (2 to 50 percent cover) of broad-leaved and xeromorphic (drought-adapted) shrubs. Creosote bush and white bursage are typically dominant, but many different shrubs, dwarf-shrubs, and cacti can also be found in typically sparse understories. This system can often appear as very open sparse vegetation, with the mostly barren ground surface as the predominant feature (NatureServe 2010a).

Sonoran Paloverde-Mixed Cacti Desert Scrub. This ecological system supports vegetation that is characterized by a scattered, emergent tree layer of saguaro cactus (*Carnegiea gigantea)* (10 to 52 feet tall) or a sparse to moderately dense canopy with xeromorphic deciduous and evergreen tall shrubs, including yellow paloverde (*Parkinsonia microphylla)* and creosote bush; and, less prominent, mesquite, desert ironwood, and ocotillo. The sparse herbaceous layer is composed of perennial grasses and forbs, with annuals seasonally present and occasionally abundant. On slopes, plants are often distributed in patches around rock outcrops where suitable habitat is present (NatureServe 2010a).

Apacherian-Chihuahuan Semi-Desert Grassland and Steppe. This ecological system is a broadly defined desert grassland, mixed shrub-succulent, or xeromorphic oak savanna that is typical of southeastern Arizona and northern Mexico . It is found on gently sloping bajadas that support frequent fires throughout the Madrean sky islands, on mesas and steeper piedmont areas (deposits at the base of mountains derived from the weathering, transport, and deposition of materials), and foothill and desert mountain slopes up to 5,480 feet in elevation. This system is characterized by a typically diverse assemblage of perennial grasses. Common species include black grama (*Bouteloua eriopoda*), hairy grama (*Bouteloua hirsuta*), Chino grama (*Bouteloua ramosa*), Rothrock's grama (*Bouteloua rothrockii*), sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), plains lovegrass (*Eragrostis intermedia*), bullgrass (*Muhlenbergia emersleyi*), bush muhly (*Muhlenbergia porteri*), curlyleaf muhly (*Muhlenbergia setifolia*), and James' galleta (*Pleuraphis jamesii*); succulent species of agave (*Agave* spp.), sotol (*Dasylirion* spp.), and yucca (*Yucca spp.*); short-shrub species of powderpuff (*Calliandra spp.*), mimosa (*Mimosa spp.*), and quinine (*Parthenium* spp.); and tall-shrub/short-tree species of acacia (*Acacia* spp.), mesquite (*Prosopis* spp.), and various oaks (*Quercus* spp.). Many of the historical desert grassland and savanna areas have been converted to this system through intensive grazing and other land uses (NatureServe 2010a).

Table 3-1. Ecological System Features within the Region of Analysis

Ecological System	Percent of Region of Analysis	Location in Region of Analysis	Predominant Features
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	27	Western portion	Sparse to moderately dense layer of broad-leaved and xeromorphic shrubs
Sonoran Paloverde-Mixed Cacti Desert Scrub	24	Hillsides, mesas, upper bajadas	Scattered saguaro cacti or sparse to moderately dense xeromorphic shrubs
Apacherian-Chihuahuan Semi-Desert Grassland and Steppe	11	Eastern; gently sloping bajadas	Desert grassland, mixed shrub-succulent, or xeromorphic oak savanna
Apacherian-Chihuahuan Mesquite Upland Scrub	10	Eastern; uplands	Invasive upland shrubland
Madrean Encinal	5	Eastern; foothills, canyons, bajadas, and plateaus	Woodlands with evergreen oaks
Chihuahuan Creosotebush, Mixed Desert, and Thorn Scrub	5	Eastern; flat to gently sloping desert basins and alluvial plains	Moderate to sparse shrub layer
North American Warm Desert Active and Stabilized Dune	3	Western	Unvegetated to sparsely vegetated active dunes and sandsheets
Chihuahuan Mixed Salt Desert Scrub	3	Eastern; alluvial plains, playas, and floodplains	Open-canopied shrublands
Madrean Pinyon-Juniper Woodland	2	Eastern; foothills, mountains, and plateaus	Madrean trees and shrubs
Cultivated Cropland	2	Lands surrounding Yuma, Arizona	Seasonal fluctuations in annual or perennial plant cover
Developed	1	Towns of Douglas, Naco, and Nogales	Permanent or semi-permanent structures, pavement, or unvegetated areas

Source: Nature Serve 2010a

Apacherian-Chihuahuan Mesquite Upland Scrub. This ecological system often occurs as invasive upland shrublands that are concentrated in the extensive desert grassland in foothills and piedmont deposits of the Chihuahuan Desert, but also extends into the sky island region. Vegetation is typically dominated by honey mesquite (*Prosopis glandulosa)* or velvet mesquite (*Prosopis velutina)* and succulents. Mesquites and other deep-rooted shrubs exploit deep soil moisture, accumulated during winter precipitation, which is unavailable to grasses and cacti. Other dominant species include desert scrub viscid acacia (*Acacia neovernicosa*), whitethorn acacia *(Acacia constricta),* one-seed juniper *(Juniperus monosperma*), or redberry juniper (*Juniperus coahuilensis)*. Over the past 100 years, the area occupied by this system has

increased as a result of drought, overgrazing by livestock, and decreases in fire frequency (NatureServe 2010a).

Madrean Encinal. This ecological system is commonly found on foothills, canyons, bajadas, and plateaus within the sky islands of southeastern Arizona. These woodlands are dominated by Madrean evergreen oaks. Lower elevation stands are typically open woodlands or savannas where they transition into desert grasslands, chaparral, or, in some cases, desertscrub. Common evergreen oak species include Arizona white oak (*Quercus arizonica*), Emory oak (*Quercus emoryi*), dwarf oak (*Quercus intricate*), gray oak (*Quercus grisea*), Mexican blue oak (*Quercus oblongifolia),* and Toumey oak (*Quercus toumeyi)*. Chaparral species such as point-leaf manzanita (*Arctostaphylos pungens*), alderleaf mountain mahogany (*Cercocarpus montanus*), bitterbrushes (*Purshia* spp.), Wright's silktassel (*Garrya wrightii*), Sonoran scrub oak (*Quercus turbinella*), birchleaf buckthorn (*Rhamnus betulifolia)*, or sumacs (*Rhus* spp.) can be present but do not dominate (NatureServe 2010a).

Chihuahuan Creosotebush, Mixed Desert, and Thorn Scrub. This ecological system consists of stands that typically occur in flat to gently sloping desert basins and on alluvial plains (plains created by deposition of sediment by rivers or streams). The vegetation is characterized by a moderate to sparse shrub layer (less than 10 percent cover on extremely dry sites) that is typically dominated by creosote bush and tar bush. Other shrubs or succulents that can also be scattered throughout the system are lechuguilla (*Agave lechuguilla*), mariola (*Parthenium incanum*), leatherstem (*Jatropha dioica*), crown of thorns (*Koeberlinia spinosa*), wolf berry species (*Lycium* spp.), and yucca species. Tar bush will often be the dominate species in silty basins that are found in this ecological system. In general, shrub diversity is relatively low as this ecological system lacks dominant thornscrub and other mixed desert scrub species. The herbaceous cover is typically low and composed of grasses such as black grama, false fluffgrass, bush muhly, tobosagrass (*Pleuraphis mutica*), burrograss (*Scleropogon brevifolius*), and alkali sacaton (*Sporobolus airoides*). Included in this ecological system are creosote bush-dominated shrublands with a sparse understory that occur on gravelly to silty upper-basin floors and alluvial plains. Desert pavement can be present on the soil surface (NatureServe 2010a).

North American Warm Desert Active and Stabilized Dune. This ecological system is composed of unvegetated to sparsely vegetated (generally less than 10 percent plant cover) active dunes and sandsheets derived from quartz or gypsum sands. The common vegetative species assemblages of this system include white bursage, desert sand verbena (*Abronia villosa*), sand sagebrush (*Artemisia filifolia*), four-wing saltbush, Colorado Desert buckwheat, creosote bush, big galleta, rosemary-mint species (*Poliomintha* spp.), mesquite species, dalea species (*Psorothamnus* spp.), little-leaf sumac (*Rhus microphylla)*, and mesa dropseed (*Sporobolus flexuosus)*. Characteristic processes of this system are dune "blowouts" and subsequent stabilization through the reestablishment of plants (NatureServe 2010a).

Chihuahuan Mixed Salt Desert Scrub. This ecological system includes extensive open-canopied shrublands in typically saline basins in the Chihuahuan Desert. Stands often occur on alluvial flats, around playas (dry lake basins), and in floodplains along the Rio Grande and Pecos rivers. Substrates are generally fine-textured, saline soils. Vegetation is typically composed of one or more saltbush species such as four-wing saltbush, mound saltbush (*Atriplex*

obovata), or saltbush, along with species of iodine bush (*Allenrolfea),* tar bush, pickleweed (*Salicornia*), seepweed (*Suaeda)*, or other salt-adapted plants. Grass species can include alkali sacaton, galleta grass, or saltgrass (*Distichlis spicata*) at varying densities (NatureServe 2010a).

Madrean Pinyon-Juniper Woodland. This ecological system is typically found on foothills, mountains, and plateau. This ecological system is closely associated with the sky islands of southeastern Arizona. The soils are generally dry and rocky. The presence of Mexican pinyon (*Pinus cembroides*), border pinyon (*Pinus discolor)*, or other Madrean trees and shrubs is diagnostic of this woodland system. Redberry juniper, alligator juniper (*Juniperus deppeana*), Pinchot's juniper (*Juniperus pinchotii*), one-seed juniper, and pinyon pine (*Pinus edulis*) can be present to dominant. Madrean oaks such as Arizona white oak, Emory oak, gray oak, or Mohr oak (*Quercus mohriana*) can be also be dominant. Ponderosa pine (*Pinus ponderosa*) is absent or sparse. If present, understory layers are variable and can be dominated by shrubs or grasses (NatureServe 2010a).

Cultivated Cropland. This system is mostly concentrated in the lands surrounding Yuma, Arizona. Cultivated croplands typically have seasonal fluctuations in annual or perennial plant cover (NatureServe 2010a). In general, grading, fertilizer application, and irrigation have converted these areas to a completely different community type than what was originally present. Crops include cotton, nuts, alfalfa, grains, and hay (Frisvold 2004).

Developed. This system is composed of areas of intensive use with much of the land constructed upon native vegetation or otherwise physically altered to an extent that native vegetation is no longer supported (Oberbauer et al. 2008). Developed land is highly modified and characterized by permanent or semi-permanent structures, pavement, or unvegetated areas. Developed areas in the region of analysis include the towns of Douglas, Naco, and Nogales.

3.4.3 Environmental Consequences

Effects on vegetation resources would be significant if the species or habitats are adversely affected over relatively large areas. Effects would also be considered significant if disturbances cause substantial or permanent reductions in population size or distribution of a species.

The significance of effects on vegetation is based on the following:

- The importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource
- The portion of the resource that would be affected relative to its occurrence in the region
- The sensitivity of the resource to proposed activities
- The duration of ecological ramifications.

3.4.3.1 Alternative 1: Proposed Action

Short- and long-term, negligible to minor, direct and indirect, adverse effects on vegetation would occur from the Proposed Action due to vegetation removal, crushing, accidental spills, and temporary increases in turbidity and sedimentation. All maintenance and repair activities would occur within or adjacent to the existing footprints of tactical infrastructure.

Negligible to minor impacts on vegetation would occur from vegetation removal associated with vegetation control and clearing. Vegetation control would occur within existing footprints where vegetation is being maintained, while vegetation clearing would occur outside of the existing footprints for new observation zones and road setbacks. Vegetation clearing could include the selective removal of woody vegetation and could have the potential to result in conversion or degradation of habitat. In addition to the direct disturbance of vegetation associated with vegetation clearing, it could result in habitat disturbance resulting in the establishment of different plant communities (including invasive species) in the cleared area.

Direct adverse effects on vegetation, such as crushing, might occur when required vehicles and equipment access, park at, and maneuver around areas requiring maintenance. All maintenance activities are expected to occur within or adjacent to existing footprints of tactical infrastructure; as such, these impacts would be minimal.

Degradation of plant communities would also occur if petroleum products or other hazardous materials are accidently released during operation or storage of maintenance vehicles and other equipment. All regulatory requirements for handling and storage of fuels, oils, and other hazardous materials (such as the development of spill prevention plans) would be implemented.

Near- and in-water maintenance, such as bridge, boat ramp, and road maintenance, and repair of damaged rip-rap, culverts, and other drainage structures and crossings, could result in direct and indirect impacts on aquatic plants and their habitat from increases in erosion, sedimentation, and turbidity. Impacts would include direct smothering of aquatic plants, degradation of habitat, and a decrease in sunlight. In addition, hazardous materials could be inadvertently released into aquatic habitat during maintenance and repair activities. These actions would temporarily degrade aquatic habitat and directly and indirectly affect aquatic plant species. However, maintenance and repair of roadways and of damaged rip-rap, culverts, and other drainage structures and crossings would reduce erosion, improve stream flow, and result in beneficial impacts on aquatic habitat and species. Under this alternative, a long-term, beneficial impact on erosion and sedimentation would occur from the periodic, scheduled inspections and maintenance of crossings and structures.

Adverse impacts on vegetation would be minimized through the use of appropriate BMPs (see **Appendix E**). The following are examples of BMPs that would be implemented with the Proposed Action to reduce impacts as necessary:

- If vegetation must be removed, allow natural regeneration of native plants by cutting vegetation with hand tools, mowing, trimming, or other removal methods that allow root systems to remain intact.

- Vegetation targeted for retention would be flagged to reduce the likelihood of being treated.
- Trees that are 6 inches in diameter at breast height (DBH), (breast height defined as 4.5 feet) would be left on site with no more than one-third of each individual tree pruned from the ground up to a maximum of 8 feet. For example, a 24-foot tree could be pruned 8 feet up from the ground.
- Where practical, stands of arrowweed or other herbaceous species that have traditional value for Native American tribes would be left on site and avoided.
- Plants occurring in river channels, such as bulrush (*Scirpus californicus* or *Scirpus* spp.) and cattail (*Typha* sp.), would not be treated.
- Initial mechanical and chemical vegetation clearing and subsequent mechanical vegetation control would be timed to avoid the migration, breeding, and nesting timeframe of migratory birds (February 1 through August 31). Herbicide re-treatments could occur throughout the year. If initial mechanical and chemical vegetation clearing or subsequent mechanical vegetation control needs occur from February 1 through August 31, a survey for nesting migratory birds would be conducted prior to the start of activities.
- Removal of riparian vegetation within 100 feet of aquatic habitats would be avoided to provide a buffer area to protect the habitat from sedimentation.
- For all in-water work in streams, sediment barriers would be used to avoid downstream effects of turbidity and sedimentation.

3.4.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, short- and long-term, minor to moderate, direct and indirect, adverse effects on vegetation would occur. Under the No Action Alternative, CBP would continue current maintenance activities and tactical infrastructure would be maintained and repaired on an as-needed basis. There would be no centralized planning process for maintenance and repair, and, as a consequence, maintenance and repair of tactical infrastructure usually would be performed on resources that are in disrepair. Under this alternative, the lack of coordinated environmental staff support and centralized planning would result in inefficiencies complying with NEPA and other environmental requirements and the eventual degradation of tactical infrastructure resulting in impacts. Maintenance and repair under this alternative would result in impacts on vegetation, such as conversion and degradation of habitat and plant communities from vegetation removal, establishment of different plant communities (including invasive species) and accidental release of petroleum products or other hazardous materials; trampling and crushing vegetation while accessing the sites; and increased erosion, turbidity, and sedimentation including the burial of aquatic plants. Under this alternative, vegetation-clearing activities for new observation zones would be conducted under a separate NEPA process.

By completing maintenance and repair work on an as-needed basis, the potential exists for increased impacts on vegetation. Without a centralized planning process, maintenance and repair specifications would not be established and standardized BMPs would not be implemented. For example, without a standardized BMP requiring that the footprint of the maintenance area be

flagged or marked, vegetation immediately adjacent to the maintenance footprint could be impacted if maintenance activities went beyond that footprint. Thus, some vegetation adjacent to tactical infrastructure could be degraded or destroyed. Therefore, it is possible that greater impacts would occur under the No Action Alternative than the Proposed Action, because the potential for habitat disturbances would be greater due to a lack of a proactive approach to maintenance and repair.

3.5 TERRESTRIAL AND AQUATIC WILDLIFE RESOURCES

3.5.1 Definition of the Resource

This section provides a description of the wildlife resources expected to occur within the region of analysis. Wildlife resources include native or naturalized terrestrial animals and the habitats in which they exist. Species addressed in this section include those that are not listed as threatened or endangered by the Federal government. Federal threatened and endangered species, other sensitive wildlife species, and migratory birds are addressed in **Section 3.6.**

3.5.2 Affected Environment

Terrestrial Wildlife. An abundance of high-quality habitat for wildlife exists within the region of analysis. This vast area is capable of supporting hundreds of wildlife species, including mammals, birds, reptiles, and amphibians.

Large ungulates adapted to surviving in the arid western regions of southwestern Arizona include desert bighorn sheep (*Ovis canadensis nelsoni*), southern mule deer, and Sonoran pronghorn (*Antilocapra americana sonoriensis*). Javelina (*Tayassu tajacu*) also occurs within the higher elevations of the scattered mountain ranges. The Madrean sky islands of southeastern Arizona are world renowned for their unique plant and animal diversity (Felger and Wilson 1995). Some of the upland mammalian fauna associated with this region include mountain lion (*Puma concolor*), bobcat (*Felis rufus*), white-nosed coati (*Nasua narica*), white-tailed deer (*Odocoileus virginianus*), long-legged myotis (*Myotis volans*), cave myotis (*Myotis velifer*), Bailey's pocket mouse (*Chaetodipus baileyi*), yellow-nosed cotton rat (*Sigmodon ochrognathus*), and southern pocket gopher (*Thomomys umbrinus*) (Brown 1994).

The mammals that inhabit the scrublands and dunelands scattered across southern Arizona typically spend much of their time below ground or dormant during the heat of the day. Consequently, the region hosts large populations of burrowing rodents, including the round-tailed ground squirrel (*Spermophilus tereticaudus*). Other mammals that occur in this region include the kit fox (*Vulpes macrotis*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), desert pocket mouse (*Chaetodipus penicillatus*), long-tailed pocket mouse (*Chaetodipus formosus*), desert kangaroo rat (*Dipodomys deserti*), and Merriam's kangaroo rat (*Dipodomys merriami*) (Brown 1994, USFS 1994).

The open, sparsely vegetated sandy plains and dunes of southwestern Arizona typically do not support the more diverse bird life associated with structurally taller and denser habitats. However, the uplands across southern Arizona are known for rich birdlife. Some of the more commonly known avian inhabitants of these uplands include Harris' hawk (*Parabuteo*

unicinctus), white-winged dove (*Zenaida asiatica*), Inca dove (*Columbina inca*), elf owl (*Micrathene whitneyi*), brown-crested flycatcher (*Myiarchus tyrannulus),* pyrrhuloxia (*Cardialis sinuatus*), and the curve-billed thrasher (*Toxostoma curirostre*). Birds common in the Chihuahuan scrub and desert grasslands of southeastern Arizona include mourning dove (*Zenaida macroura***)**, phainopepla **(***Phainopepla nitens***)**, red-tailed hawk (*Buteo jamaicensis*), burrowing owl (*Athena cunicularia)*, northern harrier (*Circus cyaneus*), loggerhead shrike (*Lanius ludoviscianus*), rufus-crowned sparrow (*Aimophila ruficeps*), western kingbird (*Tyrannus verticalis),* turkey vulture (*Cathartes aura*), black-tailed gnatcatcher (*Polioptila melanura*), eastern meadowlark (*Sturnella magna*), cactus wren (*Campylorhynchus brunneicapillus*), and ash-throated flycatcher (*Myiarchus cinerascens*). Bird species common to the Madrean sky islands of southeastern Arizona include Cooper's hawk (*Accipiter cooperii*), band-tailed pigeon (*Patagioenas fasciata***)**, Abert's towhee (*Piplio aberti*), ash-throated flycatcher, curve-billed thrasher, bridled titmouse (*Baeolophus wollweberi*), and bushtit (*Psaltriparus minimus*) (Brown 1994). Migratory bird breeding season in Arizona is February through August. Peak nesting season is February through May at lower elevations (less than 2,000 feet) in the desert regions.

The sandy plains and dunes of southwestern Arizona have resulted in a number of unique sand-adapted lizards and snakes. Examples of these are the fringe-toed horned lizard (*Uma notata*), banded sand snake (*Chilomeniscus cinctus*), and the sidewinder rattlesnake (*Crotalus cerastes*). The rocky outcrops, bajadas, talus slopes, washes, and gravel plains of south-central and southwestern Arizona each support a varied and often distinct assemblage of herpefauna species including the chuckwalla (*Sauromalus obesus*), desert spiny lizard (*Sceloporus magister*), long-tailed brush lizard (*Urosaurus graciosus*), southern desert horned lizard (*Phrynosoma platyrhinos calidiarum*), western whiptail (*Cnemidophorus tigris***)**, and desert glossy snake (*Arizona elegans eburnata*). Species of reptiles associated with the lowland scrublands scattered across all of southern Arizona include the collared lizard (*Crotaphytus bicinctores*), side-blotched lizard **(***Uta stansburiana*), western whiptail, and long-nosed leopard lizard (*Gambelia wislizenii*). Reptiles and amphibians associated with the Madrean uplands include the rock rattlesnake (*Crotalus lepidus*), green rat snake (*Elaphe triapsis*), bunchgrass lizard (*Sceloporus scalaris*), Tarahumara frog (*Rana tarahumarae*), barking frog (*Hylactophryne augusti*), and mountain skink (*Eumeces callicephalus*) (Brown 1994).

Aquatic Wildlife. Wetlands, springs, and seeps are rare in the Sonoran Desert of southwestern Arizona, but are critical to a number of rare species such as the desert pupfish (*Cyprinodon macularius*) and the Quitobaquito pupfish (*Cyprinodon macularius*). The Madrean sky islands of southeastern Arizona produce isolated, unique, and invaluable aquatic habitats. Topographically induced rainfall patterns and dry climate combine with the basin and range geology to produce disjointed perennial streams on mountain ranges and their alluvial deposits and pediments; isolated springs, and spring runs on both mountains and in the inter-basin, valley areas, and valley streams sustained by basin aquifers. The native fish fauna is not particularly diverse (13 species) but is uniquely adapted to survive harsh, limited aquatic habitats. This region is the center of distribution for many unique and rare species such as the Gila chub (*Gila intermedia*), Gila topminnow (*Poeciliopsis occidentalis*), Yaqui (*G. purpurea*) and Sonora chubs (*G. ditaenia*), and Mexican stoneroller (*Campostoma ornatum*) (DeBano et al. 1995).

3.5.3 Environmental Consequences

Effects on wildlife and aquatic resources would be significant if the species or habitats are adversely affected over relatively large areas. Effects would also be considered significant if disturbances cause substantial or permanent reductions in population size or distribution of a species**.**

The significance of effects on wildlife is based on the following:

- The importance (i.e., legal commercial, recreational, ecological, or scientific) of the resource
- The portion of the resource that would be affected relative to its occurrence in the region
- The sensitivity of the resource to proposed activities
- The duration of ecological ramifications.

3.5.3.1 Alternative 1: Proposed Action

Short- and long-term, negligible to minor, direct and indirect, adverse effects on wildlife would occur from the Proposed Action. All maintenance and repair activities would occur within or adjacent to the existing footprints of tactical infrastructure. As such, maintenance and repair of tactical infrastructure would result in temporary, minor degradation of wildlife habitat and a small amount of permanent habitat loss.

Mechanical vegetation removal, such as mowing and trimming, would likely cause larger mammals, reptiles, and birds, including breeding migratory birds, to relocate temporarily. Individuals of smaller, less-mobile species could inadvertently be directly impacted by maintenance and repair activities. Vegetation control would occur within existing footprints where vegetation is being maintained, while vegetation clearing would occur outside of the existing footprints to maintain line-of-sight along roads and other existing tactical infrastructure. As such, impacts from vegetation control would be temporary, whereas vegetation clearing of new observation zones and road setbacks could result in long-term habitat conversion and degradation. In addition to the direct disturbance of habitat associated with vegetation removal, including the selective removal of woody plants, this activity could result in the establishment of invasive species in the cleared area.

Localized degradation of habitat would also occur if petroleum products or other hazardous materials are accidently released during operation or storage of maintenance vehicles and other equipment. All regulatory requirements for handling and storage of fuels, oils, and other hazardous materials (such as the development of spill prevention plans) would be implemented. Thus, habitat degradation resulting from accidental releases of hazardous materials would be negligible.

Some wildlife might be killed or injured during ground-disturbing activities or during transportation of equipment and personnel. Most ground-disturbing activities would occur within and adjacent to previously disturbed sites; therefore, the number of animals killed or

injured during planned activities would be less than what would occur when new areas are disturbed. However, burrowing animals, such as the rodents and reptiles, could be impacted.

Near- and in-water bridge, boat ramp, road, and drainage structure maintenance and repair activities could result in direct and indirect impacts on aquatic species and their habitat from increases in erosion, sedimentation, and turbidity. Sedimentation can reduce the quantity and quality of spawning areas and influence stream productivity and food supply (e.g., aquatic insects) for both aquatic and terrestrial species. In addition, hazardous materials could be inadvertently released into aquatic habitat during maintenance and repair activities. These actions would temporarily degrade aquatic habitat and directly and indirectly affect aquatic species. BMPs would be implemented to minimize sedimentation and reduce the risk of the release of hazardous materials into aquatic systems (e.g., control of riparian vegetation would be avoided when possible to provide a buffer area to protect aquatic habitat from sedimentation). As a result of implementing these control measures, sedimentation and associated adverse effects on aquatic species would be minor. In addition, road maintenance, repair of damaged rip-rap, culverts, and other drainage structures and crossings would reduce erosion, improve stream flow, and result in beneficial impacts on aquatic habitat and species. Under this alternative, a long-term, beneficial impact on erosion and sedimentation would occur from the periodic, scheduled inspections and maintenance of crossings and structures.

Temporary displacement of mobile wildlife from noise, night lighting, and other disturbances associated with the Proposed Action could occur more often than under the No Action Alternative because maintenance would be scheduled at regular intervals. However, BMPs would be implemented to minimize these adverse effects (e.g., if lights must be used at night, they would be limited to a maximum of 1.5 foot-candles and downshielded to avoid affecting bat species, such as the cave myotis).

Adverse impacts would be minimized through the use of appropriate BMPs (see **Appendix E**). The following are examples of BMPs that could be implemented with the Proposed Action to reduce impacts:

- Project operations including both initial treatment and subsequent maintenance would be timed to avoid the migration, breeding, and nesting timeframe of special status species. In general, mechanical vegetation treatment and retreatment would occur between October 1 and March 31. Herbicide retreatments would occur throughout the year.
- Ensure temporary light poles and other pole-like structures used for maintenance activities have anti-perch devices to discourage roosting by birds.
- Minimize animal collisions during maintenance and repair activities by not exceeding speed limits of 35 miles per hour (mph) on major unpaved roads (i.e., graded with ditches on both sides) and 25 mph on all other unpaved roads. During periods of decreased visibility (e.g., night, poor weather, curves), do not exceed speeds of 25 mph.
- To prevent entrapment of wildlife species, ensure excavated, steep-walled holes or trenches are either completely covered by plywood or metal caps at the close of each work day or provided with one or more escape ramps (at no greater than 1,000-foot intervals and sloped less than 45 degrees) constructed of earth fill or wooden planks.

- Each morning before the start of maintenance activities and before such holes or trenches are filled, ensure they are thoroughly inspected for trapped animals. Ensure that any animals discovered are allowed to escape voluntarily (by escape ramps or temporary structures), without harassment, before maintenance activities resume; or are removed from the trench or hole by a qualified person and allowed to escape unimpeded.

3.5.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, CBP would continue current maintenance activities and short- and long-term, minor to moderate, direct and indirect, adverse effects on terrestrial and aquatic wildlife would occur. Tactical infrastructure would be maintained and repaired on an as-needed basis. There would be no centralized planning process for maintenance and repair, and as a consequence, maintenance and repair of tactical infrastructure usually would be performed only on resources that are in disrepair.

Under this alternative, the lack of coordinated environmental staff support and centralized planning would result in inefficiencies complying with NEPA and other environmental requirements and the eventual degradation of tactical infrastructure. The No Action Alternative would result in greater impacts on wildlife than the Proposed Action because maintenance and repair activities would be reactionary. Under this alternative, impacts on wildlife, such as displacement of wildlife; habitat conversion and degradation from vegetation removal and the accidental release of petroleum products; crushing of smaller, less-mobile species resulting in death or injury; and disturbance from noise effects, night lighting, and temporary displacement of terrestrial species would be expected.

By completing maintenance and repair work on an as-needed basis, the potential exists for increased impacts on wildlife species. Without a centralized planning process, maintenance and repair specifications would not be established and standardized BMPs might not be implemented. For example, without a standardized BMP requiring that the footprint of the maintenance area be flagged or marked, wildlife habitat immediately adjacent to the maintenance footprint could be impacted if maintenance activities went beyond the footprint. In addition, without a centralized planning process, there would be no way to determine if protected wildlife or their habitat occurred within the maintenance area, and there would be no mechanism to determine if specific BMPs (such as migratory bird species BMPs) would be required for maintenance and repair activities. Thus, some wildlife species and their habitat adjacent to tactical infrastructure could be degraded or destroyed. Therefore, it is possible that greater impacts would occur under the No Action Alternative than the Proposed Action, because the potential for habitat disturbances would be greater due to the lack of a proactive approach to maintenance and repair.

3.6 THREATENED AND ENDANGERED SPECIES

3.6.1 Definition of the Resource

NatureServe elemental occurrence data were used to determine the presence of species within the region of analysis. An elemental occurrence is defined by NatureServe as an area of land or water where a species or natural community is or was present and has conservation value. These occurrence data require that a species is in appropriate habitat, at the appropriate time of the year, and is naturally occurring (NatureServe 2010a).

3.6.2 Affected Environment

The agencies that have primary responsibility for the conservation of plant and animal species in Arizona are the USFWS, AZGFD, BLM, and the USFS. These agencies maintain lists of plant and animal species that have been classified, or are potential candidates for classification, as threatened or endangered in the State of Arizona. Listed species for Cochise, Pima, Santa Cruz, and Yuma counties were obtained through the USFWS (Arizona field office). Data on species' elemental occurrences and distributions were obtained from the USFWS and NatureServe (NatureServe 2010b). There are 18 species federally listed as endangered and seven species federally listed as threatened that are known to occur within the region of analysis and that could be affected by the Proposed Action (see **Table 3-2**). Those species and their designated or proposed critical habitat are described in the following paragraphs. Species that occur in terrestrial habitats are described first, followed by aquatic species.

An additional six threatened or endangered species occur within the four counties along the U.S./Mexico international border in Arizona. These species would not be affected by the Proposed Action because they do not occur or are very rare along the U.S./Mexico international border where tactical infrastructure is located, or because no activities will be conducted within or near habitat used by these species along or near the U.S./Mexico international border. These species (Nichol Turk's head cactus [*Echinocactus horizonthalonius var. nicholii*], loach minnow [*Tiaroga cobitis*], razorback sucker [*Xyrauchen texanus*], spikedace [*Meda fulgida*], northern aplomado falcon [*Falco femoralis septentrionalis*], and California least tern [*Sterna antillarum browni*]) are not further discussed here.

3.6.2.1 Terrestrial Threatened and Endangered Species

Cochise pincushion cactus. This is a small, unbranched cactus, 0.5 to 2.4 inches in diameter and covered by white, cottony areoles (i.e., spine-bearing structures), overlapped by radial spines within the areoles. This species has a whitish appearance with pale yellow to light beige flowers that bloom in March. Flowers are followed by orange-red to scarlet fruits that dry to a brown color rather quickly and can contain up to 20 seeds. The cacti are found on hills of high-calcium Permian limestone, at elevations from 4,200 to 4,700 feet where Chihuahuan desert scrub transitions to semidesert grassland. Preferred soils are thin gravely loam over bedrock with gravel-sized limestone rocks or rubble inclusions. Substrates are low in nutrients, well-drained, and have a pH of 7.9 to 8.0. Plants typically grow in full sunlight with the densest colonies forming on bedrock or where bedrock is close to the surface (USFWS 1993a).

Table 3-2. Federally Listed Species Known to Occur Within the Region of Analysis

Common Name	Scientific Name	Listing Status
PLANTS		
Canelo Hills ladies' tresses	*Spiranthes delitescens*	Endangered
Cochise pincushion cactus	*Coryphantha robbinsorum*	Threatened
Huachuca water umbel	*Lilaeopsis schaffneriana recurva*	Endangered, critical habitat
Kearney's slimpod	*Amsonia kearneyana*	Endangered
Pima pineapple cactus	*Coryphantha scheeri robustispina*	Endangered
FISH		
Beautiful shiner	*Cyprinella formosa*	Threatened, critical habitat
Desert pupfish	*Cyprinodon macularius*	Endangered
Gila chub	*Gila intermedia*	Endangered, critical habitat
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	Endangered
Quitobaquito pupfish	*Cyprinodon eremus*	Endangered, critical habitat
Sonoran chub	*Gila ditaenia*	Threatened, critical habitat
Yaqui catfish	*Ictalurus pricei*	Threatened, critical habitat
Yaqui chub	*Gila purpurea*	Endangered, critical habitat
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	Endangered
AMPHIBIANS AND REPTILES		
Chiricahua leopard frog	*Rana chiricahuensis*	Threatened, proposed critical habitat
New Mexico ridge-nosed rattlesnake	*Crotalus willardi obscurus*	Threatened
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	Endangered
BIRDS		
Masked bobwhite	*Colinus virginianus ridgwayi*	Endangered
Mexican spotted owl	*Strix occidentalis lucida*	Threatened, critical habitat
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered
MAMMALS		
Jaguar	*Panthera onca*	Endangered
Lesser long-nosed bat	*Leptonycteris yerbabuenae*	Endangered
Ocelot	*Leopardus pardalis*	Endangered
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Endangered

Source: NatureServe 2010b

The Cochise pincushion cactus is scattered among three small limestone hills in San Bernardino Valley, southeastern Cochise County, Arizona, within an area of 4 to 6 square miles (mi^2). At least one population is known from northern Sonora, Mexico. Within their limited range, plants are found scattered, with a few dense clumps ranging from 100 to 1,000 individuals. The range

of this species appears to be limited by the availability of optimal habitat (USFWS 1993a). NatureServe data indicate that there were two records of elemental occurrence of Cochise pincushion cactus in the region of analysis. These both occurred on the West Guadalupe Canyon USGS topographic quadrangle map (NatureServe 2010b).

Threats to the Cochise pincushion cactus include habitat degradation from cattle, wildlife, feral animals, illegal border activities, minerals exploration, development (USFWS 1993a) and competition from invasive plant species, especially grasses (USFWS 2007a). Survival and reproduction of the Cochise pincushion cactus could be affected by prolonged periods of severe drought.

Kearney's slimpod. This is a perennial herb from the dogbane family (Apocynaceae) reaching 2.3 feet in height, with pale blue flowers and milky sap (USFWS 1993b). Stems are erect, generally unbranched, and pubescent, arising from the root crown. Flowers bloom in April and form a terminal compound cyme (i.e., flat-topped flower cluster). Fruits extend above the foliage and are typical of the dogbane family.

Natural populations of Kearney's slimpod are found in southwest-draining dry rocky washes of the Baboquivari Mountains at about 4,000 to 6,000 feet. Soils in these washes are granitic and rainfall averages 16 inches per year. Plants grow on stable, partially shaded coarse alluvial deposits under deciduous riparian trees and shrubs such as Mexican blue oak (*Quercus oblongifolia*) (USFWS 1993c).

Historically, this species was known from three populations: two naturally occurring and one introduced, in the dry rocky washes of the Baboquivari Mountains in Arizona. It is believed that one natural population was extirpated sometime between 1941 and 1982, while the second contained 24 plants in 1982, 8 plants by 1986 (USFWS 1993c), and 65 plants by 1993 (USFWS 1993b). The introduced population consists of two sites where several planting efforts have been conducted. The population achieved a maximum number of 136 plants in 1990 prior to heavy rains later in the year that scoured the habitat, leaving only 33 plants. Additional plantings have been conducted in an attempt to boost the population size at this site (USFWS 1993c). Within the region of analysis, NatureServe provides six records of elemental occurrence of Kearney's slimpod within USGS topographic quadrangle map Baboquivari Peak (NatureServe 2010b).

Though adult plants do not appear to be directly grazed due to the toxic milky sap produced in plant tissues, grazing can result in the trampling of plants, loss of shade plants, changes in soil characteristics, and other factors, which could affect their reproductive success. Plants are also threatened by catastrophic floods that have the potential to destroy entire populations (USFWS 1993c).

Pima pineapple cactus. This cactus measures 4 to 18 inches tall and 3 to 7 inches in diameter. The central spine is stout and hooked, surrounded by an additional 6 to 15 straight radial spines in a cluster. The spines are usually straw-colored, becoming blackened with age. Plants can be single-stemmed, multi-headed, or can appear in clusters. Silky yellow flowers (rarely white) appear in early July with summer rains and continue through August. Fruits are green, ellipsoid, succulent, and sweet (USFWS 2000a).

This cactus species grows in the transition zone between the semidesert grasslands and Sonora desert scrub on alluvial bajadas (lower slopes of mountains characterized by loose alluvial sediments and poor soil development) and slopes of less than 10 percent grade at elevations between 2,300 to 4,600 feet (USFWS 2000a). The range is bordered by the Baboquivari Mountains to the west and the Santa Rita Mountains to the east. The range extends north to the vicinity of Tucson. Within the region of analysis, there are 27 records of elemental occurrence of the Pima pineapple cactus within the following USGS topographic quadrangle maps: Amado, Cerro Colorado, Fresno Wash, Kino Springs, Las Guijas, Mildred Peak, Palo Alto Ranch, Presumido Peak, and Wilbur Canyon (NatureServe 2010b).

The Pima pineapple cactus is threatened by illegal collection and habitat degradation, especially as a result of poor range management. Habitat has also been lost to mining, agriculture, road construction, urbanization, and aggressive nonnative grasses (USFWS 2000a).

New Mexico ridge-nosed rattlesnake. This species is a small (12 to 24 inches long), montane, grayish-brown rattlesnake with a distinct ridge on the tip of its snout. The diet of the New Mexico ridge-nosed rattlesnake consists of a broad range of prey including small mammals, birds, lizards, arthropods, and other snakes. Reproduction and birthing periods generally occur between early August and mid-October, with the majority of births occurring in mid-September. This species is active during periods of moderate temperatures, both daily and seasonally. New Mexico ridge-nosed rattlesnakes are active from April to October. The greatest periods of activity coincide with the rainy season in the Animas Mountains (July to September) (USFWS 1985).

The New Mexico ridge-nosed rattlesnake occurs in three remaining mountain populations within the Madrean sky island archipelago: Animas (New Mexico), Peloncillos (New Mexico and Arizona), and Sierra San Luis (Mexico). The distribution of this rattlesnake in the eastern portion of the region of analysis within southeastern Arizona is limited to the Peloncillo Mountains. Throughout these three ranges, the species is most commonly found in pine-oak or scrub-oak forests between 5,600 and 9,000 feet in elevation. In Arizona, this species is found in Peloncillo Mountains of Cochise County at elevations above 5,000 feet (USFWS 1985). Within these habitats, cool canyon bottoms with shaded rock outcrops or talus slopes are favored micro-habitats (Davis 2008). Deep narrow canyons that provide a greater potential for cool mesic conditions relative to surrounding habitats are especially important for the persistence of the species in the northern and relatively arid portions of the rattlesnake's range (USFWS 1985). Critical habitat has been designated for New Mexico ridge-nosed rattlesnake (43 FR 34476–34480), which occurs within the region of analysis. NatureServe data indicate one elemental occurrence of the New Mexico ridge-nosed rattlesnake in the region of analysis within USGS topographic quadrangle map Skelton Canyon (NatureServe 2010b).

Natural threats to the ridge-nosed rattlesnake include predation, starvation, and pathogenic-related diseases that remain poorly understood (USFWS 1985). Other threats, more important to the decline in population numbers include over-collecting by the pet trade, and the alteration of habitat by fire suppression, climate change, grazing, mining, and development (USFWS 1985).

Masked bobwhite. The adult male masked bobwhite has a deep cinnamon-colored breast, black head and throat, and a crown feathers that darken with age. The female bobwhite has plumage that is mottled brown, black, and white, with a pale cinnamon-colored throat (USFWS 1995c). Habitat includes level plains and river valleys, open desert grasslands, semi-arid desert scrub, weedy bottomlands, grassy and herb-strewn valleys, and forb-rich plains. The grass and weed cover is seasonal, and tree and shrub cover varies geographically. The eastern and southern distribution coincides with the beginning of denser vegetation of drought deciduous thornscrub (Sinaloan thornscrub). It is limited in the west and northwest by the paucity of summer precipitation. Nesting occurs on the ground in heavy cover (NatureServe 2010a).

The distribution of the masked bobwhite includes south-central Arizona and Sonora, Mexico. The northern limit of historic range is defined by the Altar and Santa Cruz valleys in Arizona. It was extirpated from the United States by about 1900 and reintroduced at the Buenos Aires NWR in southern Arizona (NatureServe 2010a). Distribution is limited to elevations between 33 to 3,937 feet where mean rainfall is 10 to 20 inches. NatureServe data indicate 19 elemental occurrences of the masked bobwhite in the region of analysis on USGS Survey topographic quadrangle maps: Cumero Mountain, Fresno Wash, Las Guijas, Presumido Peak, and Wilbur Canyon (NatureServe 2010b).

The masked bobwhite was listed as endangered as a result of habitat loss due to overgrazing and possibly due to competition with other native species of quail (NatureServe 2010a).

Mexican spotted owl. The Mexican spotted owl has large, dark eyes, an overall dark to chestnut brown coloring, whitish spots on the head and neck, and white mottling on the abdomen and breast (USFWS 1995d). The Mexican spotted owl inhabits canyon and forest habitats across its range and is frequently associated with mature mixed-conifer, pine-oak, and riparian forests. Owls are usually found in areas with some type of water source such as perennial streams, creeks, and springs. Home range calculations for a single owl average 1,600 acres (650 hectares), while a mating pair's home range averages 2,000 acres (810 hectares) (USFWS 2004). Mexican spotted owls use a variety of habitats for foraging, including multi-layered forests with many potential patches. In areas within Arizona and New Mexico, forests used for roosting and nesting often contain mature or old-growth stands with complex structure. The breeding period for Mexican spotted owls is March through June (USFWS 1995d).

The range of the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona, New Mexico, and far western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau. About 91 percent of known Mexican spotted owls existing in the United States between 1990 and 1993 occurred on land administered by the USFS (USFWS 1995d). Most owls have been found within the 11 national forests of Arizona and New Mexico (USFWS 2004). Critical habitat has been designated for Mexican spotted owl (69 FR 53181–53298), which occurs within the region of analysis. NatureServe provides records for approximately 43 elemental occurrences of the Mexican spotted owl within USGS topographic quadrangle maps: Fort Huachuca, Harshaw, Huachuca Peak, Miller Peak, Montezuma Pass, Mount Hopkins, Mount Hughes, Mount Wrightson, Parajito Peak, Peña Blanca Lake, Pyeatt Ranch, and Ruby (NatureServe 2010b).

The primary threats to the Mexican spotted owl are even-aged timber harvest and the threat of catastrophic wildfire. Additional threats include development from oil, gas, and mining, and recreation (USFWS 1995d).

Southwestern willow flycatcher. This is a small bird, typically less than 6 inches in length with conspicuous light-colored wing bars (USFWS 2002b). The habitat requirements of the southwestern willow flycatcher include areas of dense riparian foliage and nesting habitat with trees and shrubs that include willows (*Salix* spp.) and box elder (*Acer negundo*) (USFWS 2002b). The breeding period for this species is April through September (USFWS 2002b).

The southwestern willow flycatcher breeding range extends from southern California north to Independence, Arizona; southwestern New Mexico; southern Utah; and formerly southern Nevada. The winter range includes areas from central Mexico to northwestern Colombia (NatureServe 2010a). Southwestern willow flycatcher territories have been detected in Arizona on the following rivers: Agua Fria, Gila, Little Colorado, Salt, San Pedro, Colorado, San Francisco, Hassayampa, Verde, Big Sandy, Santa Maria, Virgin, and Bill Williams; and on the following creeks: Pinal, Tonto, and Cienaga. Currently, population stability in Arizona is believed to be largely dependent on the presence of two large subpopulations (the Roosevelt Lake and San Pedro/Gila River confluence subpopulations). Critical habitat has been designated for southwestern willow flycatcher (70 FR 60885–61009); however, it does not occur within the region of analysis. Within the region of analysis, NatureServe provides records for approximately seven elemental occurrences of the southwestern willow flycatcher within USGS topographic quadrangle maps: Gadsen, Hereford, Lewis Springs, Yuma East, and Yuma West (NatureServe 2010b).

This species is threatened by the loss and degradation of cottonwood-willow riparian habitat and structurally similar riparian habitats. Increased irrigated agriculture and livestock grazing have aided brown-headed cowbird populations that in turn impact the southwestern willow flycatcher by parasitizing their nests. The current population exists in small, fragmented subpopulations, which increases the risk of local extirpation (NatureServe 2010a).

Yuma clapper rail. This is a small marsh bird with an average height of 8 inches. This species begins breeding in February and will nest from March with a peak in mid-May through June. Nests are made on stable substrates and are typically near shore in shallow water or in the interior of marshes over deeper water. The Yuma clapper rail occurs in freshwater marshes dominated by cattail (*Typha* spp.) and bulrush (*Scirpus* ssp.) with a mix of riparian trees and shrubs. These habitats are commonly backwaters, in the impoundments behind small dams or marsh habitats that are created in fields or cells with managed water levels (USFWS 1983).

The Yuma clapper rail is known to occur in Arizona, California, and Nevada. Occupied habitat in California exists in the Imperial Valley/Salton Sea area (USFWS 1983). Additionally, Yuma clapper rails are known to nest along the Colorado River, in wetlands surrounding the Coachella Canal, within the Imperial Valley, and the upper end of the Salton Sea at the Whitewater River delta and Salt Creek (NatureServe 2010a). NatureServe provides records for approximately seven elemental occurrences of the Yuma clapper rail within USGS topographic quadrangle maps: Gadsen, Ligurta, Wellton, Yuma East, and Yuma West (NatureServe 2010b).

Populations of the Yuma clapper rail are threatened by destruction, modification, and curtailment of its habitat and range. Increased development along the Lower Colorado River and interior Arizona rivers could have direct and indirect effects on clapper rail habitat through water management regimes (USFWS 1983). In addition, the presence and increase of selenium in clapper rail habitat has been identified as a potential threat to the survival and recovery of the clapper rail (USFWS 2006b).

Jaguar. The jaguar is a large, heavy-bodied, big-headed cat about 7 feet in length. This species is found near water in the warm tropical climate of savannah and forest and is rarely found in extensive arid areas. Individuals in Arizona have been found in Sonora desertscrub up through subalpine conifer forest. Most jaguar detections occurred in Madrean oak woodland communities; however, jaguars were also documented in open mesquite grasslands and desert scrub/grasslands on the desert valley floor (USFWS 2000b).

The historic range included California, Arizona, New Mexico, Louisiana, south through Texas, and into central South America. In Arizona, the species was found in mountainous parts of eastern Arizona to the Grand Canyon. The current range includes central Mexico and into central South America as far south as northern Argentina. There are no known breeding populations in the United States (USFWS 2000b).

In Arizona, potential habitat includes areas of forest, woodland, and grassland vegetation in the Baboquivari Mountains, the southern portion of the Altar Valley, a portion of the southern Santa Cruz River basin, and the San Pedro River basin south of Arivapa Creek. The few recent (2001 to 2007) jaguar observations in south-central Arizona near the Mexican border have primarily occurred in Madrean oak woodland communities; however, jaguars were also documented in open mesquite grasslands and desert scrub/grasslands on the desert valley floor (USFWS 2007c). Within the region of analysis, NatureServe provides records for approximately four elemental occurrences of the jaguar within USGS topographic quadrangle maps: Baboquivari Peak, Skelton Canyon, and Ruby Gadsen (NatureServe 2010b).

Threats to the jaguar include illegal shooting; overhunting of jaguar prey species; and habitat loss, fragmentation, and modification (USFWS 2000b). Large-scale changes in jaguar habitat have affected not only habitat for breeding and foraging, but also movement corridors.

Lesser long-nosed bat. This is a yellow-brown or cinnamon gray bat, with a total head and body measurement of approximately 3 inches. The tongue measures approximately the same length as the body. This species also has a small nose leaf. Habitat for the species includes mainly desert scrub habitat in the U.S. portion of its range. In Mexico, the species occurs up into high elevation pine-oak and ponderosa pine forests. Altitudinal range is from 1,600 to 11,500 feet. Within the United States, this species forages at night on nectar, pollen from columnar cacti (such as saguaros), and agaves with branched flower clusters (USFWS 2001d). Considerable evidence exists for the interdependence of *Leptonycteris* bat species and certain agaves and cacti. During daylight, lesser long-nosed bats roost in caves or abandoned mines.

The species historically ranged from southern Arizona in the Picacho Mountains, the Agua Dulce Mountains, and Chiricahua Mountains to southwestern New Mexico in the Animas and Peloncillo Mountains, and much of Baja California, Mexico (USFWS 1994). The current range

is similar to historic; however, the number of occupied roost sites and the number of individuals per colony have recently declined drastically. These bats are seasonal (April to September) residents of southeastern Arizona, and possibly extreme western Arizona (i.e., Cochise, Pima, Santa Cruz, Graham, Pinal, and Maricopa counties, Arizona) (USFWS 2001d). Within the region of analysis, there are at least two maternity roost sites (Bluebird Mine and Copper Mountain Mine) and three post-maternity roost sites (Patagonia Bat Cave, Manila Mine, and the State of Arizona) (USFWS 1994). A fourth post-maternity roost site, the Cave of the Bells, occurs immediately adjacent to the region of analysis (USFWS 1994). Within the region of analysis, NatureServe provides records for approximately 22 elemental occurrences of the lesser long-nosed bat within USGS topographic quadrangle maps: Agua Dulce Mountains, Bates Well, Guadalupe Canyon, Guadalupe Spring, Miller Peak, Mohawk SW, Montezuma Pass, Mount Hughes, O'Donnell Canyon, O'Neill Hills, Parajito Peak, Patagonia, Pyeatt Ranch, and West Guadalupe Canyon (NatureServe 2010b).

Excess harvest of agaves in Mexico; the collection of saguaro and organ pipe cactus in the United States; and the conversion of habitat for agricultural uses, livestock grazing, woodcutting, and other development might contribute to the decline of long-nosed bat populations. These bats are particularly vulnerable due to many individuals using only a small number of communal roosts (USFWS 2001d). In general, the trend in the overall number of lesser long-nosed bats has been stable or increasing in both the United States and Mexico. In part for this reason, the USFWS has recommended reclassifying the status of this species as threatened (USFWS 2007d).

Ocelot. This is a medium-sized nocturnal cat, measuring up to 3 feet in body length and weighing approximately twice as much as a large domestic cat. It is slender and covered with attractive, irregularly shaped rosettes and spots that run the length of its body. The ocelot's background coloration can range from light yellow to reddish gray, to gold, and to a grayish gold color. The ocelot is divided into as many as 11 subspecies. Two subspecies occur in the United States, the Texas/Tamaulipas ocelot (*L.p. albescens*) and the Arizona/Sonora ocelot (*L.p. sonoriensis*). In general, the ocelot uses a wide range of habitats; however, this species does not seem to be a habitat generalist. In Arizona, little is known about habitat use. Some studies suggest that Arizona/Sonora ocelot are most often associated with tropical or subtropical habitat, including subtropical thornscrub, tropical deciduous forest, and tropical thornscrub (USFWS 2010f).

Historically this species was known to occur in the United States, primarily in California, Arizona, and Florida. The Arizona/Sonora ocelot subspecies is known to occur in southern Arizona and northwestern Mexico. This subspecies is isolated from the Texas/Tamaulipas ocelot by the Sierra Madre highlands and the Mexican Plateau. The first live Arizona/Sonora ocelot was documented in Cochise County, Arizona, in November 2009. In addition, a number of sightings of ocelot have been documented directly south of the U.S./Mexico international border in Sonora, Mexico (USFWS 2010f). NatureServe data do not provide any records of elemental occurrence of this species within the region of analysis.

Threats to the ocelot include destruction, modification, and curtailment of its habitat and range; collection for commercial, recreational, scientific, and educational purposes; and disease and predation (USFWS 2010f).

Sonoran pronghorn. The Sonoran pronghorn is the smallest and palest subspecies of pronghorn. The upper parts are tan; the underpart, rump, and two bands across the neck are white. The male has two black cheek patches. Both sexes have horns, although they are larger in males. Males weigh 100 to 130 pounds, while females weigh 75 to 100 pounds. Sonoran pronghorn populations typically occur in Sonoran desert scrub vegetation communities. Typical habitat ranges in elevation from 2,000 to 4,000 feet above mean sea level (USFWS 2002c). Sonoran pronghorns inhabit sites with good visibility and escape opportunities (e.g., alluvial fans and plains) but will use higher elevation alluvial fans and hills with less visibility where vegetation is more abundant. Their preferred forage is annual forbs, but they also use the shrubs and trees of desert washes and hills as the forbs dry. Vegetation associated with desert washes provides important thermal cover. Sonoran pronghorns use free-standing water when it is available and also rely on moisture from vegetation in addition to metabolic water (DHS 2008).

The U.S. subpopulation of wild Sonoran pronghorn currently occupies approximately 2,500 mi^2 of Federal lands in southwestern Arizona, including portions of the Barry M. Goldwater Range, Cabeza Prieta NWR, Organ Pipe Cactus National Monument, and a small area of BLM lands east of the Cabeza Prieta NWR and west of Highway 85. The Cabeza Prieta NWR lies at the heart of the Sonoran pronghorn range in Arizona and connects locations used on the Barry M. Goldwater Range and Organ Pipe Cactus National Monument. In 2002, extreme drought resulted in the loss of 85 percent of the United States Sonoran pronghorn herd and only 21 individuals existed in the United States (USFWS 2006c). At times, individuals of the U.S. population of Sonoran pronghorn cross into Mexico and mix with Mexican populations as was observed during construction of tactical infrastructure along the border in the southwestern corner of the Cabeza Prieta NWR in 2008. Following the severe drought, emergency recovery actions were implemented by an interagency team and, as of December 2008, there were at least 68 Sonoran pronghorn in the United States in the wild, and by July 2009, there were 73 Sonoran pronghorn in a captive breeding pen. The total number of Sonoran pronghorn at the beginning of 2009 was at least 131 individuals (USFWS 2006c). NatureServe data indicate two elemental occurrences of Sonoran pronghorn in the region of analysis within USGS topographic quadrangle maps: Wellton Hills and Granite Mountains South (NatureServe 2010b).

Conversion of habitat to other uses and barriers to movement caused by roads, canals, train tracks, and fences are the primary causes of the decline of the Sonoran pronghorn (USFWS 2002c).

3.6.2.2 Aquatic Threatened and Endangered Species

Canelo Hills ladies' tresses. This is a slender, erect member of the orchid family (Orchidaceae). Plants have five to ten grass-like leaves arising from the base of the stem. Flower stalks extend above the leaves, with up to 40 white flowers in a spiral arrangement. This species blooms July through August, but is otherwise difficult to observe as its leaves blend with other grasses and sedges. Canelo Hills ladies' tresses are short-lived perennials, surviving for only 4 to 5 years (Rice 2010).

Canelo Hills ladies' tresses grows in the fine-grained, highly organic, saturated soils of cienegas (i.e., spring fed marshes) and can be found growing dispersed among sedges and tall grasses up to an elevation of 5,000 feet. Anecdotal evidence indicates that this species might require some

form of disturbance within its preferred habitat to become established (Rice 2010). Canelo Hills ladies' tresses have been observed in five locations along the San Pedro River watershed in Cochise and Santa Cruz counties.

Most southern Arizona cienega habitats have been surveyed, so the potential for discovering new populations is low. Cienega habitats in New Mexico and Mexico have not been thoroughly studied so the potential for new populations in these areas remains (USFWS 2010a). NatureServe provides two records of elemental occurrence of Canelo Hills ladies' tresses on USGS topographic quadrangle map O'Donnell Canyon (NatureServe 2010b).

Canelo Hills ladies' tresses are rare and in decline. The limited number of locations and small populations at these locations makes this species particularly vulnerable to extinction. Direct threats include livestock grazing, improper fire management, competition with invasive plant species, water diversion and impoundments, and ground-water pumping (USFWS 2010a).

Huachuca water umbel. This is a semi-aquatic, herbaceous, perennial plant with slender erect leaves. The leaves are segmented, hollow cylinders. The flat-topped, rounded flower cluster is composed of 3 to 10 flowers that arise from the root nodes (USFWS 1999).

Huachuca water umbel is typically associated with perennial springs and stream headwaters that have permanently or seasonally saturated and highly organic soils between 4,000 to 6,500 feet. Huachuca water umbel requires wetland habitats, which are rare and declining in the southwestern United States. It is found in mid-elevation wetland communities in southern Arizona (i.e., Santa Cruz, Cochise, and Pima counties) and northern Sonora, Mexico (USFWS 1999).

A number of known disjunct populations occur along the Santa Cruz River and its tributaries in the San Rafael Valley, along Sonoita Creek, along the San Pedro River near the U.S./Mexico international border, and in eastern Cochise County (USFWS 1999). Critical habitat has been designated for Huachuca water umbel (64 FR 37441–37453); and occurs within the region of analysis. NatureServe data indicate that there are 24 records of elemental occurrence of Huachuca water umbel in the region of analysis. These all occurred east of Nogales, Arizona, on USGS topographic quadrangle maps: Fairbank, Hereford, Huachuca Peak, Leslie Canyon, Lewis Springs, Lochiel, Miller Peak, Mustang Mountains, O'Donnell Canyon, San Bernardino Ranch, and Sonoita, (NatureServe 2010b).

Threats to the Huachuca water umbel include watershed degradation due to livestock grazing and development, trampling by livestock, diversion of water and dewatering of habitats, and flash flooding (USFWS 2001a).

Beautiful shiner. This is a small minnow, approximately 2.5 inches long and similar in appearance to the common red shiner (*Cyprinella lutrensis*). It has a tan to olivaceous back, metallic silver sides, and a lighter belly. Males become more colorful during breeding season, as the body turns to bluish, the tail and lower fins take on an orange to yellow-orange color, and the top of the head becomes red to orange. This fish is generally found in the mid-water column region of small to medium streams with sand, gravel, or bedrock substrates. It is rarely found in patches of vegetation or other cover along the water margins (USFWS 2001b). It has been

reported in intermittent creeks and streams that have high percentages of riffle habitat during the wet season (USFWS 1995a).

Historically, the U.S. range of the beautiful shiner extended to the Rio Yaqui (San Bernardino Creek and Black Creek, Arizona) and Mimbres River (New Mexico). However, U.S. populations were extirpated in 1968 (USFWS 2001b) and now consist of re-introduced populations in three ponds on the San Bernardino NWR. The majority of the beautiful shiner's range is currently in Mexico (i.e., the Rios Yaqui, Casas Grandes, Santa Maria, and Santa Clara drainages of Sonora and Chihuahua, Mexico). Critical habitat has been designated for beautiful shiner (49 FR 34490–34497) and it occurs within the region of analysis. NatureServe data indicate that there have been three elemental occurrences of the beautiful shiner in the region of analysis. These were all located on the San Bernardino Ranch USGS topographic quadrangle map (NatureServe 2010b).

The beautiful shiner is threatened by habitat degradation and competition from nonnative introduced fish species (USFWS 1995a).

Desert pupfish. This is a small fish, approximately 3 inches in length with narrow dark vertical bars on a silvery background. Its diet is varied and consists of plants, algae, detritus and invertebrates. Males are larger than females and take on a bright blue body color with orange-tipped fins during the breeding season. The spawning season lasts from spring through autumn, though local conditions might allow for reproduction at any time of the year (USFWS 2010b). When particularly wet cycles in the regional weather patterns occur, the desert pupfish might take advantage of this and rapidly expand into newly flooded habitats, then shrink to a small population when those areas dry. Desert pupfish can withstand a range of environmental extremes, including high temperatures, high salinities, and low dissolved oxygen in comparison to other freshwater fish. They inhabit cienegas, springs, small streams, and along the edges of larger bodies of water. Waters tend to be clear and shallow with soft substrates (USFWS 1993d).

Natural populations of desert pupfish have been extirpated from Arizona, however at least 16 captive and wild reestablished populations now exist (USFWS 2010b). Critical habitat was designated for desert pupfish in California and at Quitobaquito Springs, Arizona (51 FR 10842–10851). The pupfish at Quitobaquito Springs are now considered a separate species (see below). NatureServe data indicate that there is one elemental occurrence of desert pupfish in the region of analysis, located on the Pyeatt Ranch USGS topographic quadrangle map (NatureServe 2010b).

Desert pupfish is declining due to dewatering of habitats such as springs, some headwaters, and lower reaches of streams and marshes; alteration of its habitat, including stream diversion, channelization, impoundment, and discharge regulation; other watershed impacts including domestic livestock grazing, timber harvest, mining, road construction, water pollution; and competition or predation with nonnative species. Numerous historic habitats have dried up as a result of groundwater pumping, channel erosion, and water impoundment (USFWS 1993e).

Gila chub. This is a chunky, small-finned minnow (Cyprinidae) with a dark olive green to silvery coloration, fading to lighter on the belly. Males tend to be smaller with adults reaching 6 inches, while females can reach 8 inches. The Gila chub is found in small streams, pools,

cienegas, and artificial impoundments, typically between 2,000 to 5,500 feet. They use a variety of stream habitats based on age class. Adult fish can be found in deep plunge-pools and eddies below swift moving sections of river. Juvenile fish beyond their first year use the high velocity areas of the stream, and fish in their first year are found in shallow waters among the shelter of plants and debris (USFWS 2008a).

The historical distribution of the Gila chub likely extended to all suitable habitats within the Gila River Basin with the possible exception of the Salt River drainage above Roosevelt Lake. The Gila chub is found in only 29 small isolated locations, which are threatened In Arizona, the chub is found in habitats in Cochise, Coconino, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz, and Yavapi counties (USFWS 2008a). Critical habitat has been designated for Gila chub (70 FR 66663–66721) and it occurs within the region of analysis. Within the region of analysis, NatureServe provides records for approximately one elemental occurrence of the Gila chub within USGS topographic quadrangle map O'Donnell Canyon (NatureServe 2010b).

The majority of Gila chub habitat has been destroyed or degraded to a point that it is not recoverable. What remains of native habitat is under heavy grazing pressure and is threatened by active mining operations. Increased recreational use has contributed to degradation of habitat, as has the introduction of nonnative species (USFWS 2008a).

Gila topminnow. This small, guppy-like, live-bearing fish is 1 to 2 inches long (USFWS 2008b). Males and females are both characterized by a tan- to olive-colored body and usually display a white belly (USFWS 1998). The Gila topminnow occurs in small streams, springs, and cienegas at elevations below 4,500 feet (USFWS 2008b). This species prefers shallow, warm, quiet waters with aquatic vegetation and debris for cover (USFWS 1998). The Gila topminnow occurs in deeper waters but tends to congregate near the surface (BLM 2005). It also is known to tolerate relatively high water temperatures and low dissolved oxygen levels (USFWS 2008b).

The Gila topminnow was historically common throughout the Gila River drainage at elevations below 5,000 feet, including the San Pedro River. Two collections exist from the San Pedro River from 1943 and 1978 (USFWS 1998). Currently, most of the populations in Arizona occur in the Santa Cruz River system within small streams, springs, and cienegas in Gila, Pinal, Graham, Yavapai, Santa Cruz, Pima, Maricopa, and La Paz counties (USFWS 2008b). Within the region of analysis, NatureServe provides records for approximately five elemental occurrences of the southwestern willow flycatcher within USGS topographic quadrangle maps: Mount Hughes, O'Donnell Canyon, Presumido Peak, and Ruby (NatureServe 2010b).

The primary threats on Gila topminnow are habitat destruction competition and predation from invasive nonnative species (USFWS 1998, USFWS 2008b). Land use practices such as livestock grazing, mining, timber cutting, road maintenance, and recreation can result in increased erosion, intensified flood events, and decreased groundwater storage, potentially affecting existing populations and suitable habitats for future reintroductions. Urban and suburban population growth and development and associated increased groundwater pumping, alteration of streams and rivers, and increased water pollution also threaten the recovery efforts of the species (USFWS 1998).

Quitobaquito pupfish. Originally described as a subspecies of the desert pupfish, recent taxonomic studies indicate that the Quitobaquito pupfish is a distinct species. The Quitobaquito pupfish differs from the desert pupfish by having a slightly deeper and broader body and head. Quitobaquito pupfish are similar in their habitat requirements to desert pupfish; however, they are restricted in distribution to a single spring-fed pond (USFWS 2010c).

The Quitobaquito pupfish is endemic to the Quitobaquito Spring just north of the U.S./Mexico international border (USFWS 2010c). This is the only location this species is known to occur. The spring and immediately surrounding area has been designated as critical habitat for the Quitobaquito (desert) pupfish. NatureServe data indicate that there was one elemental occurrence of the Quitobaquito pupfish in the region of analysis on the Quitobaquito Springs USGS topographic quadrangle map (NatureServe 2010b)

The Quitobaquito pupfish was threatened by the introduction of nonnative golden shiner in 1968 or 1969, however this species was eradicated and the Quitobaquito pupfish population was reestablished (USFWS 2010c).

Sonora chub. This is a moderately chubby, dark-colored fish less than 5 inches long; it has two prominent black lateral bands on the sides and a dark oval spot at the base of the tail. Breeding males have red lower fins and a somewhat orange belly. The Sonora chub can be described as a tenacious, desert-adapted species, adept at exploiting small marginal habitats that can survive under severe environmental conditions. It is thought to be an opportunistic feeder that takes advantage of seasonally available food resources. The Sonora chub is endemic to streams of the Rio de la Concepcion drainage of Arizona and Sonora, Mexico. This species typically inhabits intermittent streams that occur near cliffs, boulders, or other cover in the channel and thrive in the largest, deepest, and most permanent pools, with bedrock-sand substrates and areas free of thick pads of floating algae (USFWS 1992).

In Arizona, it occurs in Sycamore Creek (Bear Canyon), a tributary of the Rio Altar, 15.5 miles west of Nogales in the region of analysis. Additionally, it occurs in two tributaries of Sycamore Canyon (Penasco Creek and an unnamed stream). Although the Sonora chub is stated as having a very limited range in the United States it is locally abundant in Sycamore Creek (USFWS 1992). Critical habitat has been designated for Sonora chub (51 FR 16042–16047) that occurs within the region of analysis. Within the region of analysis, NatureServe provides records for approximately four elemental occurrences of the Sonoran chub within USGS topographic quadrangle map Ruby (NatureServe 2010b).

The major threat to the Sonora chub is the modification of suitable habitat by human activities including grazing, mining, recreation, and the introduction of exotic species (USFWS 1992).

Yaqui catfish. This is a medium to large freshwater fish of the family Ictaluridae. The species is similar in appearance to the channel catfish (*I. punctatus*). The body is usually profusely speckled in young catfish and a single color in adults. The Yaqui catfish inhabits moderate to large streams in areas of medium to slow current over sand/rock bottom between 4,000 to 5,000 feet in elevation (USFWS 2010c).

The Yaqui catfish is found only in the Rio Yaqui Drainage of southeastern Arizona and Sonora, Mexico. It was extirpated from the United States but was reintroduced to San Bernardino NWR and West Turkey Creek in Cochise County, Arizona, in 1997 (USFWS 2010c). Critical habitat has been designated for Yaqui catfish (49 FR 34490–34497), which occurs within the region of analysis. Within the region of analysis, NatureServe provides records for one elemental occurrence of the Yaqui catfish within USGS topographic quadrangle map San Bernardino Ranch (NatureServe 2010b).

Threats to the Yaqui catfish include habitat destruction and hybridization with channel catfish (USFWS 2010c).

Yaqui chub. The Yaqui chub is a medium-sized minnow, rarely exceeding 6 inches in length. It typically has a darkly colored back and is lighter below. Its most pronounced feature is a dark triangular spot at the base of its tail fin (USFWS 2010e). Some breeding males have a distinctive bluish sheen over their body and breeding females are typically straw-yellow to light brown in color (USFWS 1995a). The Yaqui chub inhabits deeper pools of small streams near undercut banks and debris, in pools associated with springheads, and in artificial ponds between 4,000 to 6,000 feet in elevation (USFWS 2010e).

The Yaqui chub is found only in the Rio Yaqui Drainage of southeastern Arizona and Sonora, Mexico. It was extirpated from its historical habitat but was reintroduced, and populations currently exist, in House Pond of the Slaughter Ranch Historic Site, West Turkey Creek in the Chiricahua Mountains, Leslie Creek in the Swisshelm Mountains, Black Draw (*syn.* San Bernardino Creek), and various ponds of the San Bernardino and Leslie Canyon National Wildlife Refuges (USFWS 1995a, USFWS 2010e). Critical habitat for Yaqui chub occurs in the region of analysis.

Threats to the Yaqui chub include habitat destruction and modification and interaction with introduced fish species (USFWS 2010e).

Yaqui topminnow. This is a small, 2-inch-long guppy-like, live-bearing fish. Breeding males are jet black with yellow fins. Females are tan to olivaceous and often have white on the belly (USFWS 1995b). It feeds on detritus and algae, and aquatic invertebrates such as amphipods and insect larvae. April through October are the main breeding months, but breeding can occur year-round where winter temperatures are ameliorated by spring flows. Habitat for the Yaqui topminnow consists of lowland and some upland streams of desert and grasslands, and margins of large, lowland rivers below 4,500 feet elevation. This species typically inhabits vegetated springs, brooks, and margins and backwaters of larger bodies of water (USFWS 1998). It prefers shallow, warm, fairly quiet waters with large mats of algae and debris but also can be found in moderate currents and depths up to 3 feet and can tolerate relatively high water temperatures and low dissolved oxygen (USFWS 2010d). The Yaqui topminnow occurs in shallows of artesian well outflows, ponds, and pool margins in the San Bernardino NWR (USFWS 1995b).

This species occurs in the United States in several natural or introduced populations in the San Bernardino NWR. An introduced population is also found in Leslie Canyon in the Swisshelm Mountains, Arizona. Natural populations persist in Mexico in the Yaqui, Mayo, and Matape rivers. NatureServe data indicate that there are 11 elemental occurrences of the Yaqui

topminnow in the region of analysis. These all occurred in the San Bernardino Valley watershed, east of Douglas, Arizona. These are on USGS topographic quadrangle maps: San Bernardino Ranch, Simmons Peak, and West Guadalupe Canyon (NatureServe 2010b).

The Yaqui topminnow was listed as endangered due to habitat loss. Competition with introduced mosquito fish (*Gambusia affinis*) in remaining habitats is also a major threat to the continued survival of the species (NatureServe 2010b).

Chiricahua leopard frog. The Chiricahua leopard frog has a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background and often green coloration on the head and back (USFWS 2007b). The Chiricahua leopard frog is known to occur in cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,300 to 8,900 feet (USFWS 2008c). The species requires permanent or semi-permanent pools for breeding. The breeding season varies depending upon elevation. At higher elevations above 5,900 feet, the breeding season occurs between May and October, while at lower, warmer elevations below 5,900 feet the breeding season occurs from March through June (USFWS 2007b, Degenhardt et al. 1996). Overall frog abundance reaches its peak in August and September, with the transformation of tadpoles to sub-adults, and is lowest from December through March (Degenhardt et al. 1996).

The Chiricahua leopard frog occurs in central and southeastern Arizona, west-central, and southwestern New Mexico, and northeastern Sonora and western Chihuahua, Mexico. The range of the species is split into two geographically isolated populations. The northern populations are located along the Mogollon Rim in Arizona east into the mountains of west-central New Mexico. The southern populations are in southeastern Arizona, southwestern New Mexico, and Mexico. Genetic analysis has indicated that the northern populations might be an undescribed, distinct species (USFWS 2007b). Within the region of analysis, NatureServe provides records for approximately 111 elemental occurrences of the Chiricahua leopard frog within USGS topographic quadrangle maps Bartlett Mountain, Bob Thompson Peak, Campini Mesa, Canelo Pass, Cumero Mountain, Duquesne, Guadalupe Springs, Harshaw, Huachuca Peak, Lochiel, Miller Peak, Mount Hughes, Mount Wrightson, Murphy Peak, Nicksville, O'Donnell Canyon, Parajito Peak, Peña Blanca Lake, Ruby, San Bernardino Ranch, Tubac, and Wilbur Canyon (NatureServe 2010b).

Threats to the Chiricahua leopard frog include predation and possibly competition by nonnative species, especially bullfrogs, fish, and crayfish. Additional threats include the fungal disease chytridiomycosis, drought, degradation, and loss of habitat as a result of water diversions and groundwater pumping, livestock management, catastrophic wildfire, mining, and development (USFWS 2007b).

Sonoran tiger salamander. Adult Sonoran tiger salamanders have a color pattern with an irregular network of light coloration, often coupled with light spots, on a dark background color to a pattern of large, well-defined light or yellow spots or bars. Larvae are gray on the back of the head and tail with a light-colored belly. Cattle ponds or tanks are the primary habitat for Sonoran tiger salamanders. The most important habitat requirement for Sonoran tiger salamanders is the availability of standing water for breeding from January through June. Mammal burrows provide refuge for terrestrial salamanders in the terrestrial environment, enabling them to avoid extreme environmental conditions (USFWS 2002a).

Most known Sonoran tiger salamander populations exist in the San Rafael Valley, where they have been found in more than 50 ponds (USFWS 2002a). This species has been collected in the plains grassland and adjacent Madrean evergreen woodlands of Arizona (NatureServe 2010b). The range of the subspecies and its occupied and potentially occupied habitat is thought to extend from the crest of the Huachuca Mountains west to the crest of the Patagonia Mountains, including the San Rafael Valley and adjacent foothills from its origins in Sonora north to the Canelo Hills. Tiger salamanders have also been found in areas just outside the San Rafael Valley, such as Fort Huachuca, Harshaw Canyon, Copper Canyon, and Coronado Memorial. Within the region of analysis, NatureServe provides records for approximately 51 elemental occurrences of Sonoran tiger salamanders within USGS topographic quadrangle maps: Campini Mesa, Canelo Pass, Duquesne, Harshaw, Lochiel, Montezuma Pass, and O'Donnell Canyon (USFWS 2002a).

The Sonoran tiger salamander faces a number of threats, including disease and predation by non-native fish, crayfish, and bullfrogs. Habitat destruction and the increased probability of small populations being extirpated due to local random events (such as drought or disease) are also significant threats to the continued existence of the Sonoran tiger salamander (USFWS 2001c).

3.6.3 Environmental Consequences

The significance of effects on threatened and endangered species is based on the following:

- Permanent loss of occupied, critical, or other suitable habitat
- Temporary loss of critical habitat that adversely affects recolonization by threatened or endangered benthic resources
- Take (as defined under ESA) of a threatened or endangered species.

3.6.3.1 Alternative 1: Proposed Action

In general, short- and long-term, direct and indirect, effects on terrestrial and aquatic threatened and endangered species would be negligible. Impacts on threatened and endangered species would be avoided and minimized through the use of appropriate BMPs (see **Appendix E**). These determinations were based in part on the following factors.

- The Proposed Action involves the maintenance and repair of existing tactical infrastructure. Those activities would be conducted within and immediately adjacent to the footprint of that infrastructure.
- CBP would use a centralized maintenance and repair planning process to ensure that program activities are appropriately planned and implemented.
- CBP would implement BMPs to avoid harming or harassing protected species and to minimize other direct and indirect adverse effects.
- When appropriate, surveys would be conducted prior to implementing maintenance and repair activities such as vegetation control and clearing within critical habitat or other suitable habitat.

- The program would result in no or very minor habitat degradation and other direct and indirect impacts on threatened and endangered species would be negligible; therefore, any contribution to the cumulative adverse effects of future non-Federal activities in the region would be negligible.
- CBP would seek approval or additional consultation from the USFWS for activities that have the potential to harm or harass protected species or adversely modify their critical habitat.

Terrestrial Threatened and Endangered Species

Terrestrial Threatened and Endangered Plant Species. Short-term, indirect effects on Cochise pincushion cactus, Kearny's slimpod, and Pima pineapple cactus would be negligible. Maintenance and repair activities would be conducted within and immediately adjacent to existing disturbances, and BMPs would be used to avoid all direct effects and avoid or minimize indirect effects under this alternative (see **Appendix E**). For example, vegetation control and clearing would not occur in areas of known threatened and endangered perennial plant species, critical habitat, and suitable habitat (see **Table 3-3**), unless a survey is conducted. A qualified biologist would conduct a survey during the appropriate blooming season (see **Table 3-3**) within the maintenance area. An area of sufficient size would be flagged to create a buffer large enough to ensure that threatened or endangered plant species are not directly or indirectly affected. In addition, use of herbicides would not be allowed in areas where these species occur unless approved by the USFWS and BMPs would be implemented to minimize sedimentation and other indirect effects on these species.

Table 3-3. Threatened and Endangered Plant Species Blooming Season

Common Name	Habitat	Blooming Season
Canelo Hills ladies' tresses	Fine-grained, highly organic, saturated soils of cienegas (i.e., spring-fed marshes) and among sedges and tall grasses up to an elevation of 5,000 feet.	July–August
Cochise pincushion cactus	High-calcium Permian limestone at elevations from 4,200 to 4,700 feet where Chihuahuan desert scrub transitions to semidesert grassland.	March–April
Huachuca water umbel	Perennial springs, rivers, and stream headwaters that are permanently or seasonally saturated within Sonoran desertscrub, grassland, or oak woodlands between 4,000 to 6,500 feet.	July–August
Kearney's slimpod	Southwest-draining, dry, rocky washes of the Baboquivari Mountains at about 4,000 to 6,000 feet.	April–May
Pima pineapple cactus	Transition zone between the semidesert grasslands and Sonora desert scrub on alluvial bajadas (lower slopes of mountains characterized by loose alluvial sediments and poor soil development) and slopes of less than 10 percent grade at elevations between 2,300 to 4,600 feet.	July–August

New Mexico Ridge-Nosed Rattlesnake. Short-term, direct, effects on the New Mexico ridge-nosed rattlesnake would be negligible. This species is limited to a very small area within the region of analysis, and maintenance and repair within that area would be limited to within and immediately adjacent to existing tactical infrastructure. BMPs designed to avoid harming New Mexico ridge-nosed rattlesnakes during road maintenance and other activities associated with the Proposed Action would be implemented. For example, maintenance and repair activities within the activity period, maintenance and repair vehicles would not exceed a speed of 15 to 20 mph during periods of elevated roaming and foraging activities from July through August within New Mexico ridge-nosed rattlesnake habitat. New Mexico ridge-nosed rattlesnake habitat is defined as occupied habitat, critical habitat, and potential habitat (i.e., pine-oak woodlands at elevations of 5,500 to 9,000 feet and the Peloncillo Mountains).

Masked Bobwhite. Short-term and long-term, direct, effects on the masked bobwhite would be negligible. Maintenance and repair activities would occur within or adjacent to existing footprints of tactical infrastructure and BMPs would be implemented to minimize or avoid impacts on masked bobwhite. For example, all vegetation control and clearing of savanna grassland habitat in the Buenos Aires NWR would be avoided. If vegetation control and clearing of other vegetation types would be required adjacent to masked bobwhite habitats in Buenos Aires NWR, qualified personnel with experience identifying masked bobwhite habitat would conduct a survey and delineate and clearly mark the habitat to be avoided. Vegetation control and clearing would be conducted from December 31 through June 30, outside the breeding and hatching season.

Vegetation control and clearing within other areas of Buenos Aires NWR would also be conducted from December 31 through June 30, outside the breeding and hatching season. If other maintenance activities including low-impact maintenance and repair activities are to be conducted within the Buenos Aires NWR during the breeding season (July 1 through November 30), a qualified biologist would conduct a survey for masked bobwhite prior to initiating those activities. If masked bobwhites are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance and repair area for the duration of the activity. If an active nest is located, a 300-foot buffer would be established around the nest until the young have fledged.

Mexican Spotted Owl. Short- and long-term, direct, effects on the Mexican spotted owl would be negligible. Activities would occur within or adjacent to existing footprints of tactical infrastructure and BMPs would be implemented to minimize or avoid impacts on the Mexican spotted owl and its habitat. Mexican spotted owl habitat is defined as occupied or suitable habitat (i.e., closed-canopy forests [riparian, mixed conifer, pine-oak, and pinyon juniper woodland] and steep, narrow entrenched rocky canyons and cliffs) and designated critical habitat. All vegetation clearing and control in closed canopy forests and shady canyons within designated Mexican spotted owl critical habitat and suitable habitat would be avoided. If vegetation control and clearing adjacent to Mexican spotted owl habitat is required, qualified personnel with experience identifying Mexican spotted owl habitat would conduct a survey and delineate and clearly mark the habitat to be avoided.

All vegetation control and clearing adjacent to Mexican spotted owl habitat would be conducted from July through February, outside of the breeding and hatching season. If other maintenance

activities, including low-impact maintenance activities, are to be conducted within suitable Mexican spotted owl habitat during the breeding season (March through June), a qualified biologist would conduct a survey for Mexican spotted owl prior to initiating maintenance activities. If Mexican spotted owls are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is located, a 300-foot no-maintenance activity buffer would be established around the nest until the young have fledged.

Southwestern Willow Flycatcher. Short-term, direct and indirect, effects on the southwestern willow flycatcher would be negligible. Activities would occur within or adjacent to existing footprints of tactical infrastructure and BMPs would be implemented to minimize or avoid impacts on southwestern willow flycatcher and its habitat. For example, all vegetation clearing or control in occupied riparian habitats would be avoided. If vegetation removal of other vegetation types is required near or adjacent to occupied southwestern willow flycatcher habitat, critical habitat, and potential habitat (i.e., dense riparian habitats along streams, rivers, lakesides, and other wetlands), qualified personnel with experience identifying southwestern willow flycatcher habitat would conduct a survey and delineate and clearly mark the habitat to be avoided. In addition, vegetation clearing or control would be conducted from September 16 through March 14, outside the southwestern willow flycatcher-breeding season.

If other maintenance activities within occupied southwestern willow flycatcher habitat, critical habitat, and potential habitat are to be conducted during the southwestern willow flycatcher breeding season (March 15 through September 15), a qualified biologist would conduct a survey for southwestern willow prior to initiating maintenance activities. If southwestern willow flycatchers are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is found, a 300-foot, no-maintenance activity buffer would be established around the nest until the young have fledged.

Yuma Clapper Rail. Short- and long-term, direct and indirect effects on Yuma clapper rail would be negligible. Maintenance and repair activities would occur within or adjacent to existing tactical infrastructure and BMPs designed to minimize or avoid impacts on Yuma clapper rail would be implemented. Yuma clapper rail habitat is defined as occupied habitat and potential habitat (i.e., freshwater marshes dominated by cattail [*Typha* spp.] and bulrush [*Scirpus* ssp.] with a mix of riparian trees and shrubs). Vegetation control will not occur within that habitat. If vegetation control and clearing is required near or adjacent to Yuma clapper rail habitat, qualified personnel with experience identifying that habitat would conduct a survey and delineate and clearly mark the habitat to be avoided. All vegetation control and clearing near Yuma clapper rail habitat would be conducted from mid-July through mid-March, outside the Yuma clapper rail breeding season. If other maintenance activities are to be conducted within occupied habitat and potential habitat during the breeding season (mid-March through mid-July), a qualified biologist would conduct a survey for Yuma clapper rail prior to initiating maintenance activities. If Yuma clapper rail are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is located, a 300-foot, no-maintenance activity buffer would be established around the nest until the young have fledged.

Jaguar/Ocelot. Short- and long-term, direct and indirect effects on jaguars and ocelots due to road maintenance and repair would be negligible. Maintenance and repair activities would occur within or adjacent to existing tactical infrastructure, and would therefore result in very little or no degradation or modification of undisturbed areas where jaguars and ocelots might occur and no additional fragmentation of habitat. The presence of maintenance crews and equipment, and their associated noise, could cause jaguars or ocelots to move away from an area or otherwise modify their behavior, in the unlikely event they are present. Because most repair and maintenance activities would be completed within an area in less than 1 day, and almost all would be completed within a few days, any displacement or other associated adverse effects would be temporary. Additionally, because jaguars and ocelots are so rare in southern Arizona, the potential for an individual jaguar or ocelot to encounter maintenance activities is extremely unlikely.

Lesser Long-nosed Bat. Short- and long-term, direct effects on lesser long-nosed bat from removal of forage plants (columnar cactus [i.e., saguaro and organ pipe] and agave) or potential disturbances caused by maintenance and repair activities in close proximity to occupied roosts would be negligible. Maintenance and repair activities would occur within or adjacent to existing tactical infrastructure, and BMPs designed to minimize or avoid impacts on lesser long-nosed bat would be implemented. For example, prior to conducting any vegetation clearing and control in areas containing columnar cactus or agaves, a qualified biologist would conduct a survey within the maintenance area. Individual forage plants would be flagged and vegetation-clearing activities would not disturb demarcated individuals. In addition, no maintenance and repair activities would be conducted at night within 5 miles of any known roost sites (i.e., Las Lesnas and Sierra de la Narriz Mountains) for the lesser long-nosed bat from mid-April through June. If night lighting is unavoidable, lights would shine directly onto the work area to ensure worker safety and efficiency, and light would not exceed 1.5 foot-candles in lesser long-nosed bat habitat.

Sonoran Pronghorn. Short-term, direct effects on the Sonoran pronghorn would be negligible. Maintenance and repair activities would occur within or immediately adjacent to existing tactical infrastructure; thus, these activities would cause no or very minor degradation of habitat or disturbances within Sonoran pronghorn habitat, and would not fragment pronghorn habitat or result in any additional, permanent barriers to movements. The presence of maintenance crews and equipment, and their associated noise, could cause pronghorn to move away from an area or otherwise modify their behavior. Because most repair and maintenance activities would be completed within an area in less than 1 day, and almost all would be completed within a few days, any displacement or other associated adverse effects would be temporary. BMPs also would be implemented to further reduce these and other potential adverse effects on this species. For example, the number of vehicle trips related to maintenance per day to and from the maintenance site would be minimized to reduce the likelihood of disturbing pronghorn in the area or injuring an animal on roads. The use of vehicle convoys, multi-passenger vehicles, and other methods would be used to reduce the number of vehicles. During maintenance and repair activities, if a pronghorn is observed within 1 mile of the activity, any work that could disturb the pronghorn would cease. For vehicle operations, this would entail stopping the vehicle until the pronghorn moves away. Vehicles can continue at reduced speeds (10 to 15 mph) once the pronghorn has moved away or retreat from the area in the direction from which they came. All maintenance and repair activities that occur during the fawning season (March 1 to July 15)

within occupied or suitable Sonoran pronghorn habitat (i.e., Sonoran desert scrub communities) would be coordinated with USFWS and the other relevant Federal land managers (if applicable) and approval would be obtained prior to commencing the activities.

Aquatic Threatened and Endangered Species

Aquatic Threatened and Endangered Plant Species. Short-term, indirect effects on the Canelo Hills ladies' tresses and Huachuca water umbel would be negligible. Maintenance and repair activities would be conducted within and immediately adjacent to existing disturbances and BMPs would be used to avoid all direct effects and avoid or minimize indirect effects under this alternative. For example, vegetation control and clearing would not be conducted in areas of known threatened and endangered Canelo Hills ladies' tresses and Huachuca water umbel individuals and Huachuca water umbel critical habitat, and suitable habitat (see **Table 3-3**) unless a survey is conducted. If maintenance and repair activities in areas of known occurrences of these species and critical habitat are unavoidable then a qualified biologist would conduct a survey during the appropriate blooming season (see **Table 3-3**) within the maintenance area. An area of sufficient size would be flagged to create a buffer large enough to ensure that threatened or endangered plant species are not directly or indirectly affected. If maintenance activities must be conducted within 0.5 miles of known or potential Huachuca water umbel habitat or critical habitat, vegetation control and clearing would be limited to those that are needed to meet project objectives and erosion-control measures put in place to reduce sediment runoff and avoid indirect effects on these species. Additionally, for all in-water work in streams, sediment barriers will be used to avoid downstream effects of turbidity and sedimentation and use of herbicides would not be allowed in areas where this species occurs unless approved by the USFWS.

Beautiful Shiner, Desert Pupfish, Gila chub, Gila Topminnow, Quitobaquito Pupfish, Sonoran Chub, Yaqui Catfish, Yaqui chub, and Yaqui Topminnow. Short-term, indirect effects on threatened or endangered species of fish would be negligible from activities associated with the vegetation clearing, near- and in-water maintenance activities, and activities designed to maintain drainage structures and low water crossings (cleaning blocked drainages, resizing and replacement of culverts, repairing or adding riprap, removing debris and trash, and repairing grates. Maintenance and repair activities would be conducted within and immediately adjacent to existing disturbances and BMPs would be implemented to minimize or avoid indirect effects. For example, CBP would coordinate all maintenance and repair activities within the vicinity of habitat for these species with the appropriate land management agency. All vegetation-clearing activities would avoid riparian vegetation within 100 feet of suitable aquatic habitat within their known range to provide a buffer area to protect the habitat from sedimentation. Use of herbicides would not occur within areas of known occurrences, suitable aquatic habitat within their known range, or critical habitat unless approved by the USFWS. If removal of partially or wholly submerged debris from culverts or drainages and other in-water maintenance or repair of culverts or dams within suitable aquatic habitat within their known range is required, a qualified biologist would conduct a survey of the drainage structure to determine whether the species are present. If they are present, CBP would enter into further consultation with the USFWS.

Chiricahua Leopard Frog. Short-term, direct and indirect effects on Chiricahua leopard frogs would be negligible. Activities would occur or within or adjacent to existing footprints of

tactical infrastructure, and BMPs would be implemented to minimize or avoid impacts. For example, all vegetation-clearing activities would avoid riparian vegetation within 100 feet of aquatic habitats where Chiricahua leopard frogs occur to provide a buffer area to protect the habitat from sedimentation. Disease prevention protocols would be employed when working in areas known or likely to harbor chytridiomycosis; CBP would consult with the USFWS to identify those areas. In such cases, if vehicles and equipment would be used in more than one area where frogs occur, workers would ensure that all equipment is clean and dry or disinfected before moving that equipment to other areas. Routine road maintenance practices would be implemented to minimize or avoid prolonged establishment of tire ruts within and adjacent to known Chiricahua leopard frog occurrences and potential frog habitats. If maintenance activities must be conducted within 0.5 miles of known or potential habitat, vegetation clearing would be limited to those that are needed to meet project objectives and erosion-control measures put in place to reduce sediment runoff potential. The use of herbicides would not occur within areas of known Chiricahua leopard frog occurrences or habitat, unless approved by the USFWS. Additionally, any use or storage of chemicals or fuels at maintenance and repair sites or staging areas would be kept 0.3 miles away from frog habitat.

Sonoran tiger salamander. Short-term, direct and indirect effects on Sonoran tiger salamanders would be negligible. Activities would occur within or adjacent to existing footprints of tactical infrastructure, and BMPs would be implemented to minimize or avoid impacts. For example, if maintenance and repair activities are required within 0.3 miles of documented breeding habitat (such as cattle ponds) and suitable habitat (e.g., cattle ponds and tanks with standing water) during the breeding season (January through June), a qualified biologist would survey the anticipated disturbance area immediately prior to and during the maintenance and repair activity. Any use or storage of chemicals or fuels at project sites or staging areas would be kept 0.3 miles away from salamander habitat (areas of known Sonoran tiger salamander occurrence, breeding habitat, or suitable habitat). Use of herbicides would not occur within 0.3 miles of Sonoran tiger salamander habitat unless approved by the USFWS. Maintenance vehicle/equipment would be operated at speeds of 25 mph or less within 0.3 miles of occupied Sonoran tiger salamander habitat during the breeding season. All maintenance activities and repair within 0.3 miles of Sonoran tiger salamander habitat would be conducted during daylight hours. If a Sonoran tiger salamander individual is observed, maintenance and repair activities would cease in the immediate area, including vehicular traffic, until the salamander leaves the active project area on its own. All vegetation-clearing activities would avoid riparian vegetation within 100 feet of known Sonoran tiger salamander occurrences in order to provide a buffer area to protect the habitat from sedimentation.

3.6.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, CBP would continue current maintenance activities and short- and long-term, minor to moderate, direct and indirect, adverse effects on threatened and endangered species would occur. Tactical infrastructure would be maintained and repaired on an as-needed basis. There would be no centralized planning process for maintenance and repair, and as a consequence, maintenance and repair of tactical infrastructure usually would be performed only on resources that are in disrepair. The lack of coordinated environmental staff support and formalized planning under this alternative would result in inefficiencies complying with NEPA, the ESA, and other environmental requirements. Implementation of this alternative

would result in impacts on threatened and endangered species, including conversion and degradation of habitat from vegetation removal, displacement of wildlife, including threatened and endangered wildlife, accidental release of petroleum products or other hazardous materials; incidental trampling and crushing while accessing the sites; and increased erosion, turbidity, and sedimentation. Under this alternative, vegetation-clearing activities for new observation zones would be conducted under a separate NEPA process.

By completing maintenance and repair work on an as-needed basis, the potential exists for increased impacts on threatened and endangered species. Without a centralized planning process, maintenance and repair specifications would not be established and standardized BMPs might not be implemented. For example, without a standardized BMP requiring that the footprint of the maintenance area be flagged or marked, habitat for threatened and endangered species immediately adjacent to the maintenance footprint could be impacted if maintenance activities go beyond the footprint. In addition, without a centralized planning process, there would be no way to determine if threatened and endangered species or their habitat occurred within the maintenance area, and there would be no mechanism to determine if species-specific BMPs would be required for maintenance and repair activities. Thus, some threatened and endangered species and habitat adjacent to tactical infrastructure could be degraded or destroyed. Therefore, it is possible that greater impacts would occur under the No Action Alternative than the Proposed Action, because the potential for habitat disturbances would be greater due to a lack of a proactive approach to maintenance and repair.

3.7 HYDROLOGY AND GROUNDWATER

3.7.1 Definition of the Resource

Evaluation of hydrology requires a study of the occurrence, distribution, and movement of water, and its relationship with the environment. Many factors affect the hydrology of a region, including natural precipitation and evaporation rates and outside influences such as groundwater withdrawals. Groundwater is a subsurface hydrologic resource. It functions to recharge surface water and is used for drinking, irrigation, and industrial processes. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, recharge rate, and surrounding geologic formations.

3.7.2 Affected Environment

Climate and hydrology. The region of analysis spans the length of the U.S./Mexico international border within Arizona, and encompasses two ecoregions. The first is the Sonoran Basin and Range Ecoregion, which is typified by hot, arid conditions, and two rainy seasons per year, with an average annual precipitation of 0 to 10 inches with 0 to 0.2 inches of runoff. Average annual evaporation is as much as 140 inches in this area (USEPA 2007, USGS 1995a). The other ecoregion is the Madrean Archipelago Ecoregion, also known as the Sky Islands (USEPA 2007, USGS 2010a), in southeastern Arizona. This area has dramatic gradients in topography, temperature, and precipitation, ranging from hot, semiarid plains at lower elevations, to a cool, wet, climate at higher elevations. The Madrean Archipelago Ecoregion also has a biannual precipitation regime, characterized by winter rainfall and summer thunderstorms (USGS 2010a). It is influenced by monsoons from the south, with 10 to 20 inches of rainfall a year, and average

annual evaporation rates of approximately 80 to 110 inches with 0.2 to 5 inches of runoff (USGS 1995a, Griffith et al. 2006).

Groundwater. All aquifers in the region of analysis are classified as basin and range aquifers (USGS 1995a, USGS 1995b). Aquifer recharge primarily occurs from precipitation in the surrounding mountains, but also can occur through percolation from irrigation, reservoirs, and canals. Discharge from the aquifers typically occurs from evaporation to streams or springs and well withdrawals.

Groundwater withdrawal from wells is the largest method of discharge from basin and range aquifers. Approximately half of the water withdrawn is lost to the atmosphere by evapotranspiration; the other half percolates through the soil and eventually recharges the aquifer. In some of the more urban and developed basins in Arizona, the rate of withdrawal is about 200 times the rate of recharge, and in some areas of large water level declines, land subsidence, and earth fissures have resulted. Land subsidence from compaction of the unconsolidated sediments in the aquifers ranges from 1 foot in most of the state to up to 15 feet in the more developed areas (USGS 1995a).

The largest groundwater basins associated with this portion of the region of analysis are the Lower Gila Basin, the Tucson Active Management Area (AMA), and the Safford Basin. The Lower Gila Basin is in southwestern Arizona, and covers approximately 7,309 mi^2. It contains five large reservoirs, the largest being the Imperial Reservoir, and two rivers, the Gila and the Colorado. The largest source of natural recharge is runoff and the Gila River floodplain. Water quality in this basin is generally poor; 250 of the wells have exceeded drinking water standards, primarily from excess fluoride. Other commonly exceeded parameters are arsenic, cadmium, lead, nitrates, selenium, and total dissolved solids. Water use is generally for irrigation, with some industrial and municipal use as well. There are eight wastewater treatment facilities in the basin (ADWR 2010a).

The Tucson AMA is 3,869 mi^2, with two large reservoirs, and numerous streams and springs. Primary recharge of the aquifer is from groundwater inflow, infiltration of runoff into stream channels, and recharge from precipitation in the mountains. Drinking water standards exceeded parameters for arsenic, lead, nitrates, fluoride, beryllium, cadmium, organics, mercury, copper, chromium, zinc, total dissolved solids, radionucleotides, and selenium at 356 sites from wells, springs, and mines. Municipal water is the greatest use of groundwater in the Tucson AMA, followed by industrial and agricultural demand. There are 25 wastewater treatment facilities in the area (ADWR 2010b).

The Safford Basin is approximately 4,747 mi^2, with 12 large reservoirs, and numerous springs and streams, including the Gila, Blue, and San Carlos rivers. Water quality testing at 114 well, mine, and spring sites yielded results that exceeded drinking water standards for parameters such as fluoride, arsenic, total dissolved solids, nitrates, and lead. The groundwater demand for Safford Basin is almost exclusively agricultural. There are 13 wastewater treatment facilities in this basin, at least one of which recharges the aquifer through an unlined impoundment (ADWR 2010c).

3.7.3 Environmental Consequences

A proposed action could cause a significant, adverse impact on hydrology or groundwater if it were to substantially affect water quality; substantially reduce water availability or supply to existing users; threaten or damage hydrologic characteristics; or violate established Federal, state, or local laws and regulations.

3.7.3.1 Alternative 1: Proposed Action

Short-term, negligible to minor, indirect, adverse impacts could occur on groundwater and hydrology from vegetation and debris removal, which could cause the deposition of fill materials or increased erosion into groundwater recharge areas. During maintenance and repair USBP sector personnel and contract-support personnel well-versed in grading techniques would be employed. The addition of fill material to boat ramps would be kept to a minimum. The use of soil stabilization agents could be required on some boat ramps. It is proposed that any applications would be made with soil stabilization products approved by the USEPA and relevant Federal land management agency (where appropriate), and would be performed in accordance with label requirements by qualified USBP sector or contract-support personnel.

No impacts on groundwater or hydrology would be expected from maintenance and repair of existing FC-1 and FC-2 roads if standard BMPs, such as spill prevention measures, erosion and sediment controls, and proper equipment maintenance are implemented. Maintenance and repair of FC-3, FC-4, and FC-5 roads could lead to short-term, negligible to minor, adverse impacts on hydrology and groundwater during maintenance and repair activities, such as grading and other ground-disturbing activities, that would result in erosion and sedimentation. Water required for the activities would be trucked in from approved, offsite sources. In addition, maintenance and repair of FC-4 roads could require the removal of vegetation and rock, which could alter the flow of water and percolation of rain water into the ground, resulting in a long-term, negligible to minor, adverse impact on groundwater recharge.

Long-term, minor beneficial impacts on groundwater and hydrology would occur through properly maintained roads, which would reduce the effects incurred from negligence, such as washout and long-term sedimentation.

Rutting can occur along graded earth and sand roads and rutting is exacerbated by rain events that further erode the surface. Unmanaged storm water flow also causes general erosion to occur, washing out complete sections of road and in many instances making roads impassable. Maintenance and repair of the existing roads would have short- and long-term, minor to moderate, beneficial impacts on hydrology and groundwater by minimizing erosion of potentially contaminated (e.g., oils, metals) road material into groundwater recharge areas. Improper maintenance could result in short-term, negligible to minor, direct and indirect, adverse impacts on groundwater by increasing erosion or introducing fill material into groundwater recharge areas. A poorly regraded surface quite often results in rapid deterioration of the surface. The graded earthen roads should be slightly crowned and absent of windrows in the gutter line to avoid ponding and channeling within the road during rain events. USBP sector personnel and contract support personnel well versed in grading techniques would be employed for such activity. The addition of material to these roads to achieve the proposed objective

would be kept to a minimum. Any associated roadside drainage would be maintained to ensure that runoff is relieved from the road surface quickly and effectively without creating further erosion issues. Maintenance and repair of the existing road tactical infrastructure would be in accordance with proven maintenance and repair standards. All necessary erosion-control BMPs would be adopted to ensure stabilization of the project areas. All of the standards CBP is adopting are developed based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resource agencies.

Mowing and clearing of vegetation within the road setback could result in short- to long-term, negligible to minor, adverse impacts on groundwater and hydrology by increasing erosion into groundwater recharge areas. In areas deemed too difficult to mow (e.g., under guardrails, within riprap, and immediately adjacent to bodies of water within the proposed setbacks) the use of herbicides might occur. It is proposed that terrestrial and aquatic herbicide applications would occur with products approved by the USEPA and relevant Federal land management agency, where appropriate. The use of herbicides has the potential for long-term, minor, direct, adverse effects on groundwater if spills were to occur. All use of herbicides would be performed in accordance with label requirements by certified USBP sector or contract support personnel. Herbicide use would follow an integrated approach that uses the least intensive approach first and only progresses in intensity if necessary. Implementation of BMPs to maintain runoff on site during maintenance and repair activities would minimize potential for adverse effects on downstream water quality.

3.7.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, short- and long-term, minor to moderate, direct and indirect, adverse impacts on hydrology and groundwater would occur. Degrading infrastructure, particularly eroding roads, might lead to increased sediments, nutrients, and contaminants in wetlands, streams, and other groundwater recharge areas, and blocked drainage structures could increase flood risk. Impacts on hydrology and groundwater under the No Action Alternative would be anticipated to be greater than impacts for the Proposed Action. The potential for the introduction of contaminants in groundwater recharge areas could be greater under the No Action Alternative if BMPs cannot be implemented during ad hoc/emergency repair activities. Changes in hydrology from clogged drainage structures could occur, which could reduce the potential for groundwater recharge in the area.

3.8 SURFACE WATERS AND WATERS OF THE UNITED STATES

3.8.1 Definition of the Resource

Surface water resources generally consist of wetlands, lakes, rivers, and streams. All of these surface water components contribute to the economic, ecological, recreational, and human health of a community.

Waters of the United States are defined within the CWA, and jurisdiction is addressed by the USEPA and the USACE. These agencies assert jurisdiction over traditional navigable waters

and their relatively permanent tributaries, and the wetlands that are adjacent to these waters (USEPA 2010a).

The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States (USEPA 2010b), with the objective of restoration and maintenance of chemical, physical, and biological integrity of the Nation's waters (USEPA 2010a). To achieve this objective, several goals were enacted, including (1) eliminate discharge of pollutants into navigable waters by 1985; (2) achieve water quality that provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water by 1983; (3) prohibit the discharge of toxic pollutants in toxic amounts; (4) provide Federal financial assistance to construct publicly owned waste treatment works; (5) develop and implement the national policy that areawide waste treatment management planning processes ensure adequate control of sources of pollutants in each state; (6) enforce the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into navigable waters, waters of the contiguous zone, and the oceans; and (7) establish the national policy that programs be developed and implemented in an expeditious manner so as to enable the goals to be met through the control of both point and nonpoint sources of pollution.

The USACE regulates the discharge of dredged and fill material (e.g., concrete, riprap, soil, cement block, gravel, sand) into waters of the United States including adjacent wetlands under Section 404 of the CWA (USEPA 2010b) and work on structures in or affecting navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899 (USEPA 2010c).

Wetlands and riparian habitats are ecologically important communities that provide many benefits for people, and fish and wildlife. They provide key habitat for a wide array of plant and animal species, including resident and migrating birds, amphibian and fish species, mammals, and insects. Vegetation production and diversity are usually very high in and around these sites, with many plant species adapted only to these unique environments. In addition, wetlands and riparian zones provide a variety of hydrologic functions vital to ecosystem integrity. They protect and improve water quality by storing floodwaters, recharging groundwater, and filtering out nutrients and chemicals (USEPA 2001a). Development and conversion of wetlands and riparian zones affects wildlife diversity, carrying capacity, and hydrologic regime. More than 220 million acres of wetlands are estimated to have existed in the lower 48 states in the 1600s. More than half of those wetland acres have been drained or converted to other uses, with the most impacts occurring in the 1950s to 1970s. Approximately 60,000 acres of wetlands are still lost annually, primarily from conversion for agriculture and other development purposes (USEPA 2001b).

Wetlands are a protected resource under EO 11990, *Protection of Wetlands*, issued in 1977 "to avoid to the extent possible the short- and long-term, adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." Wetlands have been defined by agencies responsible for their management. The term "wetlands" used herein, is defined using USACE conventions. The USACE has jurisdiction to protect wetlands under Section 404 of the CWA using the following definition:

> . . . areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b]).

Three diagnostic characteristics must be met to classify an area a wetland: (1) more than 50 percent of the dominant vegetation species present must be classified as obligate (species that are found greater than 99 percent of the time in wetlands), facultative wetland (species that are found 67 to 99 percent of the time in wetlands), or facultative (species that are found 34 to 66 percent of the time in wetlands); (2) the soils must be classified as hydric; and (3) the area is either permanently or seasonally inundated, or saturated to the surface at some time during the growing season of the prevalent vegetation (USACE 1987).

Wetlands are protected as a subset of "the waters of the United States" under Section 404 of the CWA. The term "waters of the United States" has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats, including wetlands. Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill materials into the waters of the United States, including wetlands. In addition, Section 404 of the CWA also grants states with sufficient resources the right to assume these responsibilities. Section 401 of the CWA gives the state board and regional boards the authority to regulate through water quality certification any proposed federally permitted activity that could result in a discharge to water bodies, including wetlands. The state may issue certification, with or without conditions, or deny certification for activities that might result in a discharge to water bodies (USEPA 2010b).

3.8.2 Affected Environment

3.8.2.1 Surface Waters

There is one regional watershed in southern Arizona, the Lower Colorado watershed. This large watershed is divided into several subwatersheds, six of which are in the region of analysis. From west to east, they are the Lower Colorado, Lower Gila, Sonora, Middle Gila, Upper Gila, and the Rio de Bavispe subwatersheds (USGS 2010b).

Lower Colorado River Watershed and Lower Gila Watershed

The Lower Colorado River and the Lower Gila watershed are evaluated as a single unit by the ADEQ (ADEQ 2009). The major surface waters are the Colorado and the Gila rivers. The Colorado-Lower Gila watershed covers approximately 14,460 mi^2, and is sparsely populated with the exception of a few urban areas along the Colorado River. Much of the land area is in Federal ownership, in the form of military bases and wildlife refuges. The remaining private and tribal land is used primarily for agriculture and grazing. In total, the watershed has approximately 450 miles of perennial streams, 145 miles of intermittent streams, 14,000 miles of ephemeral streams, and almost 37,000 acres of lakes (ADEQ 2009).

Colorado River. The Colorado River is the major water resource in the southwestern United States. There are numerous dams along the river, including the Hoover, Parker, and Davis dams,

which are used to generate hydroelectric power, deliver irrigation and drinking water, and perform flood control functions (USBR 2009). The lower portion of the river (below Hoover Dam) is generally considered to be in good health, with no segments on the USEPA 303(d) list; however, it is on the Arizona state impaired waters list for selenium and low dissolved oxygen (USEPA 2010d).

Gila River. For simplicity, the water quality issues of the entire Gila River are included in the following discussion, although there are separate watersheds for the upper, middle, and lower reaches. The Gila River originates in New Mexico and flows west across Arizona until it reaches the Colorado River. There are numerous dams and reservoirs on the river. Most of the Lower Gila River is ephemeral, and flows only during precipitation events and upstream dam releases. Flow during dry conditions in some reaches of the river is primarily from wastewater effluent and irrigation return (ADEQ 2009). The Middle Gila River is on the USEPA 303(d) list for DDT metabolites, toxaphene, and chlordane, while the Upper Gila River is listed for suspended sediments. The Lower Gila River is on the Arizona state impaired waters list for selenium and boron, the Middle Gila for sediments and boron, and the Upper Gila for suspended sediments, *E.coli*, and selenium (USEPA 2010d).

Other surface waters. Hunter's Hole, a series of interconnected ponds along the Lower Colorado River, has exceeded acceptable levels of selenium in the past. Painted Rock Borrow Pit Lake, associated with Painted Rock Reservoir off the Gila River, is listed as impaired for dissolved oxygen (CRWQCB 2007).

Sonora Watershed

The Sonora watershed is divided into three subwatersheds in the region of analysis, the Rio Sonyata, the Rio de la Conception, and the Rio de Bavispe (USGS 2010b).

Middle Gila Watershed

The Middle Gila watershed is divided into two subwatersheds in the region of analysis, the Santa Cruz and the San Pedro-Willcox (USGS 2010b). As water quality data are most readily obtainable from the ADEQ, the state watershed divisions (Santa Cruz and San Pedro) will be used for the discussion of this area.

Santa Cruz Watershed

The Santa Cruz watershed is approximately 11,100 mi^2. Tribal lands account for approximately 40 percent of the watershed, with another 40 percent owned by the state and Federal government, and 20 percent in private ownership. The major land use is grazing, and there are active and abandoned mines throughout the area (ADEQ 2009). Approximately 85 miles of perennial streams, 550 miles of intermittent streams, and 11,040 miles of ephemeral streams are in the Santa Cruz watershed, along with 10,889 acres of perennial lakes and 11,119 acres of nonperennial lakes (ADEQ 2009). The major river of this watershed is the Santa Cruz River.

Santa Cruz River. The Santa Cruz River begins in Arizona, flows south into Mexico for approximately 25 miles, and then returns into Arizona, where it discharges into the Gila River (USEPA 2010e). Much of the river has good water quality, but sections downstream of the

Mexican border are on the USEPA 303(d) impaired waters list for *E.coli* (USEPA 2010e), and exceedances of dissolved oxygen, pH, chlorine, and mercury have been measured (ADEQ 2009).

Other Surface Waters. Alum Gulch, Three R Canyon, and Cox Gulch, which are all streams in the Santa Cruz watershed, are on the USEPA 303(d) list as impaired for cadmium, copper, zinc, and pH. In addition, Nogales Wash is listed as impaired for ammonia, chlorine, copper, and *E.coli*, and Sonoita Creek is on the 303(d) list for zinc (USEPA 2010e, ADEQ 2009).

San Pedro Watershed

The San Pedro watershed includes 7,015 mi^2 in Arizona, with a very small area in the extreme southwestern corner of New Mexico. There are historic copper, silver, and gold mines in the area, but most are inactive. Approximately 60 percent of the land is owned by the Federal and state government, and the rest is privately owned. There are 195 miles of perennial streams, 665 miles of intermittent streams, and 6,610 miles of ephemeral streams in this watershed. There are also 1,319 acres of perennial lakes and almost 30,000 acres of nonperennial lakes in the area. The major surface waters in the San Pedro watershed within the region of analysis include the San Pedro River and the Whitewater Draw (ADEQ 2009).

San Pedro River. The San Pedro River begins in Mexico and flows north, where it enters the Gila River. Some sections of the San Pedro River are on the USEPA 303(d) impaired waters list for *E.coli* and nitrate, and are on the state impaired waters list for selenium. Other common historic and current exceedances in the San Pedro River include chromium, arsenic, lead, mercury, dissolved oxygen, copper, manganese, and suspended sediments (ADEQ 2009).

Whitewater Draw. Whitewater Draw is in extreme southeastern Arizona, and is a key component to the Whitewater Draw Wildlife Area, managed by the State of Arizona. Much of the area was converted to agriculture but restoration projects are ongoing (AGFD 2010). Whitewater Draw is a major drainage in Arizona and a tributary to the Rio de Bavispe in Mexico. No sections of the draw are listed as impaired by the USEPA (USEPA 2010d, ADEQ 2009).

Other surface waters. Two small streams in the San Pedro watershed are on the USEPA 303(d) impaired waters list. Brewery Gulch is listed as impaired for copper, with additional exceedances of lead and pH levels. Mule Gulch is impaired for pH, copper, zinc, and cadmium, and exceedances for lead have also been measured. Numerous other small streams and creeks in the watershed have excessive amounts of copper, pH, lead, mercury, and low dissolved oxygen levels, but are not currently on the 303(d) list (ADEQ 2009).

Upper Gila Watershed

The Upper Gila watershed covers 15,100 mi^2 of New Mexico and Arizona (USGS 2010b) and is considered a sparsely populated agricultural area. Other land uses include grazing, recreation, and forestry lands. In the Arizona portion of the watershed, there are approximately 550 miles of perennial streams, 1,020 miles of intermittent streams, and 10,100 miles of ephemeral streams, with 11,812 acres of perennial lakes (ADEQ 2009). The Upper Gila watershed is divided into several subwatersheds, with only the San Simon watershed is in the Arizona portion of the region

of analysis. It is approximately 2,230 mi^2 (USGS 2010b) with the major surface water being the San Simon River.

San Simon River. The San Simon River is a major tributary to the Gila River. It has no segments on the USEPA 303(d) list (USEPA 2010e), but a significant amount of the silt load entering the impaired Upper Gila River is attributed to this stream (Brandau et al. 2005).

Other surface waters. There are no additional waters on the USEPA 303(d) list for this watershed, but portions of Cave Creek, a major tributary to the San Simon River, are considered impaired by the state due to high selenium levels. Dankworth Pond and Roper Lake are two small systems in the watershed that are considered naturally impaired by low dissolved oxygen as a result of groundwater upwelling (NRCS 2007).

Rio de Bavispe Watershed

The Rio de Bavispe Watershed drains south and extends into New Mexico and Mexico. Black Draw, and further upstream at Whitewater Draw, are tributaries to the Rio de Bavispe in Mexico. The Rio de Bavispe joins the Rio Yaqui, which discharges into the Gulf of California.

Black Draw. Black Draw, also known as the San Bernardino Creek, is a perennial stream in the southeastern corner of Arizona in Chochise County (ADWR 2011). Black Draw contains the lowest elevation within the San Bernardino Valley Basin where Black Draw exits the basin. No water quality exceedances exist for this stream (ADWR 2010d).

3.8.2.2 Wetlands

Arizona has an arid climate, and less than one percent of the land area contains wetlands. Numerous streams and wetlands throughout the state have been modified or drained, resulting in the loss of more than one-third of the original wetlands. The arid conditions and seasonally varying precipitation significantly influence wetland formation and distribution in the state (USGS 1996).

The most extensive wetlands are in riparian zones. Palustrine forested riparian ecosystems associated with the Lower Colorado, Lower Gila, Santa Cruz, and San Pedro rivers are the most common wetlands found in the region of analysis. Playa lakes are another wetland type in the region, predominately in southeastern Arizona. Playa lakes are seasonally flooded depressions in alkali flats, and are considered lacustrine habitats. Numerous springs and seeps are also found in the region of analysis, particularly along the major rivers. Cienegas are wet flats or valleys that are formed by multiple springs, and are found in the southeastern and south-central regions. Cienegas can be palustrine forested or palustrine emergent. Arroyos and palm oases are also found in the area (USACE 1994b).

3.8.3 Environmental Consequences

3.8.3.1 Alternative 1: Proposed Action

Short-term, negligible to moderate, indirect, adverse impacts could occur from vegetation and debris removal, bridge repair, and boat ramp maintenance, which could cause the deposition of

fill materials or increased sedimentation into wetlands, arroyos, or other surface water or drainage features. However, maintenance and repair of tactical infrastructure would be conducted in such a manner as to have minimal impacts on wetlands, waters, and floodplain resources to the maximum extent practical. Erosion-control BMPs would be adopted to maintain runoff on site and would minimize the potential for adverse effects on downstream water quality.

USBP sector personnel and contract-support personnel well-versed in grading techniques would be employed for such activity. The addition of fill material to boat ramps to achieve the proposed objective would be kept to a minimum. The use of soil stabilization agents could be required on some boat ramps. It is proposed that any applications would be made with soil stabilization products approved by the USEPA and relevant Federal land management agency (where appropriate), and would be performed in accordance with label requirements by qualified USBP sector or contract-support personnel.

Pertinent Federal, state, and local permits would be obtained for any work, including work that could occur in jurisdictional drainages, waterways, or wetlands. CBP is consulting with the USACE Los Angeles District to minimize wetland impacts and identify potential avoidance, minimization, and conservation measures. Maintenance and repair of the existing roads would be in accordance with proven maintenance and repair standards. All of the standards CBP would adopt are developed based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resource agencies. No impacts on surface water resources would be expected from maintenance and repair of lighting and electrical systems or the RVSSs.

No impacts on surface water resources would be expected from routine repair and maintenance of existing FC-1 and FC-2 roads if standard BMPs are implemented and any necessary local, state, or Federal permitting requirements are met. Maintenance of FC-3, FC-4, and FC-5 roads would minimize erosion and deposition of potentially contaminated road material (e.g., oils, metals) into wetlands, surface waters, washes, and other drainage features. When subjected to heavier traffic, rutting occurs, which in turn is exacerbated by rain events that further erode the surface. Unmanaged storm water flow also causes general erosion to occur, washing out complete sections of road and in many instances making roads impassable. The road should be slightly crowned and absent of windrows in the gutter line to avoid ponding and channeling within the road during rain events. Grading with the use of commercial grading equipment is proposed to restore an adequate surface. USBP sector personnel and contract support personnel well versed in grading techniques would be employed for such activity. The addition of material to these roads to achieve the proposed objective would be kept to a minimum. Any associated roadside drainage would be maintained to ensure that runoff is relieved from the road surface quickly and effectively without creating further erosion issues.

In addition, bridges would be inspected on a routine basis and their structural integrity maintained. Short-term, minor to moderate, adverse impacts would occur on surface water resources from bridge maintenance and repair, depending on the extent of required work.

Mowing and vegetation control within the road setback could result in increased erosion into wetlands, surface waters, arroyos, and other drainage areas. In areas deemed too difficult to mow, such as under guardrails, within riprap, and immediately adjacent to bodies of water within

the proposed setbacks, the use of herbicides might occur. It is proposed that terrestrial and aquatic herbicide applications would be made with products approved by the USEPA and relevant Federal land management agency (where appropriate). The use of herbicides would result in long-term, minor, direct, adverse effects on surface water resources, if spills were to occur. All use of herbicides would be performed in accordance with label requirements by certified USBP sector or contract support personnel. Herbicide use would follow an integrated approach that uses the least intensive approach first and only progresses in intensity if necessary.

All necessary erosion-control BMPs would be adopted to ensure stabilization of the project areas. Implementation of BMPs to maintain runoff on site during maintenance and repair activities would minimize potential for adverse effects on downstream water quality. Pertinent Federal, state, and local permits would be obtained for any work, including work that might occur in jurisdictional drainages, waterways, or wetlands.

3.8.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, there is a potential for short- and long-term, minor to major, direct and indirect, adverse impacts on surface waters. The No Action Alternative would result in greater impacts on surface waters than the Proposed Action because a proactive approach to maintenance and repair would not occur; therefore, reactive maintenance and repair activities would occur when a problem has arisen. For example, degrading infrastructure, particularly eroding roads, could lead to increased sediments, nutrients, and contaminants in wetlands, streams, washes, and other water-related features. Blocked drainage structures could increase flood risk. In addition, all BMPs might not be implemented during emergency repair activities, which could result in adverse impacts on surface waters.

3.9 FLOODPLAINS

3.9.1 Definition of the Resource

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters that are periodically inundated. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, nutrient cycling, water quality maintenance, and support of a diversity of plants and animals. Floodplains provide a broad area to spread out and temporarily store floodwaters. This reduces flood peaks and velocities and the potential for erosion. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body (FEMA 1994). Floodplains are subject to periodic or infrequent inundation due to rain or melting snow. Risk of flooding typically hinges on local topography, the frequency of precipitation events, and the size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain. The 100-year floodplain is the area that has a 1 percent chance of inundation by a flood event in a given year (FEMA 1994). Certain facilities inherently pose too great a risk to be in either the 100- or 500-year floodplain, such as hospitals, schools, or storage buildings for irreplaceable records. Federal, state, and local regulations often limit floodplain development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety. EO 11988, *Floodplain Management*, requires Federal agencies to determine whether a proposed action would occur within a floodplain. This

determination typically involves consultation of appropriate FEMA Flood Insurance Rate Maps (FIRMs), which contain enough general information to determine the relationship of the project area to nearby floodplains. EO 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative. Where the only practicable alternative is to site in a floodplain, a specific step-by-step process must be followed to comply with EO 11988 outlined in the FEMA document *Further Advice on EO 11988 Floodplain Management*.

3.9.2 Affected Environment

Some of the water bodies in the region of analysis that are listed as having a 100-year floodplain include the Colorado River, Gila River, Cuerda de Lena, San Simon Wash, Menagers Lake, Vamon Wash, Aguirre Lake, the Santa Cruz River, Whitewater Draw, and Silver Creek (FEMA 2010).

3.9.3 Environmental Consequences

Evaluation of impacts on floodplains is based on existence of floodplains and associated regulations. The potential impact of flood hazards on a proposed action is important if such an action occurs in an area with a high probability of flooding.

3.9.3.1 Alternative 1: Proposed Action

Short-term, negligible to minor, indirect, adverse impacts and short- and long-term, minor, direct, beneficial impacts on floodplains would be anticipated from implementing the Proposed Action. Short-term, negligible to minor, indirect impacts could occur on floodplain areas from vegetation control and debris removal, which could cause increased sedimentation into floodplains and drainage management structures. However, clearing blocked drainage structures of debris and fill materials would result in short- and long-term, direct and indirect, beneficial impacts on floodplains by improving conveyance of floodwaters. BMPs would be implemented to minimize impacts on floodplains to negligible. No adverse impacts on floodplains from maintenance of bridges, lighting and electrical systems, RVSSs, or boat ramps would be expected. USBP sector personnel and contract-support personnel well-versed in grading techniques would be employed for such activity. The addition of fill material to these ramps to achieve the proposed objective would be kept to a minimum. The use of soil stabilization agents could be required on some ramps. It is proposed that any applications would be made with soil stabilization products approved by the USEPA and relevant Federal land management agency (where appropriate), and would be performed in accordance with label requirements by qualified USBP sector or contract-support personnel.

No impacts on floodplains would be expected from routine repair and maintenance of existing FC-1 and FC-2 roads if standard BMPs are implemented and any necessary local, state, or Federal permitting requirements are met. The majority of proposed maintenance and repair is planned for FC-3 and FC-4 roads. Because of their lack of formal construction design, FC-3 and FC-4 roadways are subject to the greatest deterioration if left unmaintained. Maintenance and repair of FC-3 and FC-4 roads could lead to short- and long-term, minor, adverse and beneficial impacts on floodplains.

Proper maintenance of existing FC-3 (graded earth) and FC-5 (sand) roads would have short- and long-term, minor to moderate, beneficial impacts on floodplains by minimizing erosion of road material into floodplain areas. When subjected to heavier traffic, rutting occurs, which is exacerbated by rain events that further erode the surface. Unmanaged storm water flow also causes general erosion to occur, washing out complete sections of road and in many instances making roads impassable. Improper maintenance could result in increased erosion or introduction of fill material into the floodplain area. A poorly regraded surface could result in rapid deterioration of the surface. The road should be slightly crowned and absent of windrows in the gutter line to avoid ponding and channeling within the road during rain events. Grading with the use of commercial grading equipment is proposed to restore an adequate surface to FC-3 roads. USBP sector personnel and contract support personnel well versed in grading techniques would be employed for such activity. The addition of material to these roads to achieve the proposed objective would be kept to a minimum. Any associated roadside drainage would be maintained to ensure that runoff is relieved from the road surface quickly and effectively without creating further erosion issues.

Proper maintenance of existing FC-4 (two-track) roads would have short- and long-term, minor, direct, beneficial impacts on floodplains by minimizing erosion of road material into floodplain areas. Improper maintenance could result in short- to long-term, negligible to minor, direct and indirect, adverse impacts on floodplains by increasing erosion and adding fill materials into floodplain areas. Installation of culverts could cause long-term, minor, direct, adverse impacts on floodplains by creating restrictions to water flow and potentially increasing flood risk. Proper sizing of culverts would reduce this potential impact. Two-track roads have no crown, and generally do not have any improved drainage features or ditches, although culverts and low water crossings could be installed where continuous erosion issues occur. Installation of improperly sized culverts would have long-term, minor, direct, adverse impacts on floodplains by restricting flow, whereas replacing improperly sized culverts and cleaning blocked drainage structures could have short- and long-term, direct and indirect, beneficial impacts by decreasing restrictions and improving conveyance of floodwaters.

Mowing and clearing of vegetation within the road setback could result in short- to long-term, negligible to minor, adverse impacts on floodplains by increasing erosion into floodplain areas. In areas deemed too difficult to mow, such as under guardrails, within riprap, and immediately adjacent to bodies of water within the proposed setbacks, the use of herbicides might occur. It is proposed that terrestrial and aquatic herbicide applications would be made with products approved by the USEPA and relevant Federal land management agency (where appropriate). All use of herbicides would be performed in accordance with label requirements by certified USBP sector or contract support personnel. Herbicide use would follow an integrated approach that uses the least intensive approach first and only progresses in intensity if necessary. Short-term, negligible to minor, adverse impacts on floodplains would be expected from the use of herbicides, as the decrease in vegetation in the floodplain could allow for easier conveyance of floodwaters within the floodplain and increase the velocity and volume of storm water flow until native vegetation has been reestablished. Impacts from herbicides on water quality are discussed in **Section 3.8**.

All necessary erosion-control BMPs would be adopted to ensure stabilization of the project areas. Pertinent local, state, and Federal permits would be obtained for any work, including work that occurs in floodplains. The maintenance and repair of tactical infrastructure would be conducted in such a manner as to have minimal impacts on floodplains to the maximum extent practical. CBP is consulting with the USACE Los Angeles District to minimize floodplain impacts and identify potential avoidance, minimization, and conservation measures. Maintenance and repair of the existing road tactical infrastructure would be in accordance with proven maintenance and repair standards. All of the standards CBP is adopting are developed based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resource agencies.

Implementation of BMPs to maintain runoff on site during maintenance and repair activities would minimize potential for adverse effects on downstream water quality. Pertinent Federal, state, and local permits would be obtained for work that might occur in floodplains.

3.9.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, there is a potential for short- and long-term, minor to moderate, direct and indirect, adverse impacts on floodplains. Degrading infrastructure, particularly eroding roads, could lead to increased sediments and other fill materials in the floodplain, and blocked drainage structures impair flow, which could increase flood risk. This approach would result in greater impacts on floodplains than the Proposed Action as a proactive approach to maintenance and repair would not occur. Reactive maintenance and repair activities would be coordinated once an issue arises. For example, instead of clearing blocked drainage structures periodically of debris, the drainage structures could be cleared when flooding occurs and it becomes a necessity to maintain the structure. Thus, structures generally not impacted by floodwaters could be affected under the No Action Alternative if the blockage of the drainage structure is not detected or attended to in a timely manner. The No Action Alternative does not guarantee that all BMPs would be implemented during emergency repair activities.

3.10 AIR QUALITY

3.10.1 Definition of the Resource

In accordance with Federal CAA requirements, the air quality in a given region or area is measured by the concentration of criteria pollutants in the atmosphere. The air quality in a region is a result of not only the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological "air basin," and the prevailing meteorological conditions.

Under the CAA, the USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to affect human health and the environment. The NAAQS represent the maximum allowable concentrations for ozone (O_3) measured as either volatile organic compounds (VOCs) or total nitrogen oxides (NO_x), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur oxides (SO_x), respirable particulate matter (including particulate matter equal to or less than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and

lead (Pb) (40 CFR Part 50). The CAA also gives the authority to states to establish air quality rules and regulations. **Table 3-4** presents the USEPA NAAQS.

Federal Prevention of Significant Deterioration (PSD) regulations apply in attainment areas to a major stationary source (i.e., source with the potential to emit 250 tons per year [tpy] of any criteria pollutant), and a significant modification to a major stationary source (i.e., change that adds 15 to 40 tpy to the facility's potential to emit depending on the pollutant). PSD regulations can also apply to stationary sources if (1) a proposed project is within 10 kilometers of national parks or wilderness areas, i.e. Class I Areas, and (2) regulated stationary source pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 microgram per cubic meter ($\mu g/m^3$) or more (40 CFR 52.21[b][23][iii]). A Class I area includes national parks larger than 6,000 acres, national wilderness areas and national memorial parks larger than 5,000 acres, and international parks. PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's Class designation (40 CFR 52.21[c]).

Title V of the CAA Amendments of 1990 requires states and local agencies to permit major stationary sources. A major stationary source has the potential to emit more than 100 tpy of any one criteria air pollutant, 10 tpy of a hazardous air pollutant (HAP), or 25 tpy of any combination of HAPs. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their impact on air quality. Section 112 of the CAA defines the sources and kinds of HAPs.

GHGs are gaseous emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The most common GHGs emitted from natural processes and human activities include CO_2, methane, and nitrous oxide. GHGs are mainly produced by the burning of fossil fuels and through industrial and biological processes. On 22 September 2009, the USEPA issued a final rule for mandatory GHG reporting from large GHG emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on CO_2 and other GHG emissions that can be used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons or more of CO_2 equivalent emissions per year but excludes mobile source emissions. The first emissions report is due in 2011 for 2010 emissions. GHG emissions will also be factors in PSD and Title V permitting and reporting, according to a USEPA rulemaking issued on 3 June 3 2010 (75 FR 31514). GHG emissions thresholds of significance for stationary sources are 75,000 tons CO_2 equivalent per year and 100,000 tons CO_2 equivalent per year under these permit programs.

Table 3-4. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
		Federal	
CO	8-hour (1)	9 ppm (10 mg/m^3)	None
	1-hour (1)	35 ppm (40 mg/m^3)	None
Pb	Quarterly average	1.5 µg/m^3	Same as Primary
	Rolling 3-Month Average	0.15 µg/m^3 (2)	Same as Primary
NO_2	Annual Arithmetic Mean	53 ppb (3)	Same as Primary
	1-hour	100 ppb (4)	None
PM_{10}	Annual Arithmetic Mean	--	Same as Primary
	24-hour (5)	150 µg/m^3	Same as Primary
$PM_{2.5}$	Annual Arithmetic Mean (6)	15 µg/m^3	Same as Primary
	24-hour (7)	35 µg/m^3	Same as Primary
O_3	8-hour (8)	0.075 ppm (2008 Standard)	Same as Primary
	8-hour (9)	0.08 ppm (1997 Standard)	Same as Primary
	1-hour (10)	0.12 ppm	Same as Primary
SO_2	Annual Arithmetic Mean	0.03 ppm	0.5 ppm (3-hour) (1)
	24-hour (1)	0.14 ppm	0.5 ppm (3-hour) (1)
	1-hour	75 ppb (11)	None

Source: USEPA 2010f

Notes: Parenthetical values are approximate equivalent concentrations.

1. Not to be exceeded more than once per year.
2. Final rule signed 15 October 2008.
3. The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
4. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective 22 January 2010).
5. Not to be exceeded more than once per year on average over 3 years.
6. To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
7. To attain this standard, the 3-year average of the weighted annual of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective 17 December 2006).
8. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective 27 May 2008).
9. a. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
   b. The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
   c. USEPA is in the process of reconsidering these standards (set in March 2008).
10. a. USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard (anti-backsliding).
    b. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
11. Final rule signed on 2 June 2010. To attain this standard, the 3-year average of the 99th percentile of daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Key: ppm = parts per million; ppb = parts per billion; mg/m^3 = milligrams per cubic meter; µg/m^3 = micrograms per cubic meter

3.10.2 Affected Environment

Table 3-5 shows the county, air quality control region (AQCR), and attainment status for counties along the U.S./Mexico international border in Arizona. All sectors are described in further detail on the following pages.

Table 3-5. Tactical Infrastructure Maintenance and Repair Air Quality Control Regions and Attainment Status in Arizona

County	AQCR	Attainment Status
Pima, Santa Cruz, and Cochise	Pima Intrastate Southeast Arizona Intrastate	Moderate nonattainment for PM_{10} Moderate nonattainment for PM_{10} and $PM_{2.5}$ (P) Attainment/unclassified for all other criteria pollutants
Yuma	Mojave-Yuma Intrastate	Serious nonattainment for PM_{10} Nonattainment for $PM_{2.5}$ (P) Nonattainment for CO (P) Attainment/unclassified for all other criteria pollutants

Source: USEPA 2010g
Key: (P) = Portion of the county

The ADEQ oversees the implementation of the Federal CAA in the State of Arizona. Yuma County, Arizona, is within the Mojave-Yuma Intrastate AQCR (MYIAQCR) (40 CFR 81.268). A portion of Yuma County has been characterized by the USEPA as a Federal unclassified nonattainment area for CO, and a Federal moderate nonattainment area for PM_{10}. The MYIAQCR has been characterized as unclassified/attainment for all other criteria pollutants (USEPA 2010g).

Pima County, Arizona, is within the Pima Intrastate AQCR (PIAQCR) (40 CFR 81.269). The air quality in the PIAQCR, including Pima County, has been characterized by the USEPA as a Federal moderate nonattainment area for PM_{10}, and as unclassified/attainment for all other criteria pollutants (USEPA 2010g).

Santa Cruz and Cochise counties, Arizona, are within the Southeast Arizona Intrastate AQCR (SEAIAQCR) (40 CFR 81.272). A portion of Santa Cruz and Cochise counties has been characterized by the USEPA as a Federal moderate nonattainment area for PM_{10} and $PM_{2.5}$. The SEAIAQCR has been characterized as unclassified/attainment for all other criteria pollutants (USEPA 2010g).

3.10.3 Environmental Consequences

The environmental consequences to local and regional air quality conditions near a proposed Federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in NAAQS "attainment" areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Exceed any Evaluation Criteria established by a SIP or permit limitations/requirements
- Emissions representing an increase of 100 tpy for any attainment criteria pollutant (NO_x, VOCs, CO, PM_{10}, $PM_{2.5}$, SO_2), unless the proposed activity qualifies for an exemption under the Federal General Conformity Rule.

Although the 100 tpy threshold is not a regulatory-driven threshold, it is being applied as a conservative measure of significance in attainment areas. The rationale for this conservative threshold is that it is consistent with the highest General Conformity *de minimis* levels for nonattainment areas and maintenance areas. In addition, it is consistent with Federal stationary source major source thresholds for Title V permitting which formed the basis for the nonattainment *de minimis* levels.

Effects on air quality in NAAQS "nonattainment" areas are considered significant if the net changes in project-related pollutant emissions result in any of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Increase the frequency or severity of a violation of any ambient air quality standard
- Delay the attainment of any standard or other milestone contained in the SIP or permit limitations.

The Federal *de minimis* threshold emissions rates were established by USEPA in the General Conformity Rule to focus analysis requirements on those Federal actions with the potential to substantially affect air quality. **Table 3-6** presents these thresholds, by regulated pollutant. As shown in **Table 3-6**, *de minimis* thresholds vary depending on the severity of the nonattainment area classification.

With respect to the General Conformity Rule, effects on air quality would be considered significant if the proposed Federal action would result in an increase of a nonattainment or maintenance area's emissions inventory above the *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been redesignated as a maintenance area. 40 CFR 93.153(c) exempts certain Federal actions from a general conformity determination.

In addition to the *de minimis* emissions thresholds, Federal PSD regulations define air pollutant emissions to be significant if the source is within 10 kilometers of any Class I area, and stationary source emissions would cause an increase in the concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more (40 CFR 52.21[b][23][iii]).

Table 3-6. Conformity *de minimis* Emissions Thresholds

Pollutant	Status	Classification	*de minimis* Limit (tpy)
O_3 (measured as NO_x or VOCs)	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO_x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO_x)
		Outside ozone transport region	100
CO	Nonattainment/ maintenance	All	100
PM_{10}	Nonattainment/ maintenance	Serious	70
		Moderate	100
		Not Applicable	100
$PM_{2.5}$ (measured directly, as SO_2, or as NO_x)	Nonattainment/ maintenance	All	100
SO_2	Nonattainment/ maintenance	All	100
NO_x	Nonattainment/ maintenance	All	100

Source: 40 CFR 93.153

3.10.3.1 Alternative 1: Proposed Action

The Proposed Action would only generate temporary air pollutant emissions as a result of grading, filling, compacting, and other maintenance and repair activities. These emissions would not be expected to generate any offsite effects. The Proposed Action would not result in a net increase in personnel or commuter vehicles. Therefore, the emissions from existing personnel and commuter vehicles would not result in an adverse impact on local or regional air quality.

Maintenance and repair activities would result in short-term emissions of criteria pollutants as combustion products from maintenance and repair equipment and particulate matter emissions as fugitive dust from ground-disturbing activities. Emissions of all criteria pollutants would result from maintenance and repair activities including combustion of fuels from on-road haul trucks transporting materials and maintenance and repair employee commuter emissions. Fugitive dust emissions would be greatest during initial site preparation activities and would vary from day to day depending on the type of maintenance and repair, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from maintenance and repair activities is proportional to the area of land being worked and the level of activity.

Appropriate BMPs and mitigation measures would be adopted to reduce fugitive dust and other emissions to the greatest extent possible. All of the standards developed are based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resource agencies.

Arizona has extensive laws requiring BMPs to reduce fugitive dust and other emissions from maintenance and repair projects. These BMPs are displayed in **Appendix E**. No additional BMPs above what is required by regulation were deemed necessary for the Proposed Action.

For the purpose of analysis in this EA, the total mileage of roadways currently used by CBP was obtained to estimate air emissions associated with the Proposed Action. The exact number of miles of roads maintained and repaired by CBP within Arizona could change over time to accommodate CBP needs (e.g., illegal border activity has shifted to another area requiring USBP agents to use different roadways). Therefore, the miles of roads associated with the Proposed Action should be considered somewhat flexible and not constrained by a quantifiable number. It is estimated that every 3 months approximately 5 percent of roadways analyzed in this EA would be graded, for a total of 20 percent of roadways graded annually. All other portions of the tactical infrastructure analyzed in this EA would require other routine maintenance and repair activities such as vegetative management, soil stabilization measures, filling potholes, and minor repairs. **Table 3-7** describes the approximate mileage and acreage that would be graded by sector. **Appendix G** contains air quality emissions calculations for the Proposed Action.

Table 3-7. Approximate Tactical Infrastructure Maintenance and Repair Area That Would Be Graded By Sector in Arizona

Sector	Approximate Mileage Under Consideration in this EA	Mileage Included in Air Quality Analysis	Area Included in Air Quality Analysis (acres)
Tucson	645	129	313
Yuma	55	11	27
Total	**700**	**140**	**340**

Assumptions:

Every 3 months approximately 5 percent of roadways considered in this EA would be graded annually for a total of 20 percent. The remaining portions would only include other routine maintenance and repair activities.

Area of land disturbance considered in this air quality analysis assumes the width of disturbance would be 20 feet multiplied by the length.

Notes:

Yuma Sector Example: Mileage Included in Air Quality Analysis (11) x 5,280 feet/mile x 20 feet wide / 43,560 ft^2/acre = 27 acres.

A road (less than 5.6 miles in length) associated with the El Paso sector extends from New Mexico into Arizona.

Under the General Conformity rule, a number of different Federal activities are exempt. The exemption under 40 CFR 93.153(c)(iv) of the General Conformity rules states, "routine maintenance and repair activities, including repair and maintenance of administrative sites, roads, trails, and facilities" are exempt from General Conformity. Proposed activities associated with the Proposed Action would include routine maintenance and repair activities, and are considered to be exempt under the General Conformity rule. If any future actions would require

constructing new road networks, significant upgrades to existing roadways, expanding roads or drainages, or installing new mission-support equipment, separate NEPA analysis would be required. A detailed description of air quality impacts in Arizona is described in the following paragraphs.

Pima County has been characterized by the USEPA as a Federal moderate nonattainment area for PM_{10}, and as unclassified/attainment for all other criteria pollutants (USEPA 2010g). Santa Cruz and Cochise counties have been characterized by the USEPA as a Federal moderate nonattainment area for PM_{10} (portion) and $PM_{2.5}$ (portion), and as unclassified/attainment for all other criteria pollutants (USEPA 2010g). Yuma County has been characterized by the USEPA as a Federal unclassified nonattainment area for CO (portion), Federal moderate nonattainment area for PM_{10} (portion), and as unclassified/attainment for all other criteria pollutants (USEPA 2010g). General Conformity Rule requirements are applicable to those activities not qualifying for exemption. The Proposed Action would generate emissions well below *de minimis* levels with the exception of fugitive dust (PM_{10}). PM_{10} emissions generated by the Proposed Action with BMPs in place have been estimated to be approximately 387 tpy (see **Appendix G**). Although emissions are estimated to be above the 100 tpy threshold, all emissions would be short-term. In addition, activities planned would qualify for exemption under the General Conformity Rule.

Greenhouse Gas Emissions. The Proposed Action would contribute directly to emissions of GHG from the combustion of fossil fuels from maintenance and repair activities and commuting of support personnel. CO_2 accounts for 92 percent of all GHG emissions; electric utilities are the primary source of anthropogenic CO_2, followed by transportation.

The Energy Information Agency (EIA) estimates that in 2008, gross CO_2 emissions in the State of Arizona were 103.0 million metric tons of CO_2 equivalents (EIA 2010). Annual activities associated with the maintenance and repair of tactical infrastructure in Arizona would emit 588.1 metric tons of CO_2. Total annual CO_2 emissions from the Proposed Action in the State of Arizona would be 0.0006 percent of the Arizona state CO_2 emissions and, therefore, would represent a negligible contribution towards statewide GHG inventories.

3.10.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, tactical infrastructure maintenance and repair activities along the U.S./Mexico international border in Arizona would continue. Tactical infrastructure would be maintained and repaired on an as-needed basis, and short- and long-term, negligible to minor, adverse impacts on air quality would be anticipated from emissions associated with combustion of fossil fuels, particulate matter, and fugitive dust emissions. The No Action Alternative would be expected to result in greater impacts on air quality than the Proposed Action as a proactive approach to maintenance and repair would not occur, and reactive maintenance could entail a more spatially and temporally concentrated use of construction equipment. In addition, the No Action Alternative does not guarantee that all BMPs would be implemented during emergency repair activities, such as the wetting of soil to minimize fugitive dust emissions.

3.11 NOISE

3.11.1 Definition of the Resource

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on a rooftop. Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. How an individual responds to the sound source will determine if the sound is viewed as music to one's ears or as annoying noise. Affected receptors are specific (e.g., schools, churches, or hospitals) or broad (e.g., nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

Noise Metrics and Regulations. Although human response to noise varies, measurements can be calculated with instruments that record instantaneous sound levels in decibels. A-weighted decibel (dBA) is used to characterize sound levels that can be sensed by the human ear. "A-weighted" denotes the adjustment of the frequency range to what the average human ear can sense when experiencing an audible event. The threshold of audibility is generally within the range of 10 to 25 dBA for normal hearing. The threshold of pain occurs at the upper boundary of audibility, which is normally in the region of 135 dBA (USEPA 1981a). **Table 3-8** compares common sounds and shows how they rank in terms of the effects on hearing. As shown, a whisper is normally 30 dBA and considered to be very quiet while an air conditioning unit 20 feet away is considered an intrusive noise at 60 dBA. Noise levels can become annoying at 80 dBA and very annoying at 90 dBA. To the human ear, each 10 dBA increase seems twice as loud (USEPA 1981b).

Table 3-8. Sound Levels and Human Response

Noise Level (dBA)	Common Sounds	Effect
10	Just audible	Negligible*
30	Soft whisper (15 feet)	Very quiet
50	Light auto traffic (100 feet)	Quiet
60	Air conditioning unit (20 feet)	Intrusive
70	Noisy restaurant or freeway traffic	Telephone use difficult
80	Alarm clock (2 feet)	Annoying
90	Heavy truck (50 feet) or city traffic	Very annoying; Hearing damage (8 hours)
100	Garbage truck	Very annoying*
110	Pile drivers	Strained vocal effort*
120	Jet takeoff (200 feet) or auto horn (3 feet)	Maximum vocal effort
140	Carrier deck jet operation	Painfully loud

Source: USEPA 1981b, *HDR extrapolation

Under the Noise Control Act of 1972, OSHA established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed to is 115 dBA and exposure to this level must not exceed 15 minutes within an 8-hour period. The standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that would reduce sound levels to acceptable limits.

Maintenance and Repair Sound Levels. Maintenance and repair work can cause an increase in sound that is well above the ambient level. A variety of sounds are emitted from loaders, trucks, saws, and other work equipment. **Table 3-9** lists noise levels associated with common types of maintenance and repair equipment.

Table 3-9. Predicted Noise Levels for Maintenance and Repair Equipment

Potential Maintenance and Repair Equipment	Predicted Noise Level at 50 feet (dBA)
Bulldozer	80
Grader	80–93
Truck	83–94
Roller	73–75
Backhoe	72–93
Jackhammer	81–98
Concrete mixer	74–88
Welding generator	71–82
Paver	86–88

Source: USEPA 1971

3.11.2 Affected Environment

The U.S./Mexico international border in Arizona is characterized by desert and mountain landscapes. Property uses include public lands, national forest, national monuments, wildlife refuges, Native American reservations, and farm/ranch land. The region of analysis contains both urban/mixed use areas and rural/undeveloped areas. The areas north of the U.S./Mexico international border are largely rural/undeveloped areas. Prominent sources of noise in these areas are most likely from vehicle traffic, aircraft, and agricultural equipment. The closest populations within the region of analysis include the City of Yuma, Gadsden, San Luis, Sells, Nogales, Naco, and Douglas.

In addition to vehicle and industry noise, natural sources of noise also occur within the region of analysis. In Arizona, most natural noise occurs from dusk until dawn. Many animals in the desert are dormant during the day due to extreme temperatures, and several nocturnal species are present (see **Sections 3.5** and **3.6** for a discussion on wildlife and threatened and endangered species). Furthermore, birds are most active just before dawn and as the sun is setting.

Weather-related noise is another source of natural noise, such as thunder during the monsoon season (July through September). High winds also cause natural noise.

The areas south of the region of analysis in Mexico include the cities of San Luis Rio Colorado, Sonoita, Heroica Nogales, Naco, and Agua Prieta, which are urban/mixed use areas. Prominent sources of noise in these areas are most likely from vehicle traffic and industry. The closest populations in Mexico are approximately 50 feet from the region of analysis. Areas outside of the urban centers in Mexico are largely rural/undeveloped. Prominent sources of noise in these areas are most likely from vehicle traffic and agricultural equipment.

3.11.3 Environmental Consequences

Noise impact analyses typically evaluate potential changes to the existing noise environment that would result from implementation of a proposed action. Potential changes in the acoustical environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels or reduce the ambient sound level), negligible (i.e., if the total number of sensitive receptors exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased sound exposure to unacceptable noise levels or ultimately increase the ambient sound level). Projected noise effects were evaluated qualitatively for the alternatives considered.

3.11.3.1 Alternative 1: Proposed Action

Maintenance and repair of tactical infrastructure would occur sporadically along the U.S./Mexico international border. Long-term, periodic, negligible to minor, adverse effects on the ambient noise environment would occur.

The specific noise levels and effects would vary depending on the location, type, and quantity of maintenance or repair being performed, and the distance from the source of the noise to sensitive populations. Maintenance and repair activities usually involve the use of more than one piece of equipment simultaneously (e.g., paver and haul truck). To predict how maintenance and repair activities would impact populations, noise from probable maintenance and repair activities was estimated. The cumulative noise from a paver and haul truck was estimated to determine the total impact of noise from maintenance and repair activities at a given distance. As stated in **Section 3.11.2**, the nearest populations vary depending on location; however, the majority of area considered in this EA is sparsely populated or uninhabited. Examples of expected cumulative maintenance and repair noise during daytime hours at specified distances are shown in **Table 3-10**. These sound levels were predicted at 50, 300, 500, 1,000, and 3,000 feet from the source of the noise.

The noise from equipment used for maintenance and repair activities would be localized, short-term, and intermittent during machinery operations. The proposed maintenance and repair activities would be expected to result in noise levels comparable to those indicated in **Table 3-10**. Noise levels of up to 92 dBA would occur in the areas where maintenance and repair activities were occurring for the duration of those activities during normal working hours (i.e., approximately 7:00 a.m. to 5:00 p.m., depending on local ordinances).

Table 3-10. Predicted Noise Levels from Maintenance and Repair Activities

Distance from Noise Source	Predicted Noise Level
50 feet	92 dBA
300 feet	76 dBA
500 feet	72 dBA
1,000 feet	66 dBA
3,000 feet	56 dBA

3.11.3.2 Alternative 2: No Action Alternative

Impacts on noise from the No Action Alternative would be similar to those described for the Proposed Action (see **Section 3.11.3.1**); however, it can be reasonably anticipated that the maintenance and repair activities would occur less frequently, and in fewer locations along the U.S./Mexico international border in Arizona. For this reason, populations within 1,000 feet of the proposed maintenance and repair activities would have the potential to experience less of a long-term effect than those described for the Proposed Action. However, short-term impacts on noise from implementing the No Action Alternative could be greater than the Proposed Action, because it is possible that the reactive activities would occur on a larger scale. Therefore, short-term impacts on noise from implementing the No Action Alternative would be expected to be greater than the Proposed Action, but long-term impacts would be less than the Proposed Action.

3.12 CULTURAL RESOURCES

3.12.1 Definition of the Resource

"Cultural resources" is an umbrella term for many heritage-related resources defined in several Federal laws and EOs, including the National Historic Preservation Act (NHPA), the Archeological and Historic Preservation Act (ARHA), the American Indian Religious Freedom Act (AIRFA), the Archaeological Resources Protection Act (ARPA), and the Native American Graves Protection and Repatriation Act (NAGPRA). The NHPA focuses on cultural resources such as prehistoric and historic sites, buildings and structures, districts, or other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reasons. Such resources might provide insight into the cultural practices of previous civilizations or retain cultural and religious significance to modern groups. Resources judged important under criteria established in the NHPA are considered eligible for listing in the National Register of Historic Places (NRHP). These resources are termed "historic properties" and are protected under the NHPA.

NAGPRA requires consultation with culturally affiliated Native American tribes for the disposition of Native American human remains, burial goods, and cultural items recovered from federally owned or controlled lands. Typically, cultural resources are subdivided into archaeological sites (prehistoric or historic sites containing physical evidence of human activity but no standing structures); architectural sites (buildings or other structures or groups of

structures, or designed landscapes that are of historic or aesthetic significance); and sites of traditional, religious, or cultural significance to Native American tribes.

Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (i.e., artifacts). Architectural resources include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to warrant consideration for the NRHP. More recent structures, such as Cold War-era resources, might warrant protection if they are of exceptional importance or have the potential to gain significance in the future. Resources of traditional, religious, or cultural significance to Native American tribes can include archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans consider essential for the preservation of their traditional culture.

3.12.2 Affected Environment

3.12.2.1 Regional Prehistory

The time when the New World was first inhabited by humans is known as the Paleoindian Period. The earliest well-established occupations in North America are associated with fluted projectile points that date around 10,000 B.C. In the western United States, Paleoindians are believed to have been highly mobile big-game hunters. The Paleoindian Period is followed by the Archaic Period in the Southwest (c. 8500 B.C.–A.D. 200) (Cordell 1984, Fagan 2005). Both of these periods are characterized by a shift to broad-spectrum hunting and gathering, including the exploitation of wild plants and small mammals. The Archaic Period is also characterized by the introduction of ground stone tools to process plants and the spread of the atlatl, or spearthrower, which extended the distance and velocity that a spear could be thrown.

In the Southwest, the late prehistoric period is characterized by ceramic production, horticulture or agriculture, and increased sedentism. Archaeologists recognize three major and two minor cultural traditions in the Southwest at this time (Cordell 1984). Three of these traditions extend near or across the U.S./Mexico international border. The Patayan tradition (after A.D. 875) is centered on the Colorado River and extends into southeast California and southwest Arizona. It is characterized by paddle-and-anvil pottery, hunting and floodplain agriculture, and pithouse dwellings. The Hohokam tradition (circa A.D. 400–1500) of south-central Arizona is characterized by paddle-and-anvil pottery, irrigation agriculture, single-unit rectangular dwellings, low-platform mounds, ball courts, and cremations. The Mogollon tradition (250 B.C.–A.D. 1450) extends from southeastern Arizona across southern New Mexico and into the westernmost part of Texas. It is characterized by red and brown scraped-and-polished pottery, equal dependence on hunting and agriculture, round pithouses and then rectangular dwellings, large ceremonial structures formally similar to houses, and inhumation (Fagan 2005). The late prehistoric period (after circa A.D. 900) is marked by the adoption of the bow and arrow and ceramic production.

3.12.2.2 Regional History

The first European expedition into Arizona was led by the Spanish Franciscan Marcos de Niza in 1539. Arizona was thereafter explored during a 1540–42 expedition led by Francisco Vásquez

de Coronado. The goal of this famous expedition was to find the fabled Seven Golden Cities of Cibola. Spanish missions were established in southern Arizona as early as the 1690s. The first Spanish presidio (fortified town) at Tubac, however, was not established until 1752. Tucson was founded 23 years later. On September 27, 1821, Spain recognized the independence of Mexico. This new country included what is today California, Arizona, New Mexico, and Texas. The Treaty of Guadalupe Hidalgo, signed on February 2, 1848, ended the Mexican-American war and formalized the border. The treaty also ceded California and much of modern-day Arizona and New Mexico to the United States. The remaining southernmost portions of modern-day Arizona and New Mexico were ceded to the United States under the Gadsden Purchase, which was ratified by the Senate on April 25, 1854. The modern U.S./Mexico international border was fully established at this time. Arizona became the 48th state on February 14, 1912.

3.12.2.3 Known Cultural Resources

In May 2010, HDR prepared a *Summary of Cultural Resources Management Reports from the Construction of Tactical Infrastructure, U.S.-Mexico International Border, California, Arizona, New Mexico, and Texas* (Church and Hokanson 2010). According to this study, 979.1 miles have been surveyed for cultural resources along the U.S./Mexico international border. A total of 458 archaeological sites, 164 historic structures, and 1 historic district were identified during these surveys. The following is a brief review of these data for Arizona.

A total of 282.7 miles was surveyed for cultural resources along the Arizona border as part of the Joint Task Force Six and Vehicle Fence 70 programs. Another 76.7 miles of project area and 35 acres (14.2 hectares) of construction staging areas were surveyed as part of the Vehicle Fence 300 and Pedestrian Fence 225 programs. The latter consists of 16.8 miles of fence in the Yuma Sector and 59.9 miles of fence and roads in the Tucson Sector. A total of 359.4 miles has therefore been surveyed to date along the U.S./Mexico international border in Arizona. These surveys identified 198 cultural resources, including 53 sites with prehistoric components and 29 border monuments. Data recovery or extensive subsurface testing was conducted at 14 sites.

3.12.3 Environmental Consequences

Adverse effects on cultural resources can include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or that alter its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

Ground-disturbing activities associated with the implementation of the proposed action constitute the most relevant potential impact on cultural resources.

3.12.3.1 Alternative 1: Proposed Action

Under the Proposed Action, ground-disturbing activities would be confined to the existing footprint of the tactical infrastructure. As a result, these activities have minimal or no potential to impact historic properties. The Proposed Action would therefore have no adverse effects on cultural resources.

Ground-disturbing activities under the Proposed Action would be covered by a PA between CBP, ACHP, SHPOs, and BLM. The specific activities covered by the agreement are defined in Stipulation IV of the PA. According to Stipulation IV, CBP is required to determine if all of the actions within the scope of an activity or project are included in the terms and conditions set forth in Stipulation IV. If so, CBP is required to document this determination in the project file. CBP may then proceed with the activity or project without further Section 106 review. If the activity or project is not composed entirely of the actions listed in Stipulation IV, CBP is required to conduct the applicable Section 106 review for the activities that are not listed. In other words, CBP is required to comply with Section 106 of the NHPA of 1966, as amended, and its implementing regulations (36 CFR 800) before conducting maintenance and repair activities. The normal Section 106 process would also be followed prior to any maintenance and repair activities occurring on the land of agencies that are not signatories to the PA.

The potential exists for the unanticipated discovery of cultural resources or human remains during the maintenance and repair of tactical infrastructure. Consequently, CBP would develop an Inadvertent Discovery Plan that details crewmember responsibilities for reporting in the event of a discovery during maintenance and repair activities. The plan would also include mitigation procedures to be implemented in the event of a significant unanticipated find. If human remains are discovered, CBP would adhere to the stipulations of Public Resources Code Section 5097.98 and Health and Safety Code 7050 and stop work within 15 meters (50 feet) of the discovery. CBP would then contact the county coroner and a professional archaeologist that meets the Secretary of the Interior's Professional Qualifications Standards in archaeology or history to determine the significance of the discovery. If appropriate, CBP would also adhere to NAGPRA and its implementing regulations (43 CFR 19). Depending on the recommendations of the coroner or the archaeologist, CBP would consult with the county to establish additional mitigation procedures. Potential mitigation procedures for unanticipated discoveries include avoidance, documentation, excavation, and curation. As a result, potential impacts on cultural resources discovered during the maintenance and repair of tactical infrastructure would be minor.

3.12.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, maintenance and repair would take place on an ad hoc basis. There would be no systematic program to maintain and repair tactical infrastructure. As a result, tactical infrastructure could degrade to the point that emergency repairs would be required, which could result in ground-disturbing activities outside the existing footprint of the tactical infrastructure. Ground-disturbing activities outside of the existing footprint could potentially disturb previously unidentified cultural resources. The No Action Alternative therefore has the potential to impact historic properties and have an adverse effect on cultural resources. The No Action Alternative does not guarantee that BMPs would be implemented during emergency repair activities.

There would be no PA under the No Action Alternative. As a result, undertakings with the potential to cause effects on historic properties would follow the review and mitigation procedures set forth in Section 106 of the NHPA. Unanticipated find procedures under the No Action Alternative would be identical to those of the Proposed Action.

3.13 ROADWAYS AND TRAFFIC

3.13.1 Definition of the Resource

The transportation resource is defined as the system of roadways and highways that are within or near to the region of analysis and could reasonably be affected by the proposed action. Traffic relates to changes in the number of vehicles on roadways and highways as a result of a proposed action.

3.13.2 Affected Environment

Arizona contains a multitude of roads within the region of analysis, including Interstate- (I) 8 and I-19, the two most heavily traveled highways in the region. I-8 extends from the border of California and Arizona and runs through a portion of the region of analysis before angling northeast to terminate near the city of Tucson. I-19 extends north-south from Tucson to Nogales. Other smaller, two-lane highways include U.S. Highway- (US) 95 near Yuma, Arizona Highway- (AZ) 85 near Organ Pipe Cactus National Monument, AZ-82 near Nogales, AZ-83 and AZ-92 near Sierra Vista, and US-191 and AZ-80 near Douglas. Numerous paved and unpaved tertiary roadways are present throughout much of the region of analysis.

The majority of roadways are classified as FC-3 and FC-4 roadways and extend across mostly undeveloped property. Due to the remoteness of the region, very little public traffic is present, and the USBP is the primary user of these roadways. Many roads proposed for maintenance and repair extend across the Barry M. Goldwater Range, the Tohono O'odham Indian Nation, the USFS property, and the BLM property.

FC-3 roads are crowned and often have storm water drainage ditches on either side. Features such as bridges, low water crossings, and security gates are present along many of these roads. FC-4 roads are unpaved, single-lane roads with limited grading and base material that measure approximately 10 feet wide. FC-4 roads usually are not crowned and do not have formal storm water drainage features. The primary function of the roadways proposed for maintenance and repair is to support USBP efforts to limit illegal border intrusion. Most of these roads extend across undeveloped land and the vast majority of vehicles to traverse these roads are USBP vehicles. Very little public traffic is present.

Common issues with the roadways proposed for maintenance and repair include flooding, erosion, and the overgrowth of vegetation. Improper management of storm water can cause water to pond at low points and create flooding deep enough to obstruct vehicles. Improper management of storm water can also cause erosion that leads to potholes and washouts. Over long periods, erosion can wash out entire sections of roadway and in many instances make roads impassable. Vegetative growth can encroach into the roadways creating obstructions and visual impairments.

CBP's current maintenance and repair regiment is generally designed to address issues as they occur. Obvious potholes, ruts, and washouts are repaired as issues are noticed, but preventative maintenance, such as properly crowning and grading roadways and removing debris from drainage ditches, often is not done until an issue has occurred. While such reactive maintenance

keeps roadways passable, it does not address long-term maintenance requirements. Gradual roadway degradation can occur from CBP's lack of a formal, long-term maintenance plan.

3.13.3 Environmental Consequences

Impacts on transportation are evaluated by the ability of existing roadways to accommodate changes in traffic. Adverse effects would occur if drivers experience high delays because the proposed maintenance and repair activities altered traffic patterns beyond existing lane capacity or resulted in the closures or detours of roadways.

3.13.3.1 Alternative 1: Proposed Action

Short-term, negligible to minor, adverse effects on transportation would be expected from the Proposed Action due to local increases in traffic from the vehicles conducting maintenance and repair activities. Long-term, minor to moderate, beneficial effects on transportation would be expected by preventing the roadways from falling into disrepair and improving the conditions of those roadways that have already fallen into disrepair. Periodic maintenance would lessen the potential for the gradual degradation of the roadways rather than only making small-scale, reactionary repairs as is currently done (see **Section 3.13.3.2**). Periodic maintenance would ensure that roadways adhere to national quality standards.

Traffic impacts would be most notable closer to the location of a given repair and maintenance effort and less noticeable farther away. Larger highways such as I-8 and the two-lane Arizona highways would experience no noticeable change in traffic volume. A slight increase in traffic volume on the smaller, single-lane roadways might be noticeable but would affect very few people due to the remoteness of the region. Due to the limited number of vehicles anticipated to be needed for the proposed maintenance and repair activities, impacts on traffic volume would be negligible to minor.

The tactical infrastructure maintenance and repair activities focusing on the roadways themselves would likely cause short-term roadway closures and detours while work is underway. Because most of the roadways proposed for maintenance and repair are used solely by CBP, the public would not be impacted by these roadway closures or detours. The roadway closures and detours would be temporary and CBP would experience only minor disruptions to daily efforts to limit illegal border intrusion. All tactical infrastructure maintenance and repair efforts would be spread over many years and would be scattered across the entire region of analysis in Arizona. As such, all short-term effects on transportation are expected to be limited.

It is possible that the Proposed Action would result in increased public use of access roads. For areas already authorized for unrestricted public access, improving road maintenance would result in a long-term, beneficial effect. For protected areas, such as wilderness areas, road maintenance would be coordinated with the land management agency to ensure that any potential for increased public use would be consistent with the agency's policies. Improvements to the quality of roads used by USBP would allow for faster, safer, and more efficient responses to threats. Better quality roads would lessen the wear-and-tear on USBP vehicles and minimize the potential for blown tires, damaged vehicle components, and stuck vehicles. Improvements to these roadways would not increase the amount of long-term traffic because USBP patrols would

not increase in frequency and most of the roads proposed for repair and maintenance are not accessible by the public.

3.13.3.2 Alternative 2: No Action Alternative

The No Action Alternative would result in the continuation of the existing CBP roadway maintenance and repair procedures as described in **Section 3.13.3.1**. The roadways proposed by CBP for maintenance and repair under the No Action Alternative would continue to be repaired on an as-needed basis. As such, most roadway repairs would be reactive to immediate issues affecting these roadways and would not address the long-term maintenance requirements. Repairs performed on an as-needed basis would not be considered sustainable in quality because it would result in gradual degradation of these roadways. The No Action Alternative would result in greater impacts on roadways and traffic than the Proposed Action. The No Action Alternative could entail larger and longer disruptions in the flow of traffic due to reactionary maintenance and repair activities that potentially require greater attention than those associated with a preventative maintenance plan. Conversely, the periodic maintenance and repair activities as discussed under the Proposed Action would result in more occurrences of minor roadwork, which would be anticipated to result in a shorter disruption to the flow of traffic. Therefore, the No Action Alternative would result in greater short-term, and less long-term, impacts on roadways and traffic when compared to the Proposed Action.

3.14 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

3.14.1 Definition of the Resource

Hazardous materials are defined by 49 CFR 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions" in 49 CFR Part 173. Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations within 49 CFR Parts 105–180.

A hazardous substance, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. §9601(14)), is defined as "(A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33; (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, (42 U.S.C. §6921); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any HAPs listed under section 112 of the CAA (42 U.S.C. §7412); and (F) any imminently hazardous chemical substance or mixture which the Administrator of USEPA has taken action pursuant to section 2606 of Title 15." The term hazardous substance does not include petroleum products.

Hazardous wastes are defined by RCRA at 42 U.S.C. §6903(5), as amended by the Hazardous and Solid Waste Amendments, as: "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or

otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR Part 273.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). The USEPA is given authority to regulate these special hazard substances by the Toxic Substances Control Act (TSCA) Title 15 U.S.C. Chapter 53. USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR Part 763 with additional regulation concerning emissions (40 CFR Part 61). Whether from lead abatement or other activities, depending on the quantity or concentration, the disposal of the LBP waste is potentially regulated by the RCRA at 40 CFR 260. The disposal of PCBs is addressed in 40 CFR Parts 750 and 761.

Pesticides are regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 (40 CFR Parts 150–189). In 1972, Congress enacted the Federal Environmental Pesticide Control Act, which amended FIFRA by specifying methods and standards of control in greater detail. Subsequent amendments have clarified the duties and responsibilities of the USEPA. These regulations stipulate the USEPA must regulate all pesticides that are sold and distributed in the United States. The term "pesticides" includes pesticides, herbicides, rodenticides, antimicrobial products, biopesticides, and other substances used to control a wide variety of pests.

EO 12088, *Federal Compliance with Pollution Control Standards*, as amended, directs Federal agencies to (1) comply with "applicable pollution control standards," in the prevention, control, and abatement of environmental pollution; and (2) consult with the USEPA, state, interstate, and local agencies concerning the best techniques and methods available for the prevention, control, and abatement of environmental pollution.

Evaluation of hazardous materials and wastes focuses on the storage, transport, handling, and use of pesticides, herbicides, petroleum products, fuels, solvents, and other hazardous substances. Evaluation also extends to generation, storage, transportation, and disposal of hazardous wastes when such activity occurs at or near the project site. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of release of hazardous materials or wastes, the extent of contamination varies based on the type of soil, topography, and water resources.

Solid waste management primarily relates to the availability of landfills to support a population's residential, commercial, and industrial needs. Alternative means of waste disposal include waste-to-energy programs and incineration. In some localities, landfills are designed specifically for, and limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, papers, asphalt, and concrete) reduce reliance on landfills for disposal.

3.14.2 Affected Environment

The management of hazardous substances, petroleum products, hazardous and petroleum wastes, pesticides, solid waste, ACMs, LBP, and PCBs is regulated by Federal and state agencies. Each state has its own regulatory agency and associated regulations. The state agencies either adopt the Federal regulations or have their own regulations that are more restrictive than the Federal regulations. The following sections address the regulatory agencies and existing conditions of these materials.

Likewise, the Federal government and state agencies also have regulations for the handling, disposal, and remediation of special hazards; however, the nature and age of the tactical infrastructure is such that the handling or disposal of these materials is unlikely for the activities associated with the Proposed Action.

Hazardous Substances, Petroleum Products, and Hazardous and Petroleum Wastes. The ADEQ Waste Programs Division regulates the management of hazardous substances, petroleum products, and hazardous and petroleum wastes in Arizona. The ADEQ's hazardous waste inspection and compliance program ensures that facilities are treating, storing, and disposing of hazardous wastes in accordance with the regulations. The ADEQ Waste Programs Division also regulates the operation of aboveground storage tanks (ASTs) and underground storage tanks (USTs). The ADEQ's pollution prevention program requires businesses to reduce toxic substances at the source, minimize the generation of hazardous waste, and prevent the release of pollutants to the environment. It requires all industrial facilities within a certain threshold of hazardous waste generation and toxic substance use to perform a pollution prevention analysis and to file an annual Pollution Prevention Plan.

USBP or its contractors store, transport, handle, use, generate, and dispose of various types and quantities of hazardous substances, petroleum products, and hazardous and petroleum wastes as a result of conducting tactical infrastructure maintenance and repair activities. These materials are used for or are generated directly from maintenance and repair activities. The primary hazardous substances and petroleum products used likely include materials such as lead-acid batteries, motor oil, antifreeze, paint and paint thinners, cleaners, hydraulic oils, lubricants, and liquid fuels (diesel and gasoline). The hazardous substances, petroleum products, and hazardous and petroleum wastes are stored at various USBP or contractor maintenance shops and managed in accordance with each group's respective hazardous materials standard operating procedures. The hazardous and petroleum wastes are recycled or disposed of offsite in accordance with Federal, state, and local regulations.

USBP stations within the Arizona tactical infrastructure area that are listed in the USEPA RCRAInfo database are Yuma and Nogales. Both of these stations are listed as inactive RCRA hazardous waste handlers with no current permit (USEPA 2011a).

There are several public and private storage areas, facilities, maintenance areas, and other operations that store, transport, handle, use, generate, and dispose of various types and quantities of hazardous substances, petroleum products, and hazardous and petroleum wastes within and near the region of analysis (CBP 2008a, CBP 2008b). There is one active National Priorities List site (U.S. Marine Corps Air Station Yuma; USEPA ID: AZ0971590062) within the region of analysis (USEPA 2011b).

Pesticides. The Arizona Department of Agriculture Environmental Services Division and the State Office of Pest Management are jointly responsible for the oversight of pesticide production and use, and worker and sensitive populations' safety in Arizona. The main duties performed by these agencies are to register and license pesticide companies or products in accordance with Federal and state laws, and enforce pesticide use compliance to ensure established buffer zones are adhered to, environmental concerns are met, and people are protected.

USBP or its contractors currently use small quantities of herbicides for vegetation control in the region of analysis. The herbicides are stored at various USBP or contractor maintenance shops and applied by certified personnel in accordance with label requirements.

The region of analysis is heavily agricultural, with elaborate irrigation systems fed by the Colorado River, and, therefore, are likely to have a large number of pesticide storage facilities and a large volume of pesticide applications.

Solid Wastes. Solid wastes in Arizona are regulated by a combination of mandated laws promulgated by the Federal, state, and regional Councils of Government. The ADEQ Waste Programs Division regulates the treatment, storage, transport, and disposal of solid waste in Arizona.

USBP or its contractors currently generate, store, transport, and dispose of various types and quantities of solid wastes due to performing tactical infrastructure maintenance and repair activities on an as-needed basis. The solid waste generally consists of vegetation (e.g., tree trimmings) and construction materials (e.g., damaged infrastructure). They are temporarily stored at various USBP or contractor maintenance shops prior to offsite recycling or disposal in accordance with Federal, state, and local regulations.

There are several public and private storage areas, facilities, maintenance areas, and other operations that generate, store, transport, and dispose of solid wastes within and near the region of analysis.

3.14.3 Environmental Consequences

Impacts on hazardous materials management would be considered significant if a proposed action resulted in worker, resident, or visitor exposure to these materials. Impacts on hazardous materials management would be considered significant if the Federal action resulted in noncompliance with applicable Federal and respective state regulations, or increased the amounts generated or procured beyond current CBP hazardous materials management procedures and capacities.

An effect on solid waste management would be significant if the proposed action exceeded existing capacity or resulted in a long-term interruption of waste management, a violation of a permit condition, or a violation of an approved plan for that utility.

3.14.3.1 Alternative 1: Proposed Action

Long-term, negligible to minor, adverse impacts on hazardous substances, petroleum products, hazardous and petroleum wastes, and pesticides would be expected from implementation of the Proposed Action. Maintenance vehicles containing hazardous substances and petroleum

products would be deployed more frequently, increasing the probability of a spill or release. Greater volume of these materials could be required under the Proposed Action than under the No Action Alternative. Prior to pesticide application, ADEQ would be consulted for the appropriate permits or instruction on the quantity and approved application techniques.

No impacts on ACMs, LBP, or PCBs would be expected from implementation of the Proposed Action as the tactical infrastructure it is not anticipated to contain ACMs, LBP, or PCBs. If maintenance and repair activities require disturbance of a known or encountered solid waste landfill, ADEQ would be consulted prior to disturbance to significantly reduce or eliminate any potential exposure to ACMs, LBP, or PCBs that might be in the landfill.

No impacts on solid waste would be expected. The volumes of solid waste produced during the repair and maintenance activities would be minimal and are not anticipated to increase.

3.14.3.2 Alternative 2: No Action Alternative

No impacts on hazardous substances, petroleum products, hazardous and petroleum wastes, or pesticides would be expected from the implementation of No Action Alternative as the existing storage, transport, handling, use, generation, and disposal of hazardous substances, petroleum products, and hazardous and petroleum wastes as described in **Section 3.14.2** would continue.

No impacts on ACMs, LBP, or PCBs would be expected from implementation of the No Action Alternative. As stated in **Section 3.14.2**, due to the nature and age of the tactical infrastructure, it is not anticipated to contain these materials. If maintenance and repair activities require disturbance of a known or encountered solid waste landfill, the respective state regulatory agency would be consulted prior to disturbance to significantly reduce or eliminate any potential exposure to ACMs, LBP, or PCBs that might be in the landfill.

Long-term, negligible to minor, adverse impacts on solid waste would be expected from implementation of the No Action Alternative. This alternative is reactive in nature and could eventually result in greater deterioration of tactical infrastructure over time due to lack of preventative maintenance, which could result in more frequent maintenance and repair of tactical infrastructure. This could create greater volumes of solid waste. The No Action Alternative does not guarantee that all BMPs would be implemented during emergency repair activities. Therefore, the No Action Alternative would result in greater impacts associated with hazardous materials and wastes than the Proposed Action.

3.15 SOCIOECONOMIC RESOURCES, ENVIRONMENTAL JUSTICE, AND PROTECTION OF CHILDREN

3.15.1 Definition of the Resource

Socioeconomic Resources. Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Factors that describe the socioeconomic environment represent a composite of several interrelated and nonrelated factors. There are several factors that can be used as indicators of economic conditions for a geographic area, such as median household income, employment and unemployment rates, percentage of residents living below the poverty level, and employment by business sector. Data on employment can identify gross numbers of employees, employment by

industry or trade, and unemployment trends. Data on household income in a region can be used to compare the before and after effects of any jobs created or lost as a result of a proposed action. Data on industrial, commercial, and other sectors of the economy provide baseline information about the economic health of a region. After the project, the same data can be gathered again to analyze any impacts from the proposed action to the economic health of the region.

Environmental Justice. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued on February 11, 1994, by President Clinton, and pertains to environmental justice issues and relates to various socioeconomic groups and the health effects that could be imposed on them. This EO requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The EO was created to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of a proposed action.

Protection of Children. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that each Federal agency "(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

3.15.2 Affected Environment

The geographical area in which a majority of the socioeconomic, environmental justice, and protection of children effects for the alternatives might occur is defined as the region of influence (ROI). The ROI is considered a primary impact area because it could receive direct and indirect socioeconomic impacts from the proposed maintenance and repair of tactical infrastructure. The ROI for this EA is composed of the counties along the U.S./Mexico international border in Arizona: Cochise, Pima, Santa Cruz, and Yuma. Data and analysis pertaining to housing, schools, and community services within the ROI is excluded from the socioeconomic analysis as the alternatives would not likely result in drastic increases or decreases in demographics or employment characteristics. Subsequently, impacts on the housing market, schools, or community services would not be expected under the proposed alternatives. Therefore, analysis of the housing market, schools, or community services is dismissed from further detailed analysis.

Socioeconomic Resources

The socioeconomic baseline conditions are presented using three spatial levels: (1) county-level data for the ROI, (2) state-level data for Arizona, and (3) national-level data. County-level data are included in the analysis to provide a baseline condition. Data for Arizona and the United States are included for comparative purposes.

Demographic Characteristics. The southwestern region of the United States has been characterized by robust population growth over the past 20 years. During the period from

1990 to 2009, the population in Arizona increased 73 percent, an increase of nearly 3 million people from 3.65 million in 1990 to 6.32 million in 2009. Growth in Arizona by percentage was much greater than the United States from 1990 to 2009. The United States grew 21 percent from 1990 to 2009 with population increasing from 248.7 million in 1990 to 301.5 million in 2009 (U.S. Census Bureau 1990, U.S. Census Bureau 2009).

Approximately 373 miles of the U.S./Mexico international border occurs within four counties in Arizona: Cochise, Pima, Santa Cruz, and Yuma. From 1990 to 2009 Yuma County's population growth was similar to Arizona, with 77 percent and 73 percent growth, respectively. In Yuma County, the population grew from approximately 106,000 people in 1990 to 189,000 people in 2009. Over the 19-year period ending in 2009, population growth in Cochise, Pima, and Santa Cruz counties was 31 percent, 48 percent, and 43 percent, respectively. The growth rate for each of these counties was greater than the United States at 21 percent, but less than Arizona at 73 percent. Pima County, which contains the City of Tucson, experienced the largest numerical increase in population, with an increase of 330,000 people reported between 1990 and 2009 (U.S. Census Bureau 1990, U.S. Census Bureau 2009). Complete population data for the four counties, Arizona, and the United States are displayed in **Table 3-11**.

Table 3-11. Population Estimates for Border Counties in Arizona, the State of Arizona, and the United States, 1990, 2000, and 2009

Geographic Area	1990	2000	2009	Percent Change		
				1990 to 2000	2000 to 2009	1990 to 2009
Cochise County	97,624	117,755	127,613	21%	8%	31%
Pima County	666,880	843,746	990,213	27%	17%	48%
Santa Cruz County	29,676	38,381	42,550	29%	11%	43%
Yuma County	106,895	160,026	188,983	50%	18%	77%
Arizona	3,665,228	5,130,632	6,324,865	40%	23%	73%
United States	248,709,873	281,421,906	301,461,533	13%	7%	21%

Sources: U.S. Census Bureau 1990, U.S. Census Bureau 2000, U.S. Census Bureau 2009

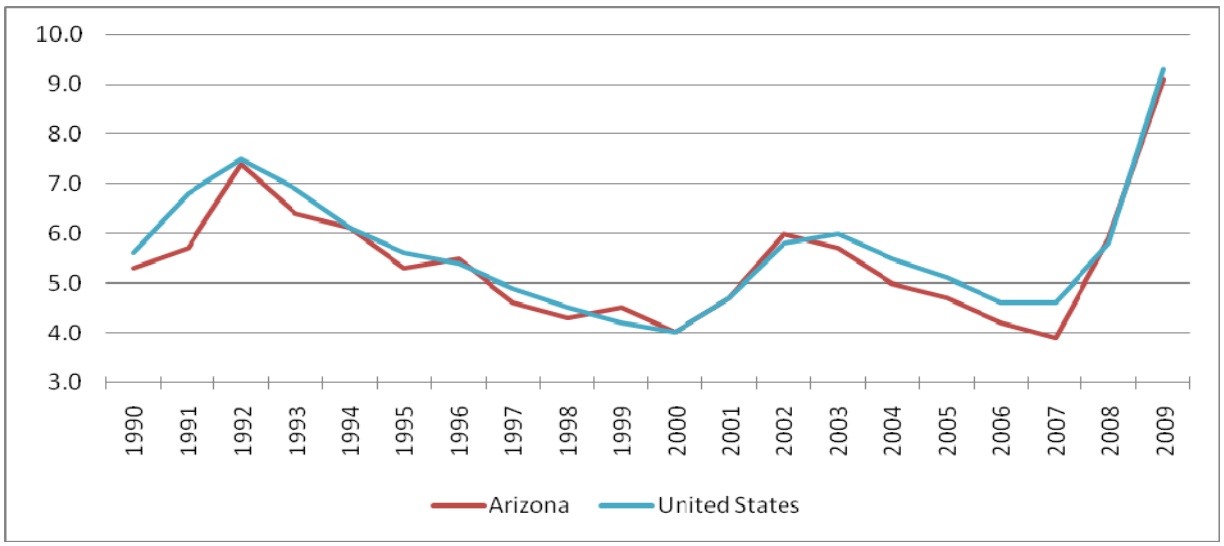
Employment Characteristics. The largest percentage of people employed by industry in Arizona and the United States is in the educational services, and health care and social assistance industry, composing approximately 19 and 22 percent respectively of all employed positions for these regions. The second largest industry is the retail trade industry accounting for approximately 12 percent of all those employed in Arizona and the United States. The agriculture, forestry, fishing and hunting, and mining industry is the smallest industry by percentage of those employed in Arizona (1.3 percent) and the United States (1.8 percent) (U.S. Census Bureau 2009). **Table 3-12** contains data for Arizona and the United States for all 13 industries as defined by the U.S. Census Bureau.

Table 3-12. Employment by Industry in Arizona and the United States by Percentage, 2009

Industry	Arizona	United States
Population 16 years and over in labor force	1,895,684	94,056,060
Agriculture, forestry, fishing and hunting, and mining	1.3	1.8
Construction	9.9	7.4
Manufacturing	7.9	11.2
Wholesale trade	2.9	3.2
Retail trade	12.1	11.5
Transportation and warehousing, and utilities	4.9	5.1
Information	1.9	2.4
Finance and insurance, and real estate and rental and leasing	8.3	7.1
Professional, scientific, and management, and administrative and waste management services	11.1	10.3
Educational services, and health care and social assistance	19.4	21.5
Arts, entertainment, and recreation, and accommodation and food services	10.2	8.8
Other services, except public administration	4.7	4.8
Public administration	5.2	4.7

Source: U.S. Census Bureau 2009

Figure 3-1 displays unemployment data for Arizona and the United States. From 1990 to 2000, Arizona and the United States follow a similar trend. From 2004 to 2009, the unemployment rate in Arizona was less or similar to the unemployment rate for the United States. The highest annual unemployment occurred in 2009. In Arizona, the lowest unemployment rate was in 2007 with 3.9 percent unemployment. In the United States, the annual unemployment rate was lowest in 2000, at 4.0 percent (BLS 2010).



Source: BLS 2010

Figure 3-1. Annual Unemployment Rates for Arizona and the United States, 1990 – 2009

The largest percentage of people employed within one industry in Cochise, Pima, and Yuma counties is the educational services, and health care and social assistance industry with 20 percent, 24 percent, and 17 percent, respectively, relatively similar to Arizona overall at 20 percent. In Santa Cruz County, the retail trade industry is the largest with 18 percent of all persons employed, and the educational services, and health care and social assistance industry employs 17 percent of the population 16 years and older. The smallest industry in Yuma County is the information industry, composing 1 percent of all positions. In Pima and Santa Cruz counties, the smallest industry is the agriculture, forestry, fishing and hunting, and mining industry with 1 percent and 2 percent respectively. The wholesale trade industry in Cochise County accounts for approximately 1 percent of all positions by industry (U.S. Census Bureau 2009).

Racial, Ethnic, and Youth Population Characteristics. The southwestern United States contains a large Hispanic or Latino population. The Hispanic or Latino population in Arizona (30 percent) is much larger when compared to the United States (15 percent). The American Indian/Alaskan Native population accounts for 4 percent of the population in Arizona, compared to less than 1 percent for the entire United States. The Black or African-American population in Arizona was less by percentage when compared to the United States. The percentage of the population younger than 18 years of age in the United States was estimated at 25 percent. In Arizona, the percentage of the population younger than 18 years of age is 26 percent (U.S. Census Bureau 2009). **Table 3-13** lists the racial and ethnic characteristics for the border region.

Table 3-13. Racial and Ethnic Characteristics for Border Counties in Arizona, the State of Arizona, and the United States 2009

Race and Ethnicity	Cochise County	Pima County	Santa Cruz County	Yuma County	Arizona	United States
Total Population	127,613	990,213	42,550	188,983	6,324,865	301,461,533
Percent of population younger than 18	24.6	23.7	32.5	29.4	26.4	24.6
White	59.1	57.2	18.7	39.2	58.5	65.8
Black or African American	4.0	3.1	0.1	1.8	3.4	12.1
American Indian and Alaska Native	0.8	2.5	0.5	1.0	4.1	0.7
Asian	1.8	2.4	0.3	1.0	2.4	4.3
Native Pacific Islander	0.3	0.1	0.5	0.1	0.2	0.1
Some Other Race	0.1	0.3	0.0	0.2	0.2	0.2
Two or More Races	2.4	1.6	0.1	1.0	1.5	1.6
Hispanic or Latino	31.5	32.8	79.9	55.7	29.8	15.1

Source: U.S. Census Bureau 2009

Environmental Justice and the Protection of Children

The four counties along the U.S./Mexico international border in Arizona contain varying levels of minority populations. In Santa Cruz County, nearly 80 percent of the population is identified as Hispanic or Latino, which is greater than the 30 percent Hispanic or Latino population in Arizona. Yuma County also contains a large Hispanic or Latino population at 56 percent of the overall population. The remaining two counties, Cochise and Pima, contain Hispanic or Latino populations similar to Arizona, at 32 percent and 33 percent, respectively. Cochise and Pima counties contain a youth population (25 percent and 24 percent, respectively) that is smaller by percentage when compared to Arizona (26 percent). In Santa Cruz and Yuma counties, the youth population is slightly larger by percentage (33 percent and 30 percent, respectively) when compared to Arizona (26 percent) (see **Table 3-13**) (U.S. Census Bureau 2009).

Low-income and Poverty Characteristics. The overall poverty rate and rate of families living below the poverty level in Arizona is 14.7 percent and 10.5 percent, respectively. These rates are similar to the overall poverty rate and families living in poverty rate in the United States, which are 13.5 percent and 9.9 percent, respectively (U.S. Census Bureau 2009).

The median household income in Arizona was similar when compared to the United States. In Arizona, the median household income is $50,296, similar to the $51,425 median household income for the United States (U.S. Census Bureau 2009).

The four counties along the U.S./Mexico international border in Arizona contain poverty rates greater than Arizona overall. Median household incomes in the four counties are less than Arizona's median household income. The lowest median household income was in Santa Cruz County at $37,204, $13,092 less than Arizona's median household income. Santa Cruz County also contained the largest overall poverty rate and family poverty rate of the four counties examined. See **Table 3-14** for complete poverty rate data for Arizona (U.S. Census Bureau 2009).

Table 3-14. Poverty Rates and Median Household Income for Border Counties in Arizona

Geographic Area	Overall Poverty Rate	Family Poverty Rate	Median Income
Cochise County	16.3	12.5	$43,304
Pima County	15.7	10.7	$45,885
Santa Cruz County	22.1	17.9	$37,204
Yuma County	19.9	16.8	$38,854
Arizona	14.7	10.5	$50,296
United States	13.5	9.9	$51,425

Source: U.S. Census Bureau 2009

3.15.3 Environmental Consequences

Socioeconomic Resources. Project-related expenditures are assessed in terms of direct effects on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly, depending on the location of a proposed action.

For example, implementation of an action that creates ten employment positions might go unnoticed in an urban area, but could have considerable impacts in a rural region. If potential socioeconomic changes were to result in substantial shifts in population trends or a decrease in regional spending or earning patterns, those effects would be considered adverse. A proposed action could have a significant effect with respect to the socioeconomic conditions in the surrounding ROI if the following were to occur:

- Change the local business volume, employment, personal income, or population that exceeds the ROI's historical annual change
- Disproportionately impact minority populations or low-income populations.

Environmental Justice and Protection of Children. Ethnicity and poverty data are examined for the counties along the U.S./Mexico international border in Arizona to determine if a low-income or minority population could be disproportionately affected by a proposed action.

3.15.3.1 Alternative 1: Proposed Action

Socioeconomic Resources. Maintenance and repair of tactical infrastructure under the Proposed Action would have short-term, minor, direct and indirect, beneficial impacts on socioeconomics through increased employment and the purchase of goods and services. Direct impacts on employment and the procurement of material supplies would be minor and short-term and would not overburden the available supply. No permanent changes to the CBP workforce would be expected as a result of this alternative.

Short-term, minor, direct and indirect, adverse and beneficial impacts on demographics would be expected during periods when maintenance and repair occur. Short-term, minor increases in population might occur during times of maintenance and repair. It is assumed that many of the workers needed for this alternative would be drawn from the regional workforce and would not require the permanent relocation of workers from outside the area. The construction industry within each area would adequately be able to meet the demand for workers. The short-term nature and scale of the Proposed Action would not induce indirect population growth in the region.

It is assumed that materials for maintenance and repair would be sourced locally and local contractors would be used. In addition, many of the workers needed for the maintenance and repair would likely be employed within the regional construction industry. Incremental gains to the construction industry might occur to fulfill an increased demand for workers. Each job created by implementation of the Proposed Action would generate additional revenue and could create jobs within companies that supply goods and services. Creation of any long-term employment in the region would not be anticipated.

Direct beneficial impacts would result from increases to payroll earnings and taxes and the purchase of materials required for the Proposed Action. Indirect beneficial impacts would result from increases in expenditures on goods and services. No permanent or long-term impacts on employment, population, personal income, poverty levels, or other demographic or employment indicators would be expected.

Environmental Justice and the Protection of Children. Much of the tactical infrastructure that would be maintained and repaired as a part of the tactical infrastructure to be maintained and repaired runs through or adjacent to many rural settlements, small towns, and neighborhoods within larger cities. Property owners and residents might be affected by visual intrusion, noise, and temporary disruptions during maintenance activities. Any impacts would be short-term in nature and would be in compliance with BMPs identified in **Appendix E**.

The Proposed Action would have short- to long-term, indirect, beneficial impacts on protection of children in the areas along the U.S./Mexico international border. The maintenance and repair of tactical infrastructure would allow USBP agents to perform their mission. As a result, the Proposed Action would indirectly help to deter cross-border violators in the immediate area, which in turn could prevent drug smugglers, terrorists, and terrorist weapons from entering the surrounding area.

3.15.3.2 Alternative 2: No Action Alternative

Under the No Action Alternative, there would be no change from the baseline conditions. Overall maintenance requirements for tactical infrastructure along the U.S./Mexico international border in Arizona would not be addressed. In addition, the tactical infrastructure would not be considered sustainable in quality, resulting in the gradual degradation. If the No Action Alternative were implemented, short-term local employment benefits from the purchase of maintenance and repair materials and a temporary increase in maintenance and repair jobs would not occur. Furthermore, money from maintenance and repair payrolls that would circulate throughout the local economies would not occur. The Proposed Action would result in greater benefits to socioeconomics than the No Action Alternative because maintenance and repair work would occur on a periodic basis, providing a more stable source of income for workers and the local economy.

4. CUMULATIVE AND OTHER ADVERSE IMPACTS

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time by various agencies (Federal, state, and local) or individuals. Informed decisionmaking is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

This cumulative impacts analysis summarizes expected environmental effects from the combined impacts of past, current, and reasonably foreseeable future activities in accordance with Directive 023-01, *Environmental Planning Program,* which states that proper consideration of cumulative effects should be completed as part of the NEPA process. For the purposes of this EA, consideration was given to cumulative impacts of CBP maintenance and repair of tactical infrastructure activities on federally owned land, private land, and tribal land. The geographic scope of the analysis varies by resource area. Projects that were considered for this analysis were identified by reviewing CBP documents. Maintenance and repair projects that do not occur in close proximity (i.e., within several miles) of the project area would not be expected to contribute to a cumulative impact and are generally not evaluated further.

4.1 PROJECTS IDENTIFIED WITH THE POTENTIAL FOR CUMULATIVE EFFECTS

Past Actions

Past actions are those CBP maintenance and repair actions that occurred within the geographic scope of cumulative effects prior to the development of this EA. Past actions have shaped the current environmental conditions in close proximity (i.e., within several miles) to the proposed infrastructure. Therefore, the effects of identified past actions are now part of the existing environment, and are generally included in the affected environment described in **Section 3**.

Cumulative Tactical Infrastructure in Arizona

As discussed in **Section 1** of this EA, CBP constructed a substantial amount of tactical infrastructure along the U.S./Mexico international border under the Secretary's waiver. CBP prepared ESPs to analyze the potential environmental impacts associated with construction and maintenance of tactical infrastructure covered by the waiver. Tactical infrastructure has also been constructed that was not covered under the waiver but was analyzed in other NEPA documents. **Table 4-1** summarizes recently constructed tactical infrastructure within the USBP Yuma and Tucson sectors. For the purposes of the cumulative impacts analysis, this summary includes tactical infrastructure subject to maintenance and repair on reservation lands of the Quechan and Cocopah tribes and the Tohono O'odham Nation. **Table 4-2** summarizes total tactical infrastructure, including assets analyzed in this Proposed Action, to be cumulatively maintained by CBP. It is reasonable to assume that CBP will continue to construct and install tactical infrastructure assets similar to those described in **Table 4-1**, adding to the totals in **Table 4-2**. Future actions would require separate NEPA analysis.

Table 4-1. Descriptions of Other Recent Tactical Infrastructure in Arizona

USBP Sector	Description of Recent Tactical Infrastructure Covered under Waiver or NEPA Documentation
Yuma	• C-1. 10.3 miles of primary pedestrian fence (including 4 miles of "floating" PV-4 fence meant for use in sand dunes) and maintenance road primarily within the Algodones Dunes Recreational Area in the vicinity of the Andrade POE in Imperial County, California [a] Approximately 0.8 miles of primary pedestrian fence along Quechon Indian Reservation land. • C-2B. 3.9 miles of primary pedestrian wire mesh fence, access gates, and maintenance road along the Salinity Canal west of San Luis in Yuma County, Arizona [a] • CV-2. 8.82 miles of vehicle fence and 28 miles of roads within the Roosevelt Reservation adjacent to Cabeza Prieta NWR in Yuma County, Arizona [b] • CV-2A. 1.6 miles of vehicle fence with approximately 3.1 miles of existing roads within the Roosevelt Reservation adjacent to Cabeza Prieta NWR in Yuma County, Arizona [b] • CV-1A. 4.5 miles of vehicle fence with approximately 0.5 miles of roads from Morales Dam south to West County 13th Street near Yuma, Arizona [b] • CV-1B. Approximately 2.25 miles of vehicle fence along Cocopah Indian Reservation land.
Tucson	• DV-3A, DV-3B, DV-4A, and DV-4B. Approximately 50 miles of vehicle fence along Tohono O'odham Nation land. • D-5B/D-6. 7.5 miles of primary pedestrian fence (Bollard-style) with use of Normandy vehicle fence in floodplain areas, and maintenance roads beginning east of the DeConcini POE in Santa Cruz County, Arizona [c] • E2A. 6.3 miles of primary pedestrian fence (Bollard-style, estimated at 5.8 miles long) with use of Normandy vehicle fence and post-on-rail fence (estimated at 0.5 miles long) at the termini, and access/maintenance roads on the western edge of the San Pedro River extending westward into the Coronado National Forest in Cochise County, Arizona [c] • EV-1A/EV-1B. 13.9 miles of vehicle fence (Normandy and post-on-rail-styles) within the Roosevelt Reservation in the San Rafael Valley in Santa Cruz and Cochise counties, Arizona [d] • FV-1B. 16.5 miles of vehicle fence (post-on-rail-style) and 8.0 miles of roads within the Roosevelt Reservation in the San Rafael Valley near the City of Douglas within Cochise County, Arizona [d] • Other. 2.8 miles of primary fence in downtown Nogales, Arizona (construction will begin on this project in 2011 to repair and replace existing, degraded pedestrian fence with Bollard-style pedestrian fence), and 6 to 8 miles of road and 22 miles of roads west of Nogales, Arizona (construction will last from 2011 through 2014) [e]

Sources:
a CBP 2010b
b CBP 2010c
c CBP 2010d
d CBP 2010e
e CBP 2010f

For the purposes of this cumulative effects analysis, long-term effects that would be expected as a result of maintenance and repair of tactical infrastructure along the U.S./Mexico international border in Arizona are discussed further. Segment C-1 is within Imperial County, California, but it is included in this cumulative effects analysis because of its potential proximity to other USBP Yuma Sector tactical infrastructure. Construction activities have already occurred, so adverse

effects identified as a result of construction activities are not discussed unless some unique aspect of that project segment warrants further discussion.

Table 4-2. Summary of All Tactical Infrastructure Assets in Arizona

Asset (units)	Approximate Total
Fences and Gates (miles)	300
Roads and Integrated Bridges/Crossovers (miles)	1,200
Drainage Management Structures (number)	250
Vegetation Control Areas (miles)	16
Boat Ramps (number)	1
Lighting and Ancillary Power Systems	550
RVSSs (number of towers)	80
Equipment Storage Areas (acres)	290

Note: Table is based on GIS data from Baker dated 25 July 2011. Totals provided should be considered approximate as asset data are refined and added.

Fence maintenance and repair would either be performed by the respective USBP Sector personnel or contracted personnel. The fences are composed of nonreflective steel, and no painting is required. Fence maintenance includes removing any accumulated debris on the fence after a rain event to avoid potential future flooding. Sand and brush that builds up against the fence are also removed as needed. Brush removal could include mowing, removal of small trees, and application of herbicide if needed. During normal patrols, sector personnel observe the condition of the fence. Any destruction or breaches of the fence are repaired, as needed. Maintenance and repair activities associated with other tactical infrastructure, including roads and bridges/crossovers, drainage structures and grates, lighting and ancillary power systems, vegetation control and debris/trash removal, and RVSS components, would be similar to those described in **Section 2.2** of this EA.

4.2 CUMULATIVE ANALYSIS BY RESOURCE AREA

This section presents the resource-specific impacts related to the past, present, and reasonably foreseeable future CBP maintenance and repair activities previously discussed in **Section 4.1**.

4.2.1 Alternative 1: Proposed Action

Implementation of the Proposed Action (Alternative 1) is CBP's preferred alternative, which would result in maintenance and repair activities occurring via a periodic work plan. Maintenance and repair activities would be implemented based on prioritization and funding within each sector. Implementation of the Proposed Action would not be expected to contribute to significant adverse cumulative effects when considered with other recently completed or planned future projects in the region of analysis.

4.2.2 Land Use

Most areas along the U.S./Mexico international border are remote and contain agricultural and open space land uses, many of which are managed or protected by the Federal government. The maintenance and repair of tactical infrastructure would have no effect on land use plans or policies. Maintenance and repair activities involve work on existing infrastructure, so there would be no change in long-term land uses. Cumulatively, the Proposed Action and other tactical infrastructure maintenance and repair activities would not contribute to adverse effects on land use.

4.2.3 Geology and Soils

The potential for effects on geology and soils is generally limited to areas where ground disturbance would occur, so cumulative effects would be expected only where multiple projects are occurring at the same time and in the same vicinity. When considered individually, the Proposed Action and other tactical infrastructure repair and maintenance projects would be expected to result in short-term, minor, adverse effects that are localized to the areas where ground disturbance has occurred; there would be no new areas of development. Use of herbicides could also result in localized short-term and long-term, adverse effects due to increased erosion and sedimentation from a decrease in vegetative cover. Long-term, beneficial effects would be expected from stabilization of roadways and drainage structures. Cumulatively, it is unlikely that multiple maintenance and repair activities would be occurring in the same time and in the same place, so there is little potential for cumulative effects on geology and soils from these activities. In the event that multiple maintenance and repair activities or any ground-disturbing activities were occurring simultaneously and in proximity, minor, short-term and negligible, and long-term, adverse, cumulative effects could occur.

4.2.4 Vegetation

Minor to moderate effects on native species vegetation and habitat and introductions of nonnative species are observable from past and present development and land use. In addition, indirect, adverse impacts and direct take of habitat occurred during construction of pedestrian and vehicle fence. The Proposed Action does not involve new development activities, and effects on vegetation are generally limited to the existing footprint of tactical infrastructure. Selective maintenance and repair activities would be expected to result in generally negligible to minor adverse effects on terrestrial and aquatic vegetation. Maintenance of other existing tactical infrastructure would be expected to have similar effects on vegetation to those described in this EA (see **Section 3.4.3**). Cumulatively, effects on vegetation resources from the maintenance and repair of tactical infrastructure would be negligible.

4.2.5 Terrestrial and Aquatic Wildlife Resources

Minor to moderate effects on wildlife species have occurred from the additive effects of the past and present actions, though there is quality habitat in the region of analysis to support wildlife. The Proposed Action does not involve new development activities, and effects on wildlife and aquatic species are limited to the existing footprint and immediately surrounding areas. Maintenance and repair activities would be expected to result in generally negligible to minor,

adverse effects on wildlife and aquatic species. Operation of heavy equipment would generate temporary noise and could displace wildlife species. Maintenance of other existing tactical infrastructure would be expected to have similar effects on wildlife and aquatic resources as those described in this EA (see **Section 3.5.3**). Cumulatively, effects on terrestrial and aquatic wildlife resources from the maintenance and repair of tactical infrastructure would be negligible.

4.2.6 Threatened and Endangered Species

As discussed in **Section 3.6**, USBP will prepare a Biological Assessment for this project in the region of analysis and consult with USFWS under Section 7 of the ESA regarding potential effects on listed species and designated critical habitat. Potential direct and indirect effects on federally listed species presented in this EA are based on currently available data. A separate effects analysis is developed under NEPA but parallels impact determinations made for the Section 7 consultation process.

The designation of threatened or endangered implies that past activities have had major adverse effects on these species. Threatened and endangered species are commonly protected because their historic range and habitat have been reduced and will only support a small number of individuals. Some species have declined for natural reasons, but declines are commonly exacerbated or accelerated by anthropogenic influences. Anthropogenic influences that have contributed to reduced range and habitat availability and reduced populations include agriculture, livestock grazing, urban development and road construction, overcollection, trampling and off-road vehicle use, hydrologic modifications, and altered fire regimes. Once natural vegetation and habitat are disturbed, introduced species can colonize more readily and out-compete native species. Some species occupy specific niches, so even minor alterations are not well-tolerated.

There are 23 federally listed threatened or endangered plant or animal species that are known to occur or have the potential to occur within the geographical region of analysis (see **Table 3-2**). **Section 3.6** presents detailed discussions for each of these species. Cumulatively, present and future activities are likely to continue to affect threatened and endangered species. Potential threats include habitat loss from urbanization and road construction, trampling of protected plants, corridor fragmentation, and noise from increasingly urban areas. The ESA will continue to protect threatened and endangered species and designated critical habitat with the goal of recovery.

The Proposed Action would be expected to have negligible effects on threatened or endangered species that have been identified as potentially occurring in the region of analysis. Tactical infrastructure that was included under the waiver or previous NEPA documentation was constructed under the supervision of biological monitors to ensure that BMPs and approved mitigation measures were followed for the protection of threatened and endangered species. No direct, adverse effects on threatened and endangered species or takes were identified in the Environmental Stewardship Summary Reports during construction of pedestrian and vehicle fence along the U.S./Mexico international border. During construction of fence segments D-5B and D-6 in the USBP Tucson Sector, the lack of sufficient erosion control was noted as a potential threat to the federally listed Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) habitat (CBP 2010d). Cumulatively, the Proposed Action and other tactical

infrastructure maintenance and repair activities would be expected to have negligible contributions to adverse effects on threatened and endangered species.

4.2.7 Hydrology and Groundwater

Water quality and quantity of aquifers in the region of analysis has historically been affected adversely by surrounding land uses and water withdrawals. The Proposed Action does not involve new development activities; negligible to minor, indirect, adverse effects could occur on hydrology and groundwater systems from the maintenance and repair of roadways and drainage management structures. Maintenance and repair of other existing tactical infrastructure would be expected to have similar effects on hydrology and groundwater as those described in this EA (see **Section 3.7.3**). Cumulatively, effects on hydrology and groundwater from the maintenance and repair of tactical infrastructure would be negligible.

4.2.8 Surface Waters and Waters of the United States

Surface water quality of subwatersheds within the region of analysis has historically been moderately affected by various inputs, including agricultural and livestock runoff, urban runoff, septic and wastewater discharges, and industrial discharges. Some surface water bodies are consequently on USEPA's 303(d) list of impaired waters, as discussed in **Section 3.8** (USEPA 2010d). Historically, significant wetland losses have resulted from draining, dredging, filling, leveling, and flooding for agricultural and urban development. Due to the arid climate, less than 1 percent of the land area contains wetlands; historically, more than one-third of original Arizona wetlands have been modified or drained (USGS 1996).

The Proposed Action does not involve new development activities, but negligible to minor, indirect, adverse effects could occur on surface waters from the maintenance and repair of roadways and drainage management structures. Maintenance of other existing tactical infrastructure would be expected to have similar effects on surface water and wetlands as those described in this EA (see **Section 3.8.3**). Cumulatively, effects on surface waters and waters of the United States from the maintenance and repair of tactical infrastructure would be negligible.

4.2.9 Floodplains

Floodplain resources can be adversely impacted by development, increases in impervious areas, loss of vegetation, hydrological changes, and soil compaction. Historically, natural floodplains have been permanently altered by development activities and the construction of canals and reservoirs. The Proposed Action does not involve new development activities and would have no direct effects on floodplains. Removal of vegetation and debris could result in increased sedimentation into floodplains and drainage structures, but this would be a negligible, indirect effect. Maintenance of other existing tactical infrastructure would be expected to have similar effects on floodplains as those described in this EA (see **Section 3.9.3**). Cumulatively, effects on floodplains from the maintenance and repair of tactical infrastructure would be negligible.

4.2.10 Air Quality

USBP Tucson and Yuma sectors operate within AQCRs that are in nonattainment for one or more criteria pollutants. The Proposed Action would have short-term, minor, localized, adverse effects on air quality during maintenance and repair activities. Other construction and ground-disturbing activities could result in cumulative, adverse effects if there are multiple projects occurring at the same time and in the same vicinity. Maintenance and repair of other existing tactical infrastructure would be expected to have similar effects on air quality as those described in this EA (see **Section 3.10.3**). Cumulatively, effects on local and regional air quality from the maintenance and repair of tactical infrastructure would be negligible.

4.2.11 Noise

Cumulative effects on the noise environment occur when a project has noise emissions that are noticeably loud or that raise ambient noise levels. New noise sources are generally more noticeable in areas that have lower ambient noise levels. Cumulative effects on noise would only be expected where multiple projects are occurring at the same time and in the same vicinity because noise attenuates over distance.

The Proposed Action would have short-term, minor, localized adverse effects as a result of the operation of heavy machinery to maintain and repair tactical infrastructure. Maintenance and repair of tactical infrastructure in remote areas would be distant from most other substantial noise-generating activities, so there is little potential for cumulative effects. Increased noise from operation of machinery could combine with existing noise sources or other construction-type activities to produce a temporary cumulative effect on sensitive noise receptors. The combined noise of several projects occurring simultaneously in proximity might be heard over a greater distance, but effects would be short-term and localized. Maintenance and repair of other existing tactical infrastructure would be expected to have similar effects on the noise environment as those described in this EA (see **Section 3.11.3**). Existing noise sources would continue to dominate the noise environment. Cumulatively, effects on the noise environment from the maintenance and repair of tactical infrastructure would be negligible.

4.2.12 Cultural Resources

Historically, long-term, major, adverse effects on cultural resources have likely occurred from the destruction or alteration of resources before their significance was realized. The Proposed Action involves maintenance and repair of tactical infrastructure along existing corridors and roadways. Tactical infrastructure construction for those projects identified in **Table 4-1** was performed under the supervision of cultural resources specialists to ensure known cultural resources would be protected and that any unanticipated discoveries would be identified and coordinated with the appropriate Federal, state, or Tribal parties. CBP prepared detailed cultural resources reports and surveyed areas prior to construction, and all ground-breaking activities were subsequently monitored. No effects on cultural resources were identified in the Environmental Stewardship Summary Reports for construction of pedestrian and vehicle fence along the U.S./Mexico international border because cultural resources were appropriately identified and mitigated prior to construction. Cumulatively, effects on cultural resources from the maintenance and repair of tactical infrastructure would be negligible.

4.2.13 Roadways and Traffic

Most of the region of analysis is remote; there are fewer and smaller roadways servicing remote areas. States and localities continuously maintain or improve roadways as needed to service the population, which occurs more frequently and intensely in populated areas than in remote areas. The roadways affected by the Proposed Action are primarily unpaved roadways classified as FC-3 or FC-4 (see **Appendix C**) that are not commonly used by the general public. Maintenance of other existing tactical infrastructure would be expected to have similar effects on roadways and traffic as those described in this EA (see **Section 3.13.3**). Cumulatively, effects on roadways and traffic from the maintenance and repair of tactical infrastructure would be negligible.

4.2.14 Hazardous Materials and Waste Management

Past development activities and land uses have resulted in multiple hazardous waste sites in the region of analysis. As discussed in **Section 3.14**, Federal and state regulations govern the storage, transportation, handling, use, generation, and disposal of hazardous substances, petroleum products, and hazardous and petroleum wastes. Some of the region of analysis is heavily agricultural, so herbicides and pesticides are used and stored. Pesticide sale and use are also regulated.

The Proposed Action and other tactical infrastructure maintenance and repair activities would use small amounts of hazardous materials. Quantities of hazardous materials for individual projects would be relatively small, contained to areas associated with construction sites, and handled in accordance with all Federal and Arizona laws and regulations. Localized adverse effects could occur in the event of a spill, but the potential for cumulative adverse effects is minimal. Cumulatively, effects on hazardous materials and waste management from the maintenance and repair of tactical infrastructure would be negligible.

4.2.15 Socioeconomic Resources, Environmental Justice, and Protection of Children

The populations of Cochise, Pima, Santa Cruz, and Yuma counties have grown over the past two decades. The Proposed Action would provide only minor, short-term, beneficial effects while maintenance and repair activities are occurring and would have little potential for cumulative effects on socioeconomic resources. Maintenance and repair activities of all tactical infrastructure would result in long-term, beneficial cumulative effects by allowing USBP agents to patrol border areas effectively. This would be considered cumulatively beneficial for the safety of all residents, including children, in the southern border area.

4.2.16 Alternative 2: No Action Alternative

The No Action Alternative (Alternative 2) would result in reactive maintenance and repair of tactical infrastructure within 25 miles of the U.S./Mexico international border in Arizona. As discussed in **Section 3**, generally, the No Action Alternative would be expected to have a greater potential for adverse effects than the Proposed Action on soils, vegetation, terrestrial and aquatic wildlife, threatened and endangered species, groundwater, surface water and waters of the United States, floodplains, air quality, noise, cultural resources, roadways and traffic, hazardous materials and waste management, and socioeconomic resources. Under the No Action

Alternative, maintenance and repair work would be completed on an as-needed basis without a centralized planning process that establishes maintenance and repair specifications and standardizes BMPs. There is a greater potential for emergency repairs when BMPs might not be implemented. Maintenance and repair activities could also be more sporadic under the No Action Alternative, which would be more adverse on socioeconomic resources than the Proposed Action. Effects on land use under the No Action Alternative would be the same as effects under the Proposed Action.

Cumulative effects on soils, vegetation, terrestrial and aquatic wildlife, threatened and endangered species, groundwater, surface water and waters of the United States, floodplains, air quality, noise, cultural resources, roadways and traffic, hazardous materials and waste management, and socioeconomics under the No Action Alternative would be expected to be similar to but more adverse than those discussed under the Proposed Action. Cumulative effects on land use would be essentially the same as those discussed under the Proposed Action. Implementation of the No Action Alternative would not be expected to contribute to significant adverse, cumulative effects when considered with other recently completed or planned future projects in the region of analysis.

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible or irretrievable commitment of resources refers to effects on or losses to resources that cannot be reversed or recovered, even after an activity has ended and facilities have been decommissioned. A commitment of resources is related to the use or destruction of nonrenewable resources and the effects those losses will have on future generations. For example, if prime farmland is developed there would be a permanent loss of agricultural productivity. Since this Proposed Action involves maintaining and repairing existing tactical infrastructure, the irreversible and irretrievable commitments of resources is a negligible to minor, adverse effect. Resources that could be irretrievably lost include material and energy resources. The effects on these resources would be permanent.

Material Resources. The Proposed Action would require material resources, such as steel, concrete, stone or gravel, sand, or other materials as needed to maintain and repair tactical infrastructure. These kinds of materials are not in short supply, would not limit other unrelated construction activities, and would be minimal in quantity. No significant effects would be expected.

Energy Resources. The Proposed Action would require energy resources for the operation of trucks and equipment to repair and maintain tactical infrastructure. Energy resources used for the Proposed Action would be irretrievably lost. These include petroleum-based products (e.g., gasoline and diesel) and electricity. Consumption of these energy resources would not place a significant demand on their availability in the region. No significant effects would be expected.

4.4 RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Short-term uses of the biophysical components of the human environment include direct effects that occur over a period of less than 5 years. Long-term uses of the human environment include those effects that occur over a period of more than 5 years, including permanent resource loss.

The Proposed Action would result in short-term, adverse effects on natural resources, air quality, noise, and hazardous materials and wastes as a result of the operation of trucks and machinery to maintain and repair tactical infrastructure. Maintenance and repair are necessary to protect the long-term investment of existing tactical infrastructure. Fences, gates, roads, bridges, drainage structures, lighting and power systems, RVSS components, and areas that have adequate vegetation control and are free of debris enable the USBP to effectively accomplish their mission, which results in significant long-term benefits on biological resources, infrastructure, transportation networks, and human health and safety.

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APPENDIX A

Applicable Laws and Executive Orders

APPENDIX A

Applicable Laws and Executive Orders

Table A-1. Applicable Laws and Executive Orders [1]

Title, Citation	Summary
Archaeological and Historical Preservation Act, 16 U.S.C. 469	Protects and preserves historical and archaeological data. Requires Federal agencies to identify and recover data from archaeological sites threatened by a proposed action(s).
Clean Air Act, 42 U.S.C. 7401–7671q, as amended	Establishes Federal standards for air pollutants. Prevents significant deterioration in areas of the country where air quality fails to meet Federal standards.
Clean Water Act, 33 U.S.C. 1251–1387 (also known as the Federal Water Pollution Control Act)	Comprehensively restores and maintains the chemical, physical, and biological integrity of the nation's waters. Implemented and enforced by the U.S. Environmental Protection Agency (USEPA).
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601–9675 (also known as "Superfund")	Provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and cleanup of inactive hazardous substance disposal sites. Establishes a fund financed by hazardous waste generators to support cleanup and response actions.
Endangered Species Act of 1973, 16 U.S.C. 1531–1543, as amended	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Prohibits Federal action that jeopardizes the continued existence of endangered or threatened species. Requires consultation with U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries and a biological assessment when such species are present in an area affected by Federal government activities.
Fish and Wildlife Coordination Act, 16 U.S.C. 661–667e, as amended	Authorizes the Secretaries of the Interior and Commerce to provide assistance to and cooperate with Federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. The 1946 amendments require consultation with the USFWS and the state fish and wildlife agencies involving any waterbodies that are proposed or authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified by any agency under a Federal permit or license.
Migratory Bird Treaty Act, 16 U.S.C. 703–712	Implements various treaties for protecting migratory birds; the taking, killing, or possession of migratory birds is unlawful.
National Environmental Policy Act of 1969, 42 U.S.C. 4321–4370e, as amended	Requires Federal agencies to use a systematic approach when assessing environmental impacts of government activities. Proposes an interdisciplinary approach in a decisionmaking process designed to identify unacceptable or unnecessary impacts to the environment.

Title, Citation	Summary
National Historic Preservation Act, 16 U.S.C. 470–470x-6	Requires Federal agencies to consider the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object eligible for inclusion, or listed in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through NRHP listing), and protection of significant historical and cultural properties.
Noise Control Act of 1972, 42 U.S.C. 4901–4918	Establishes a national policy to promote an environment free from noise that jeopardizes health and welfare. Authorizes the establishment of Federal noise emissions standards and provides relevant information to the public.
Occupational Safety and Health Act of 1970, 29 U.S.C. 651–678	Establishes standards to protect workers, including standards on industrial safety, noise, and health standards.
Resource Conservation and Recovery Act, 42 U.S.C. 6901–6992k	Establishes requirements for safely managing and disposing of solid and hazardous waste and underground storage tanks.
Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, July 14, 1982, 47 FR 30959 (6/16/82), as supplemented	Requires Federal agencies to consult with state and local governments when proposed Federal financial assistance or direct Federal development impacts interstate metropolitan urban centers or other interstate areas.
EO 12898, *Environmental Justice,* February 11, 1994, 59 FR 7629 (2/16/94), as amended	Requires certain Federal agencies, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.
EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management, January 24, 2007, 72 FR 3919 (January 26, 2007)	Requires the head of each Federal agency to implement sustainable practices for energy efficiency, greenhouse gas emissions avoidance or reduction, and petroleum products use reduction; renewable energy, including bioenergy; water conservation; acquisition; pollution and waste prevention and recycling; reduction or elimination of acquisition and use of toxic or hazardous chemicals; high performance construction, lease, operation, and maintenance of buildings; vehicle fleet management; and electronic equipment. Requires more widespread use of Environmental Management Systems as the framework with which to manage and continually improve these sustainable practices.

Title, Citation	Summary
EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009, 74 FR 52117 (October 8, 2009)	Directs Federal agencies to improve water use efficiency and management; implement high performance sustainable Federal building design, construction, operation, and management; and advance regional and local integrated planning by identifying and analyzing impacts from energy usage and alternative energy sources. EO 13514 also directs Federal agencies to prepare and implement a Strategic Sustainability Performance Plan to manage its greenhouse gas (GHG) emissions, water use, pollution prevention, regional development and transportation planning, and sustainable building design; and promote sustainability in its acquisition of goods and services. Section 2(g) requires new construction, major renovation, or repair and alteration of buildings to comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.
EO 13175, Consultation and Coordination with Indian Tribal Governments, November 6, 2000, 65 FR 67249 (11/09/00)	Requires Federal agencies to establish an accountable process that ensures meaningful and timely input from tribal officials in developing policies that have tribal implications.
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001, 66 FR 3853 (1/17/01)	Requires each agency to ensure that environmental analyses of Federal actions (required by the National Environmental Policy Act or other established environmental review processes) evaluate the effects of actions and agency plans on migratory birds, emphasizing species of concern. Agencies must support the conservation intent of migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities, and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.
EO 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971, 36 FR 8921 (5/15/71)	Requires all Federal agencies to locate, identify, and record all cultural resources, including significant archeological, historical, or architectural sites.

Note:

1. This table only reflects those laws and EOs that might reasonably be expected to apply to the Proposed Action and alternatives addressed in this EA.

Other laws and Executive Orders potentially relevant to this EA include, but are not limited to, the following:

- American Indian Religious Freedom Act, 42 U.S.C. 1996, et seq.
- Antiquities Act, 16 U.S.C. 433, et seq.; Archeological Resources Protection Act, 16 U.S.C. 470 aa-ll, et seq.
- Architectural Barriers Act, 42 U.S.C. 4151, et seq.
- Community Environmental Response Facilitation Act, 42 U.S.C. 9620, et seq.
- Department of Transportation Act, Public Law (P.L.) 89-670, 49 U.S.C. 303, Section 4(f), et seq.

- Emergency Planning and Community Right-to-Know Act, 42 U.S.C. 11001–11050, et seq.
- Environmental Quality Improvement Act, P.L. 98-581, 42 U.S.C. 4371, et seq.
- Farmlands Protection Policy Act, P.L. 97-98, 7 U.S.C. 4201, et seq.
- Federal Insecticide, Fungicide, and Rodenticide Act, P.L. 86-139, 7 U.S.C. 135, et seq.
- Federal Records Act, 44 U.S.C. 2101-3324, et seq.
- Fish and Wildlife Act of 1956, P.L. 85-888, 16 U.S.C. 742, et seq.
- Flood Disaster Protection Act, 42 U.S.C. 4001, et seq.
- Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001, et seq.
- Pollution Prevention Act of 1990, 42 U.S.C. 13101-13109, et seq.
- Safe Drinking Water Act, P.L. 93-523, 42, U.S.C. 201, et seq.
- Toxic Substances Control Act, 7 U.S.C. 136, et seq.
- Wild and Scenic Rivers Act, P.L. 90-542, 16 U.S.C. 1271, et seq.
- EO 12114, dated January 9, 1979, Environmental Effects Abroad of Major Federal Actions, 44 FR 1957
- EO 12088, dated October 13, 1978, *Federal Compliance with Pollution Control Standards*, 43 FR 47707, as amended by EO 12580, dated January 23, 1987, and revoked (in part) by EO 13148, dated April 21, 2000
- EO 13132, dated August 4, 1999, *Federalism*, 64 FR 43255
- EO 11988, dated May 24, 1977, *Floodplain Management and Protection*, 42 FR 26951, as amended by EO 12148, dated July 20, 1979, 44 FR 43239
- EO 13007, dated May 24, 1996, *Historic Sites Act*, 16 U.S.C. 46, et seq.; Indian Sacred Sites, 61 FR 26771
- EO 12372, dated July 14, 1982, *Intergovernmental Review of Federal Programs*, 47 FR 30959, as amended by EO 12416, April 8, 1983, 48 FR 15587; supplemented by EO 13132, August 4, 1999, 64 FR 43255
- EO 13112, dated February 3, 1999, *Invasive Species*, 64 FR 6183, as amended by EO 13286, February 28, 2003, 68 FR 10619
- EO 11514, dated March 5, 1970, *Protection and Enhancement of Environmental Quality*, 35 FR 4247, as amended by EO 11541, July 1, 1970, 35 FR 10737 and EO 11991, May 24, 1977, 42 FR 26967
- EO 13045, dated April 21, 1997, *Protection of Children from Environmental Health and Safety Risks*, 62 FR 19885, as amended by EO 13229, October 9, 2001, 66 FR 52013 and EO 13296, April 18, 2003, 68 FR 19931
- EO 11990, dated May 24, 1977, *Protection of Wetlands*, 42 FR 26961, as amended by EO 12608, September 9, 1987, 52 FR 34617.

APPENDIX B

Public Involvement and Agency Coordination

APPENDIX B

Public Involvement and Agency Coordination

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APPENDIX C

Tactical Infrastructure Classifications and Maintenance and Repair Standards

APPENDIX C

TACTICAL INFRASTRUCTURE CLASSIFICATIONS AND MAINTENANCE AND REPAIR STANDARDS

Introduction

The tactical infrastructure will be maintained in accordance with proven maintenance and repair standards. All of the standards CBP is adopting are developed based on comprehensive engineering analysis, proven BMPs adopted by other Federal agencies, and mitigation measures derived from extensive consultation with both regulatory and resources agencies. Below is a description of tactical infrastructure classifications and maintenance and repair standards.

Road Classification

CBP has developed a road classification system whereby roads are maintained to specific standards dependent upon their classification. Under the CBP classification system, five standards for roads have been developed:

- *FC-1 Paved Road* – Paved, all-weather road constructed of any material. Road is two lane with a total road width of 24 feet (see **Figures C-1** and **C-2**).
- *FC-2 All-Weather Road* – Unpaved, all-weather road consisting of a surface of imported aggregate material such as milled bituminous material or processed stone and gravel. Road is two-lane with a total road width of 24 feet (see **Figures C-3** and **C-4**).
- *FC-3 Graded Earth Road* – Unpaved road constructed of graded, native material. Road is two-lane with a total road width of 20 feet (see **Figures C-5** and **C-6**).
- *FC-4 Two-Track Road* – Unpaved road on natural ground consisting of a single lane with an overall road width of 10 feet (see **Figures C-7** and **C-8**).
- *FC-5 Sand Road* – Unpaved, sand road consisting of natural ground conditions, two lanes, and an overall road width of 16 to 18 feet (see **Figures C-9** and **C-10**).

Road Maintenance and Repair

The maintenance and repair of FC-1 and FC-2 roads within state, county, or municipal government's purview is completed by their transportation departments. Maintenance and repair of FC-1 and FC-2 roads located on Federal land are maintained in coordination and performed where necessary by agreement with the appropriate Federal agency. In general, CBP would adhere to U.S. Forest Service (USFS) standards for road maintenance, which have been tried and proven over many years and in a variety of environmental conditions.

Some of the tactical infrastructure on Federal lands (e.g., BLM, USFS) is covered by the Secretary's waiver and is the responsibility of CBP to maintain and repair. In the few instances where CBP is required to maintain FC-1 and FC-2 roads, maintenance and repair would be restricted to minor resurfacing to address potholes in paved surfaces and rutting and raveling in all weather roads. Minor work to shoulder areas of these roads would also be required to maintain the integrity of the road surfaces and road beds.

Figure C-1. FC-1 Paved Road (Photograph)

FC 1 – Paved Roads

The proposed paved road facility consists of two (2) 3.6 m (12 ft) travel lanes with 0.6 m (2 ft) shoulders at a 2% cross slope. The proposed pavement design for this section consists of 200 mm (8 in) of compacted aggregate base with a two (2) coarse surface treatment. Parallel ditches with a 1V:3H front slope and a 1V:4H back slope are proposed to provide proper drainage. Existing FC 1 roadways may vary from proposed roadway specifications.

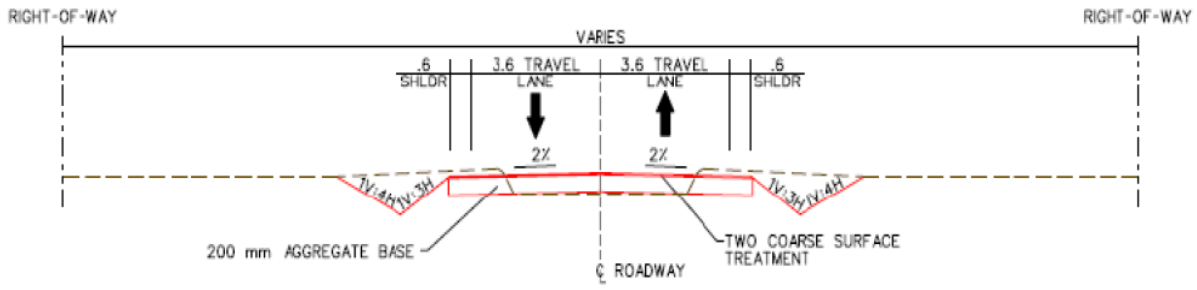

Figure C-2. FC-1 Paved Road (Diagram)

Figure C-3. FC-2 All-Weather Road (Photograph)

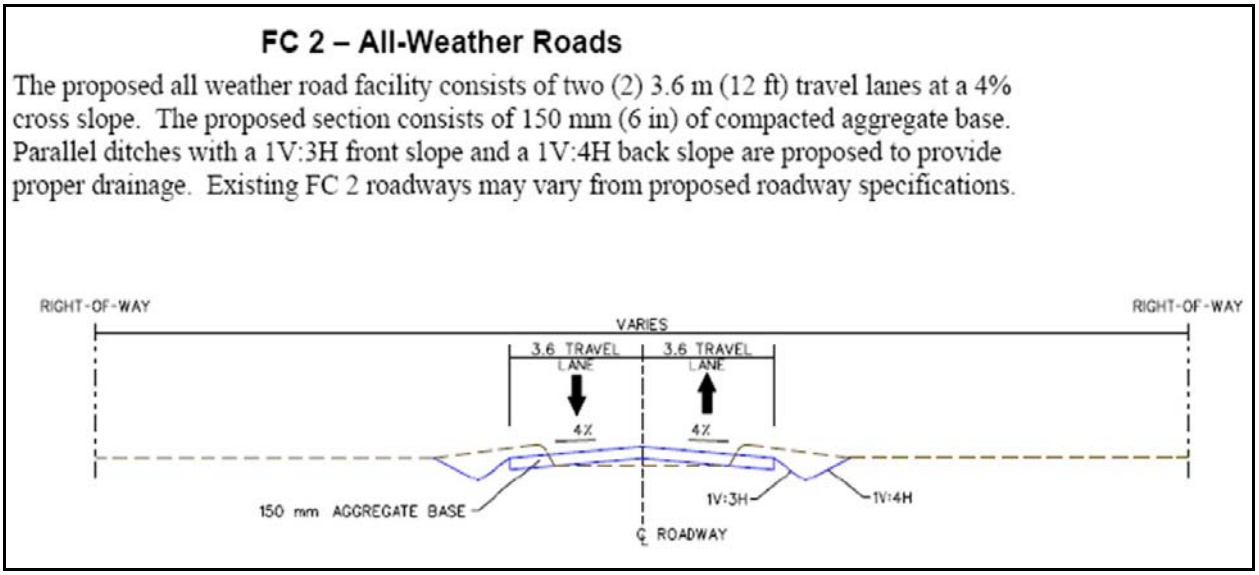

Figure C-4. FC-2 All-Weather Road (Diagram)

Figure C-5. FC-3 Graded Earth Road (Photograph)

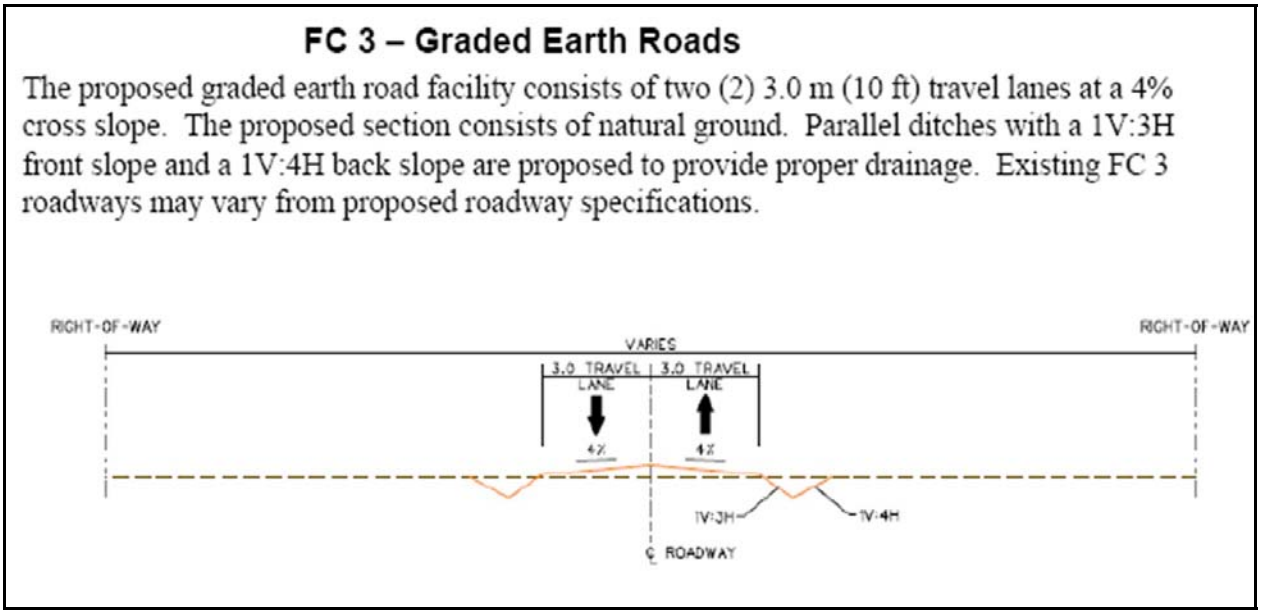

Figure C-6. FC-3 Graded Road (Diagram)

Figure C-7. FC-4 Two-Track Road (Photograph)

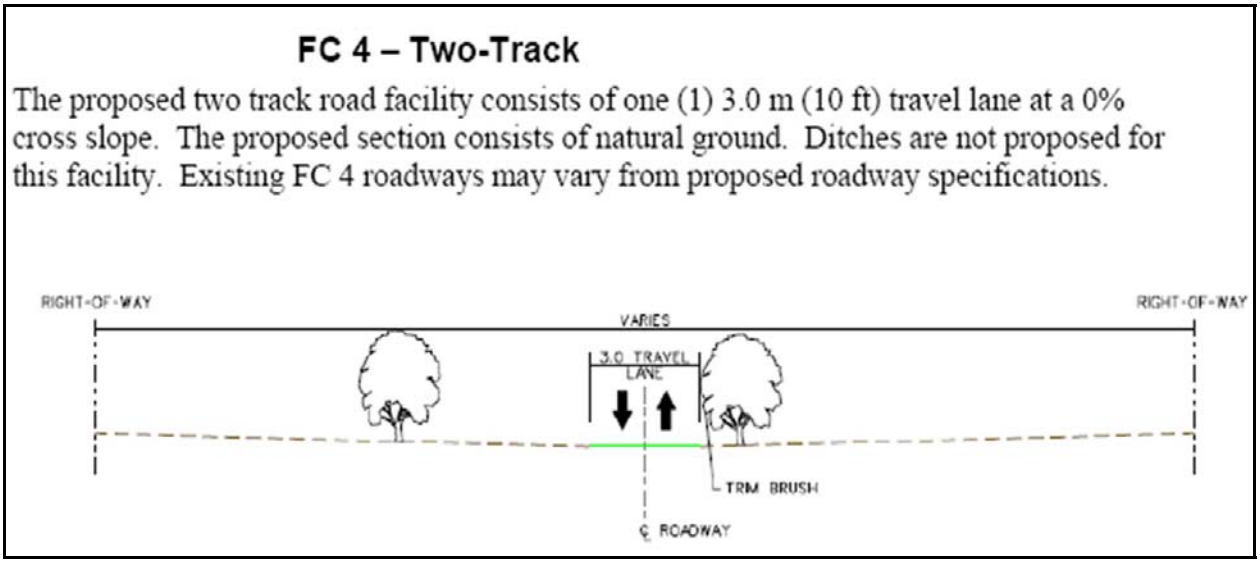

Figure C-8. FC-4 Two-Track Road (Diagram)

Figure C-9. FC-5 Sand Road (Photograph)

FC5 – Sand Road

The proposed sand road consists of 16-18 feet travel lane at a 0% cross slope. The proposed section consist of natural ground – no foundation base. Drainage ditches are not proposed for this type road. Existing FC-5 roadways may vary from proposed roadway specifications,

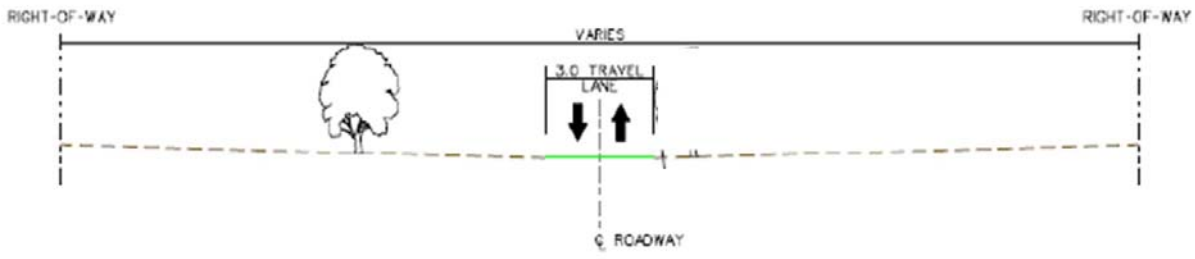

Figure C-10. FC-5 Sand Road (Diagram)

The majority of proposed maintenance and repair is planned for FC-3 and FC-4 roads. Because of their lack of formal construction design, FC-3 and FC-4 roadways are subject to the greatest deterioration if left unmaintained. When subjected to heavier traffic, rutting occurs, which in turn is exacerbated by rain events that further erode the surface. Unmanaged storm water flow also causes general erosion to occur, washing out complete sections of road and in many instances making roads impassable.

Grading with the use of commercial grading equipment (see **Figure C-11**) is proposed to restore an adequate surface to FC-3 roads. USBP sector personnel and contract support personnel well-versed in grading techniques would be employed for such activity. A poorly regraded surface quite often results in rapid deterioration of the surface. The restored road should be slightly crowned and absent of windrows in the gutter line to avoid ponding and channeling within the road during rain events. Any associated roadside drainage would be maintained to ensure that runoff is relieved from the road surface quickly and effectively without creating further erosion issues. The addition of material to these roads to achieve the proposed objective would be kept to a minimum. All necessary erosion-control BMPs would be adopted to ensure stabilization of the project areas.

Figure C-11. Standard Grading Equipment

As the two track name implies, FC-4 roads consist of two parallel tracks created by the loss of vegetation where the tires contact and compact the earth, between which a strip of low-growth vegetation might exist. These roads receive very little maintenance consisting primarily of occasional brush and boulder clearing, and possibly but much less frequently grading with small

tractor mounted box blades. Two-track roads have no crown, and generally do not have any improved drainage features or ditches, although culverts and low water crossings might be installed where continuous erosion issues occur.

Most FC-5 roads are associated with fence infrastructure that has been covered by the Secretary's waiver or previous NEPA documentation and therefore dismissed from further discussion. There are, however, some FC-5 roads that provide access to infrastructure that are not covered by the Secretary's waiver or previous NEPA documentation and will be examined throughout this EA. Activities to maintain FC-5 roads would be similar to those described above for FC-3 roads.

APPENDIX D

Detailed Maps of the Tactical Infrastructure Maintenance and Repair Region of Analysis

APPENDIX D

Detailed Maps of the Tactical Infrastructure Maintenance and Repair Area of Analysis

There are approximately 35 ecological systems in the region of analysis (see **Table D-1**). The ecological systems that generally define and compose 95 percent of the landscape within the region of analysis are described below. These ecological systems were extracted from NatureServe Explorer (NatureServe 2010).

Additionally, supplementary detailed maps of the tactical infrastructure along the U.S./Mexico international border in Arizona are on the enclosed DVD. In addition to displaying existing tactical infrastructure, the maps display zones within the area of analysis where the potential exists for impacts on specific environmental resources. Depending on the number and nature of resources that could be impacted, a graduated series of BMPs will be identified to reduce impacts to less than significant levels. The BMPs are presented in **Appendix E** along with the affected resources.

The sensitivity zones within each area of maintenance and repair are color-coded in the following manner:

- *Green* – Indicates the least sensitive areas. Maintenance and repair personnel should apply appropriate BMPs, including applicable species-specific BMPs, from **Appendix E** based upon activity.
- *Amber* – Indicates area requiring heightened awareness. Maintenance and repair personnel should check with appropriate CBP representatives regarding possible need for species-specific BMPs.
- *Purple* – Indicates the most sensitive areas. CBP should engage environmental subject matter experts prior to maintenance and repair activities.

Table D-1. Ecological Systems within the Region of Analysis

Ecological Systems
Sonora-Mojave Creosotebush-White Bursage Desert Scrub*
Sonoran Paloverde-Mixed Cacti Desert Scrub*
Apacherian-Chihuahuan Semi-Desert Grassland and Steppe*
Apacherian-Chihuahuan Mesquite Upland Scrub*
Madrean Encinal*
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub*
North American Warm Desert Active and Stabilized Dune*
Chihuahuan Mixed Salt Desert Scrub*
Madrean Pinyon-Juniper Woodland*
Cultivated Cropland*
Developed*
Undifferentiated Barren Land
North American Warm Desert Riparian Mesquite Bosque
North American Warm Desert Bedrock Cliff and Outcrop
Mogollon Chaparral
Sonoran Mid-Elevation Desert Scrub
Madrean Pine-Oak Forest and Woodland
Quarries, Mines, Gravel Pits and Oil Wells
Sonora-Mojave Mixed Salt Desert Scrub
Madrean Upper Montane Conifer-Oak Forest and Woodland
North American Warm Desert Volcanic Rockland
North American Warm Desert Wash
Recently Burned
Introduced Riparian and Wetland Vegetation
Chihuahuan Succulent Desert Scrub
North American Warm Desert Riparian Woodland and Shrubland
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub
Open Water (Fresh)
North American Warm Desert Lower Montane Riparian Woodland and Shrubland
Madrean Juniper Savanna
North American Arid West Emergent Marsh
North American Warm Desert Pavement
Rocky Mountain Aspen Forest and Woodland
Chihuahuan Sandy Plains Semi-Desert Grassland
Southern Rocky Mountain Pinyon-Juniper Woodland

Note: *Ecological systems that generally define and compose 95 percent of the landscape within the Arizona region of analysis.

APPENDIX E

Best Management Practices

APPENDIX E

Best Management Practices

The following are best management practices (BMPs) that are intended to mitigate potential impacts on natural resources, including vegetation, wildlife, migratory birds, threatened and endangered species, and water resources. It is the responsibility of all personnel performing maintenance to comply with the BMPs, unless otherwise noted. BMPs apply to all maintenance and repair activities (both waived and not waived regardless of in-house versus contracted work method) with one exception. The exception involves the waived areas where CBP will not apply for Clean Water Act (CWA) Section 404 permits or submit Stormwater Pollution and Prevention Plans (SWPPP) for regulatory review and approval. This provision is necessary in order tomaintain the integrity of waiver authority.

Land Use

1. CBP will notify all land managers at least 5 days in advance of any scheduled maintenance and repair activities on their lands.

Geology and Soil Resources

1. Silt fencing and floating silt curtains should be installed and maintained to prevent movement of soil and sediment and to minimize turbidity increases in water.

2. Implement routine road maintenance practices to avoid making windrows with the soils once grading activities are complete and use any excess soils on site to raise and shape the road surface.

3. Only apply soil-binding agents during the late summer/early fall months to avoid impacts on federally listed species. Do not apply soil-binding agents in or near (within 100 feet) surface waters (e.g., wetlands, perennial streams, intermittent streams, washes). Only apply soil-binding agents to areas that lack any vegetation.

4. Obtain materials such as gravel, topsoil, or fill from sources that are compatible with the project area and are from legally permitted sites.

Vegetation

1. Herbicide and pesticide applications must be made under the supervision of a licensed applicator. A log of the chemical used, amount used, and specific location must be maintained.

2. If mechanical methods are used to remove invasive plants, the entire plant should be removed and placed in a disposal area. If herbicides are used, the plants would be left in place. All chemical applications on federally managed land must be used in coordination with the Federal land manager. Training to identify nonnative invasive plants would be provided for CBP personnel or contractors, as necessary.

3. If the tactical infrastructure maintenance and repair activities would take place on a Federal agency's land, the appropriate agency's herbicide policy must be followed for vegetation control. Contractors applying herbicides must verify that the appropriate agency's policy is being followed, if it exists. This information should be requested from the COTR.

4. New guidance from the USEPA on herbicide application in riparian areas is imminent. Check with COTR on the status of these regulations prior to applying herbicide in such areas.

5. CBP would notify applicable owners and land managers 10 days prior to implementing clearing activities.

6. Where vegetation to be cleared is on a levee, the method of removal would ensure that the integrity of the levee is maintained.

7. Coordinate with the CBP ENV SME to determine if the maintenance activities occur in a highly sensitive area or an area that poses an unacceptable risk of transmitting diseases and invasive species. If it is determined that maintenance activities occur in such an area, follow the CBP cleaning protocol.

8. A fire prevention and suppression plan will be developed and implemented for all maintenance and repair activities that require welding or otherwise have a risk of starting a wildfire.

9. Identify fill material, sandbags, hay bales, and mulch brought in from outside the project area by its source location. Use sources that are sterile or weed-free.

10. Clearly demarcate the perimeter of all new areas to be disturbed during vegetation-clearing activities using flagging or temporary construction fencing. Do not allow any disturbance outside that perimeter.

11. Riparian vegetation should be protected during maintenance activities.

12. Avoid the removal of mature trees providing shade or bank stabilization within the riparian area of any waterway during maintenance or repair activities.

13. If vegetation must be removed, allow natural regeneration of native plants by cutting vegetation with hand tools, mowing, trimming, or using other removal methods that allow root systems to remain intact.

14. Vegetation targeted for retention would be flagged for avoidance to reduce the likelihood of being treated.

15. Periodic inspections of tactical infrastructure by the CBP SME would be conducted to evaluate and document conditions, including erosion and to ensure that prescriptions are followed and performed in the appropriate community types. As necessary, maintenance will be scheduled to minimize erosion and correct other adverse conditions.

16. Avoid removal of riparian vegetation within 100 feet of aquatic habitats to provide a buffer area to protect the habitat from sedimentation.

Wildlife

1. If hollow bollards are necessary, cover hollow bollards (i.e., those that will be filled with a reinforcing material such as concrete) to prevent wildlife from entrapment. Deploy covers (and ensure they remain fully functioning) when the posts or hollow bollards arrive on the site and are unloaded, until they are filled with reinforcing material.

2. Ensure temporary light poles and other pole-like structures used for maintenance activities have anti-perch devices to discourage roosting by birds.

3. Avoid control of riparian vegetation within 100 feet of aquatic habitats to provide a buffer area to protect the habitat from sedimentation, unless vegetation control already exists in such an area.

4. Minimize animal collisions during maintenance and repair activities by not exceeding speed limits of 35 miles per hour (mph) on major unpaved roads (i.e., graded with ditches on both sides) and 25 mph on all other unpaved roads. During periods of decreased visibility (e.g., night, poor weather, curves), do not exceed speeds of 25 mph.

5. Do not permit pets owned or under the care of the contractor or sector personnel inside the project boundaries, adjacent native habitats, or other associated work areas.

6. To prevent entrapment of wildlife species, ensure excavated, steep-walled holes or trenches are either completely covered by plywood or metal caps at the close of each work day or provided with one or more escape ramps (at no greater than 1,000-foot intervals and sloped less than 45 degrees) constructed of earth fill or wooden planks.

7. Each morning before the start of maintenance activities and before such holes or trenches are filled, ensure they are thoroughly inspected for trapped animals. Ensure that any animals discovered are allowed to escape voluntarily (by escape ramps or temporary structures), without harassment, before maintenance activities resume; or are removed from the trench or hole by a qualified person and allowed to escape unimpeded.

Threatened and Endangered Species and Other Protected Species

General BMPs

1. Coordinate with COTR or ENV SME to determine which threatened and endangered species could occur in the vicinity of maintenance activities. In areas where there are no threatened and endangered or other species concerns, the personnel performing the maintenance activity are responsible for monitoring the implementation of general maintenance and repair BMPs to avoid impacts on the environment. Environmental monitors would be provided by CBP in specific places and times to avoid impacts on biological resources, as directed by the BMPs. The environmental monitor will be notified 5 days in advance of any ground-breaking activity. The environmental monitor

will document the adherence to and proper implementation of BMPs. The environmental monitor will inform maintenance personnel of their violations and notify the appropriate CBP authorities (the COTR and ENV SME), who will temporarily suspend activities not in compliance with all BMPs or activities that are likely to result in the take of a threatened or endangered species or adverse modification of their critical habitat. If impacts on a threatened or endangered species cannot be avoided, then further consultation with the USFWS would be required.

2. To protect individuals of listed species within the project area, suspend work in the immediate vicinity of the individual until it moves out of harm's way on its own, or enlist a qualified specialist (individuals or agency personnel with a permit to handle the species) to relocate the animal to a nearby safe location in accordance with accepted species-handling protocols.

3. All vegetation-clearing activities would avoid areas of known occurrences, designated critical habitat, or other suitable habitat for threatened and endangered species. If vegetation clearing of new observation zones and road setbacks is required within areas of known occurrence, designated critical habitat, or other suitable habitat, a qualified biologist will conduct a survey for any potential threatened and endangered species and any primary constituent elements (PCEs) that have been identified for that species. If a threatened or endangered species or PCE is observed within the project area, then further consultation with USFWS would be required.

4. Obtain all pertinent training materials for biological resources for the areas where maintenance activities would occur. Prior to arrival on the work site, ensure key personnel are aware of the biological resources potentially occurring in the project area and understand the proper BMPs to implement should threatened and endangered species be encountered in the project area.

5. Check visible space underneath all vehicles and heavy equipment for listed species and other wildlife prior to moving vehicles and equipment at the beginning of each workday and after vehicles have idled for more than 15 minutes.

6. Coordinate with the CBP ENV SME to determine if the maintenance activities occur in a highly sensitive area or an area that poses an unacceptable risk of transmitting diseases and invasive species. If it is determined that maintenance activities occur in such an area, follow the CBP cleaning protocol.

Migratory Bird BMPs

1. Initial mechanical and chemical vegetation clearing and subsequent mechanical vegetation control should be timed to avoid the migration, breeding, and nesting timeframe of migratory birds (February 1 through August 31). Herbicide re-treatments could occur throughout the year. When initial mechanical and chemical vegetation clearing or subsequent mechanical vegetation control must be implemented during February 1 through August 31, a survey for nesting migratory birds would be conducted immediately prior to the start of activities. If an active nest is found, a buffer zone will be established around the

nest and no activities would occur within that zone until nestlings have fledged and abandoned the nest.

2. A survey for migratory birds will also be conducted prior to all other maintenance and repair activities to be implemented during the nesting period in areas where migratory birds may be nesting.

3. If maintenance is scheduled during the migratory bird nesting season, take steps to prevent migratory birds from establishing nests in the potential impact area. These steps could include covering equipment and structures, and use of various excluders (e.g., noise). Birds can be harassed to prevent them from nesting on the site. Once a nest is established, they cannot be harassed until all young have fledged and left the nest site. If nesting birds are found during the supplemental survey, defer intrusive maintenance activities until the birds have left the nest. Confirmation that all young have fledged should be made by qualified personnel.

Species Specific BMPs

Fishes: Beautiful Shiner *(Cyprinella formosa)*, Desert Pupfish *(Cyprinodon macularius)*, Gila Chub *(Gila intermedia)*, Gila Topminnow *(Poeciliopsis occidentalis occidentalis)*, Razorback sucker (*Xyrauchen texanus)*, Sonoran Chub *(Cyprinodon eremus)*, Yaqui Catfish *(Ictalurus pricei)*, Yaqui chub *(Gila purpurea)*, and Yaqui Topminnow *(Poeciliopsis occidentalis sonoriensis)*

1. All vegetation-clearing activities will avoid riparian vegetation within 100 feet of suitable aquatic habitats within their known range in order to provide a buffer area to protect the habitat from sedimentation.

2. Use of herbicides will not occur within areas of suitable aquatic habitat within their known range or critical habitat unless approved by the USFWS.

3. If removal of partially or wholly submerged debris from culverts or drainages or other maintenance or repair of culverts or dams within suitable aquatic habitat within their known range or their critical habitat is required, a qualified biologist will conduct a survey of the drainage structure to determine whether these species are present. If they are present, CBP would enter into further consultation with the USFWS.

Perennial Plants: Canelo Hill's Ladies'-tresses *(Spiranthes delitescens)*, Chochise Pincushion Cactus *(Coryphantha robbinsorum)*, Huachuca Water Umbel/Cienega False Rush *(Lilaeopsis schaffneriana recurva)*, Kearney's Slimpod *(Amsonia kearneyana)*, and Pima Pineapple Cactus *(Coryphantha scherriv var. robustispina)*

1. Avoid vegetation- clearing and -control activities in areas of known threatened and endangered perennial plant species, critical habitat, and suitable habitat (see **Table E-2**) unless a survey is conducted. If vegetation- clearing and -control activities in areas of known occurrences of these species, critical habitat, and suitable habitat (see **Table E-2**) are unavoidable, then a qualified biologist would conduct a survey during the appropriate blooming season (see **Table E-2**) within the maintenance area. An area of sufficient size

would be flagged in order to create a buffer large enough to ensure that threatened and endangered plant species are not directly or indirectly affected.

2. Use of herbicides will not occur within areas of known threatened and endangered plant species occurrences, critical habitat, or suitable habitat (see **Table E-2**) unless approved by the USFWS.

3. If maintenance activities must be conducted within 0.5 miles of known or potential Huachuca water umbel habitat or critical habitat, vegetation -control and -clearing would be limited to that area needed to meet project objectives and erosion-control measures would be put in place to reduce sediment runoff and avoid indirect effects on these species.

4. If maintenance or repair activities in areas of known occurrence of Huachuca water umbel are unavoidable then a qualified biologist will conduct a survey during the appropriate blooming season (June-August) within the maintenance area. An area of sufficient size would be flagged in order to create a buffer around individuals to be avoided.

Chiricahua Leopard Frog *(Lithobates chiricahuensis)*

1. All vegetation-clearing activities would avoid riparian vegetation within 100 feet of critical habitats, known Chiricahua leopard frog habitat and suitable habitat (i.e., cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,005 to 2,712 meters [3,300 to 8,900 feet]), in order to provide a buffer area to protect the habitat from sedimentation.

2. Disease prevention protocols would be employed if the project is in areas known or likely to harbor chytridiomycosis (consult with the USFWS to identify these areas). In such cases, if vehicle and equipment use would occur in more than one frog habitat, ensure that all equipment is clean and dry or disinfected before it moves to another habitat.

3. Any use or storage of chemicals or fuels would be kept 0.3 miles away from critical habitat, known Chiricahua leopard frog habitat and suitable habitat (i.e., cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,005 to 2,712 meters [3,300 to 8,900 feet]).

4. Implement routine road maintenance practices in order to avoid prolonged establishment of road and tire ruts within and adjacent to known Chiricahua leopard frog occurrences, critical habitat, and suitable habitat (i.e., cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,005 to 2,712 meters [3,300 to 8,900 feet]).

Table E-2. Threatened and Endangered Plant Species Suitable Habitat and Blooming Season

Common Name	Habit	Blooming Season
Canelo Hills ladies' tresses	Fine-grained, highly organic, saturated soils of cienegas (i.e., spring-fed marshes) and among sedges and tall grasses up to an elevation of 1,524 meters (5,000 feet).	July–August
Cochise pincushion cactus	High-calcium Permian limestone, at elevations from 1,280 to 1,433 meters (4,200 to 4,700 feet) where Chihuahuan desert scrub transitions to semidesert grassland.	March–April
Huachuca water umbel	Perennial springs, rivers, and stream headwaters that are permanently or seasonally saturated within Sonoran desertscrub, grassland or oak woodlands between 1,219 to 1981 meters (4,000 to 6,500 feet).	June–August
Kearney's slimpod	Southwest-draining dry, rocky washes of the Baboquivari Mountains at about 1,220 to 1,830 meters (4,000 to 6,000 feet).	April–May
Pima pineapple cactus	Transition zone between the semidesert grasslands and Sonora desert scrub on alluvial bajadas (lower slopes of mountains characterized by loose alluvial sediments and poor soil development) and slopes of less than 10 percent grade at elevations between 701 to 1,402 meters (2,300 to 4,600 feet).	July–August

5. Use of herbicides would not occur within areas of known Chiricahua leopard frog occurrences, critical habitat, or suitable habitat (i.e., cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,005 to 2,712 meters [3,300 to 8,900 feet]) unless approved by the USFWS.

6. Other maintenance activities within areas of critical habitat, areas of known Chiricahua leopard frog occurrences, or suitable habitat (i.e., cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,005 to 2,712 meters [3,300 to 8,900 feet]) would be avoided during the Chiricahua leopard frog breeding season (March through September, depending on elevation). If these activities cannot be avoided during this season, a qualified biologist would conduct a survey to determine if Chiricahua leopard frogs are present. If they are determined to be present, further consultation with USFWS would be conducted.

7. Erosion and sedimentation would be prevented by avoiding high-velocity releases from project activities (during and after maintenance) that could degrade habitat.

Sonoran Tiger Salamander *(Ambystoma tigrinum stebbinsi)*

1. If ground-disturbing maintenance activities and use of heavy equipment are required within 0.3 miles of Sonoran tiger salamander suitable habitat (i.e., cattle ponds and tanks with standing water), a qualified biologist would to survey the anticipated disturbance area immediately prior to and during the maintenance activity.

2. Use of herbicides would not occur within 0.3 miles of Sonoran tiger salamander suitable habitat (i.e., cattle ponds and tanks with standing water) unless approved by the USFWS.

3. Maintenance vehicles and equipment would be operated at speeds of 25 mph or less within 0.3 miles of Sonoran tiger salamander suitable habitat (i.e., cattle ponds and tanks with standing water) during the breeding season (January through June).

4. All maintenance activities within 0.3 miles of Sonoran tiger salamander suitable habitat (i.e., cattle ponds and tanks with standing water) would be conducted during daylight hours.

5. If a Sonoran tiger salamander is observed, cease maintenance activities in the immediate area, including vehicular traffic, until the salamander leaves on its own volition.

New Mexico Ridge-nosed Rattlesnake *(Crotalus willardi obscures)*

1. Maintenance vehicles would not exceed a speed of 15 to 20 mph during periods of elevated roaming and foraging activities from July through August within New Mexico ridge-nosed rattlesnake-occupied habitat, designated critical habitat, and suitable habitat (i.e., pine-oak woodlands at high elevations of 1,475 and 2,800 meters [5,600 to 9,000 feet]).

Masked Bobwhite *(Colinus virginianus ridgwayi)*

1. Vegetation clearing and control would not occur in masked bobwhite habitat (i.e., savanna grassland) in the Buenos Aires National Wildlife Refuge (NWR). If vegetation clearing or control is to be conductedadjacent to savanna grassland habitat in Buenos Aires NWR, qualified personnel with experience identifying masked bobwhite habitat would delineate and clearly mark the savanna grassland habitat to be avoided. The vegetation clearing and control would be conducted from December 31 through June 30, outside of the nesting season.

2. All other vegetation clearing and control within in Buenos Aires NWR would be conducted from December 31 through June 30, outside the breeding and hatching season.

3. For all other maintenance activities to be conducted within the Buenos Aires NWR during the masked bobwhite-nesting season (July 1 through November 30),a qualified biologist would conduct a survey for masked bobwhite prior to initiating maintenance activities. If masked bobwhites are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is found, a 300-foot, no-maintenance-activity buffer would be established around the nest until the young have fledged.

Mexican Spotted Owl *(Strix occidentalis lucida)*

1. Vegetation clearing and control would not occur in designated critical habitat or other suitable Mexican spotted owl habitat (i.e., closed-canopy forests [riparian, mixed conifer, pine-oak, and pinyon juniper woodland] and steep, narrow entrenched rocky-canyons and cliffs). If vegetation clearing or control is to be conducted adjacent to critical or other suitable habitat, qualified personnel with experience identifying Mexican spotted owl habitat would delineate and clearly mark the habitat to be avoided. Vegetation clearing or control would be conducted from July through February, outside of the nesting season. This does not apply to areas where protocol surveys were conducted and was determined that the area is not occupied and does not contain PCE.

2. For all other maintenance activities, to be conducted within or adjacent to Mexican spotted owl suitable habitat and designated critical habitat during the nesting season (March through June), the following avoidance measures will apply. A qualified biologist would conduct a survey for Mexican spotted owl prior to initiating maintenance activities. If Mexican spotted owls are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is found, a 300-foot, no-maintenance-activity buffer would be established around the nest until the young have fledged. This does not apply to areas where protocol surveys document that the area is not occupied and does not contain PCEs.

Southwestern Willow Flycatcher *(Empidonax trailli extimus)*

1. Vegetation clearing and control would not occur in designated critical habitat or other suitable habitats for southwestern willow flycatchers (i.e., dense riparian habitat along streams, rivers, lakesides, and other wetlands). If vegetation clearing or control is to be conducted adjacent to critical habitat or other suitable habitat, qualified personnel with experience identifying southwestern willow flycatcher habitat would delineate and clearly mark the habitat to be avoided. That vegetation clearing or control would be conducted from September 16 through March14, outside of the southwestern willow flycatcher-nesting season.

2. For all other maintenance activities to be conducted within critical habitat and other suitable habitat during the nesting season (March 15 through September 15), the following avoidance measures would apply. A qualified biologist would conduct a survey for southwestern willow flycatcher prior to initiating maintenance activities. If southwestern willow flycatcher are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is found, a 300-foot, no-maintenance -activity buffer would be established around the nest until the young have fledged.

Yuma Clapper Rail *(Rallus longirostris yumanensis)*

1. Vegetation clearing and control would not occur in Yuma clapper rail suitable habitat (i.e., freshwater marshes generally dominated by cattail [*Typha* spp.] and bulrush [*Scirpus* ssp.] with a mix of riparian trees and shrubs). If vegetation clearing or control is to be conducted adjacent to suitable habitat, qualified personnel with experience identifying Yuma clapper rail habitat would delineate and clearly mark the habitat to be avoided. That vegetation clearing or control would be conducted from mid-July through mid-March, outside of the Yuma clapper rail nesting season.

2. For all other maintenance activities to be conducted within or adjacent to suitable habitat during the nesting season (mid-March through mid-July), the following avoidance measures would apply. A qualified biologist would conduct a survey for Yuma clapper rail prior to initiating maintenance activities. If Yuma clapper rails are present, a qualified biologist would survey for nests approximately once per week within 500 feet of the maintenance area for the duration of the activity. If an active nest is found, a 300-foot, no-maintenance-activity buffer would be established around the nest until the young have fledged.

Lesser Long-nosed Bat *(Leptonycteris yerbabuenae)*

1. Prior to conducting any vegetation- clearing and -control activities in areas containing columnar cactus (i.e., saguaro and organ pipe) or agaves, a qualified biologist would conduct a survey within the maintenance area. Individual cacti and agaves will be flagged and vegetation-clearing activities would avoid these plants to the extent practicable.

2. Do not conduct any maintenance activities at night within 5 miles of any known roost sites (i.e., Las Lesnas and Sierra de la Narriz Mountains) for the lesser long-nosed bat from mid-April through June. If night lighting is unavoidable, light would shine directly onto the work area to ensure worker safety and efficiency, and light would not exceed 1.5 foot-candles in lesser long-nosed bat habitat.

Sonoran Pronghorn *(Antilocapra americana sonoriensis)*

1. Minimize the number of daily vehicle trips related to maintenance to reduce the likelihood of disturbing pronghorn in the area or injuring an animal on the road. The use of vehicle convoys, multi-passenger vehicles, and other methods are appropriate. This can be adjusted if additional personnel and equipment will complete the work faster and thus reduce the time of the disturbance.

2. During maintenance activities, if a pronghorn is observed within 1 mile of the activity, cease any work that could disturb the pronghorn. For vehicle operations, this will entail stopping the vehicle until the pronghorn moves away. Vehicles can continue at reduced speeds (10 to 15 mph) once the pronghorn has retreated from the area.

3. For all maintenance activities that occur within occupied or suitable Sonoran pronghorn habitat (i.e., Sonoran desert scrub communities), that occur during the fawning season (March 1 to July 15), coordination with USFWS and other the relevant Federal land managers is required.

Water Resources

1. The ENV SME must be consulted to validate the need for site-specific storm water pollution prevention plans (SWPPPs), spill protection plans, and regulatory approvals. Site-specific SWPPPs and spill protection plans would be prepared and regulatory approval sought, if necessary, in cases of highly sensitive work sites and large scopes of work that pose a significant risk. Where a site-specific SWPPP is not necessary, the personnel performing the maintenance would comply with a generic SWPPP and spill protection plan that covers most routine maintenance and repair activities. Prior to arrival on the work site, key personnel would understand correct implementation of these BMPs and their responsibility to address deficiencies.

2. The ENV SME would provide locations that have the potential for wetlands or other waters of the United States. If no current existing U.S. Army Corps of Engineers (USACE) jurisdictional determination is available, a delineation would be conducted and jurisdictional determination would be obtained from the USACE. Prior to conducting any activities that have the potential to affect wetlands and other waters of the United States, all Federal and state Clean Water Act (CWA) Section 404 individual or applicable nationwide permits and 401 and other applicable permits would be obtained.

3. Prepare and implement an SWPPP prior to applicable maintenance activities (greater than 1 acre of exposed dirt or as required by property manager). Implement BMPs described in the SWPPP to reduce erosion. Consider areas with highly erodible soils when

planning the maintenance activities and incorporate measures such as waddles, aggregate materials, and wetting compounds in the erosion-control BMPs.

4. Coordinate with the ENV SME to determine which maintenance activities occur within the 100-year floodplain. Maintenance activities within the 100-year floodplain would be conducted in a manner consistent with Executive Order (EO) 11988 and other applicable regulations.

5. All maintenance contractors and personnel would review the CBP-approved spill protection plan and implement it during maintenance and repair activities.

6. Coordinate with ENV SME to ensure that CWA permits are in place for any changes to existing boat ramps.

7. Contact the ENV SME to coordinate with waterway permitting agencies when performing work below the ordinary high water mark.

8. Wastewater from pressure washing must be collected. A ground pit or sump can be used to collect the wastewater. Wastewater from pressure washing must not be discharged into any surface water.

9. If soaps or detergents are used, the wastewater and solids must be pumped/cleaned out and disposed of in an approved facility. If no soaps or detergents are used, the wastewater must first be filtered or screened to remove solids before being allowed to flow off site. Detergents and cleaning solutions must not be oversprayed into or discharged into surface waters.

10. If the surrounding area has dense, herbaceous cover (primarily grasses) and there are no listed plant species or habitat for such, the wastewater (with or without detergent) could be discharged directly to the grassy area without collection or filtering as long as it is well dispersed and all the wastewater can percolate into the grass and soil. If wastewater runs off the grassy area, it must be filtered.

11. Prevent runoff from entering drainages or storm drains by placing fabric filters, sand bag enclosures, or other capture devices around the work area. Empty or clean out the capture device at the end of each day and properly dispose of the wastes.

12. Avoid contaminating natural aquatic and wetland systems with runoff by limiting all equipment maintenance, staging, laydown, and dispensing hazardous liquids (e.g., fuel and oil) to designated upland areas.

13. Avoid contamination of ground and surface waters by collecting concrete wash water in open containers and frequently disposing of it on site by application as a binder to riprap areas. Avoid contamination of ground and surface waters by storing any water that has been contaminated (e.g., with maintenance materials, oils, equipment residue) in closed containers onsite until removed for disposal. In upland areas, storage tanks must be on-ground containers.

14. Avoid contamination of ground and surface waters by ensuring that water tankers that convey untreated surface water do not discard unused water where it has the potential to enter any aquatic or wetland habitat.

15. Cease work during heavy rains and do not resume work until conditions are suitable for the movement of equipment and materials.

16. Uncured concrete should not be allowed to enter the water.

17. Work should be done from the top of the bank or a floating barge, when practicable. Heavy equipment use within the active flowing channel should be avoided.

18. Floating dock components containing foam must be encapsulated to prevent the introduction of foam particles into the water.

19. For all in-water work in streams, sediment barriers would be used to avoid downstream effects of turbidity and sedimentation.

20. Do not pressure wash more than the area to be painted or treated (e.g., for graffiti removal) each day.

21. If the purpose of cleaning is for graffiti removal, spot clean, steam clean, or scrape dirty areas rather than pressure washing entire sections of fence or levee wall.

22. Operate pressure-washing equipment according to manufacturer's recommendations.

23. Except for emergency repairs required to protect human life, limit work within drainages to dry periods to reduce effects on downstream water quality.

24. Riprap should be placed on a layer of geotextile fabric to prevent underlying sediment from being washed out through the openings of the riprap.

25. Riprap should be keyed into the wash/streambed to ensure its stability and effectiveness.

Air Quality

1. *Arizona State Law 49-474.05* - Applies in PM_{10} Nonattainment areas - Site Superintendent, Water Truck Drivers, and Dust Control Coordinators (DCC) will be required to be trained once every 3 years on dust control measures. If disturbance is greater than 1 acre, a DCC will be required to be on site at all times during dust generating activities.

2. *Arizona Administrative Code - R18-2-604 - Open Areas* - restricts fugitive dust emissions from open areas including, but not limited to, driveways, parking areas, vacant lots, dry washes, and riverbeds. Good modern practices for earth moving/excavating activities would be implemented. These include using approved dust suppressants or adhesive soil stabilizers, paving, covering, landscaping, continuous wetting, or detouring maintenance

and repair areas, barring access to maintenance and repair areas, or other acceptable means of reducing significant amounts of airborne dust.

3. *Arizona Administrative Code - R18-2-605 - Roadways and Streets* - restricts fugitive dust emissions from roadways and alleys, including the transportation of materials over those roadways or alleys. Dust and other particulates shall be kept to a minimum by employing the following techniques: temporary paving, dust suppressants, wetting down of roadways, detouring thru traffic, or by other reasonable means.

4. *Arizona Administrative Code - R18-2-606 - Materials Handling* - restricts fugitive dust emissions from nonpoint sources associated with operations such as material crushing, screening, handling, transporting, or conveying. No crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust would occur without taking reasonable precautions (such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to cover maintenance and repair areas) to prevent excessive amounts of particulate matter from becoming airborne.

5. *Arizona Administrative Code - R18-2-607 - Storage Piles* - restricts fugitive dust emissions from material stacking, piling, or similar storage methods. Organic or inorganic dust producing material would not be stacked, piled, or otherwise stored without taking reasonable precautions to reduce excessive amounts of particulate matter from becoming airborne, such as chemical stabilization, wetting, or covering. Stacking and reclaiming machinery used near storage piles would be operated at all times to prevent excessive amounts of particulate matter from becoming airborne.

6. *Yuma County Ordinance - 05 -01* - During maintenance and repair in Yuma County, a construction activity sign would be required in PM_{10} Nonattainment areas.

7. *Pima County Code - 17.12.470 - Fugitive dust activity permits* – No person shall conduct, cause or allow land stripping, earthmoving, blasting, trenching or road construction without first obtaining an activity permit from the Control Officer.

8. *Santa Cruz County Ordinance - 2001-06* - Dust and erosion control methods are required and a permit for grading is required.

9. *Cochise County Land Clearing Ordinance - 00-030* - A clearing permit is required for disturbances of 1 acre or more, which includes approval of dust control measures. Clearing permit for road maintenance is exempt if initial road construction occurred before 17 July 2000.

Noise

1. All Occupational Safety and Health Administration requirements would be followed with respect to maintenance and repair noise impacts. Ensure all motorized equipment possess properly working mufflers and are kept properly tuned to reduce backfires. Ensure all motorized generators will be in baffle boxes (a sound-resistant box that is placed over or

around a generator), have an attached muffler, or use other noise-abatement methods in accordance with industry standards. For activities involving heavy equipment, seasonal restrictions might be required to avoid impacts on threatened or endangered species in areas where these species or their potential habitat occur. See species-specific BMPs.

Cultural Resources

1. If Native American human remains are discovered during maintenance and repair of tactical infrastructure CBP would consult with culturally affiliated tribes and the Arizona SHPO regarding their management and disposition in compliance with Native American Graves Protection and Repatriation Act.

2. Obtain all pertinent training materials for cultural resources for the areas where maintenance and repair activities would occur. Prior to arrival on the work site, ensure key personnel are aware of the cultural resources potentially occurring in the project area and understand the proper BMPs to implement should cultural resources be encountered in the project area.

Roadways and Traffic

1. Access maintenance sites using designated, existing roads. Do not allow any off-road vehicular travel outside those areas. Ensure all parking is in designated disturbed areas. For longer-term projects, mark designated travel corridors with easily observed removable or biodegradable markers.

2. All contractors and maintenance personnel would operate within the designed/approved maintenance corridor.

Hazardous Materials and Waste Management

1. Where hazardous and regulated materials are handled, workers should collect and store all fuels, waste oils, and solvents in clearly labeled closed tanks and drums within a secondary containment system that consists of an impervious floor and bermed sidewalls capable of containing the volume of the largest container stored therein.

2. All paints and cleaning materials should be approved by the appropriate land manager.

3. Use a ground cloth or an oversized tub for paint mixing and tool cleaning. Properly dispose of the wastes.

4. Enclose spray-painting operations with tarps or other means to minimize wind drift and to contain overspray.

5. Clean paintbrushes and tools covered with water-based paints in sinks plumbed to a sanitary sewer or in portable containers that can be dumped into sanitary sewer drains. Never clean such tools in a natural drainage or over a storm drain.

6. Brushes and tools covered with non-water-based paints, finishes, thinners, solvents, or other materials must be cleaned over a tub or container and the cleaning wastes disposed of or recycled at an approved facility. Never clean such tools in a natural drainage or over a storm drain.

7. If maintenance activities would continue at night, direct shielded light only onto the area required for worker safety and productivity. Lights would not exceed 1.5-foot candles within the lit area.

8. Implement proper and routine maintenance of all vehicles and other maintenance equipment such that emissions are within the design standards of all maintenance equipment.

9. Use water-based paints instead of oil-based paints. Look for the words "Latex" or "Cleanup with water" on the label. Do not rinse into natural drainages (e.g., creeks, irrigation canals, wetlands) or storm drains.

10. Do not use paints more than 15 years old. They could contain toxic levels of lead.

11. Use ground or drop cloths underneath painting, scraping, sandblasting, and graffiti removal work. Properly dispose of the waste and scraps collected on the drop cloth.

12. Minimize site disturbance and avoid attracting predators by promptly removing waste materials, wrappers, and debris from the site. Any waste that must remain on site more than 12 hours should be properly stored in closed containers until disposal.

Socioeconomic Resources, Environmental Justice, and Protection of Children

No BMPs were identified for socioeconomic resources, environmental justice, or the protection of children.

APPENDIX F

Soils Mapped within the Tactical Infrastructure Maintenance and Repair Region of Analysis

APPENDIX F

Soils within the Tactical Infrastructure Maintenance and Repair Area of Analysis

Table F-1. Soil Properties of Soils Mapped along the U.S./Mexico international Border in Arizona

Map Unit Name	Counties	Erosion Potential	Farmland Classification	Permeability
Arizona				
Coolidge-Wellton-Antho	Yuma	Slight	None	Moderately rapid
Imperial-Glenbar-Holtville	Yuma	Slight	None	Slow to moderate
Harqua-Perryville-Gunsight	Yuma	Slight	None	Moderately slow
Rillito-Gunsight-Pinal	Pima, Yuma	Slight	None	Moderate to rapid
Comora-Pima	Santa Cruz	Slight	None	Slow
Gothard-Crot-Stewart	Cochise	Slight	None	Moderately slow
Elfrida	Cochise	Slight	None	Moderately slow
Karro	Cochise	Slight	None	Moderate to slow
McAllister	Cochise	Slight	Prime Farmland soil if Irrigated	Slow
Mohave	Cochise	Slight	None	Moderately slow
Dry Lake-Playa	Cochise	Slight	None	Moderately slow
Comoro-Anthony-Grabe	Cochise	Slight	None	Moderately rapid
Vinton-Gila	Cochise, Pima	Slight	None	Rapid
Guest	Cochise	Slight	Prime Farmland soil if irrigated and protected from flooding	Slow to very slow

Sources: NRCS 2003, NRCS 2011

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APPENDIX G

Air Quality Emissions Calculations

Summary	Summarizes total emissions by calendar year for the Proposed Action in Arizona
Combustion	Estimates emissions from non-road equipment exhaust.
Fugitive	Estimates particulate emissions from construction activities including earthmoving, vehicle traffic, and windblown dust.
Grading	Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions.
Construction Commuter	Estimates emissions for construction workers commuting to the site.

Air Quality Emissions from the Proposed Action

	NO_x (ton)	VOC (ton)	CO (ton)	SO_2 (ton)	PM_{10} (ton)	$PM_{2.5}$ (ton)	CO_2 (ton)
Construction Combustion	4.25	0.26	1.60	0.08	0.26	0.25	504.04
Construction Fugitive Dust	-	-	-	-	386.91	38.69	-
Construction Commuter	0.11	0.11	0.99	0.001	0.01	0.01	131.48
TOTAL	***4.36***	***0.37***	***2.59***	***0.09***	***387.18***	***38.95***	***635.52***

Note: Total $PM_{10}/_{2.5}$ fugitive dust emissions are assuming USEPA 50% control efficiencies.

CO_2 emissions converted to metric tons =	***576.41***	***metric tons***	
State of Arizona's CO_2 emissions =	***103,014,944***	***metric tons***	*(EIA 2011)*
Percent of State of Arizona's CO_2 emissions =	***0.0006%***	***metric tons***	

Source: U.S. Department of Energy, Energy Information Administration (EIA). 2011. State Carbon Dioxide Emissions Summary by State. Available online: <http://www.eia.doe.gov/oiaf/1605/state/state_emissions.html>. Accessed 17 January 2011.

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO_2, CO, $PM_{2.5}$, $PM_{10,}$ and CO_2 due to Construction

General Construction Activities	**Area Disturbed**		
Arizona Grading Activities	14,784,000	ft^2	Road Grading would be 140 miles by 20 feet wide
Total General Construction Area:	14,784,000	ft^2	
	339.4	acres	
Total Demolition Area:	0	ft^2	(none)
	0.0	acres	
Total Pavement Area:	0	ft^2	(none)
	0.0	acres	
Total Disturbed Area:	14,784,000	ft^2	
	339.4	acres	
Construction Duration:	12	months	
Annual Construction Activity:	240	days/yr	Assume 12 months, 4 weeks per month, 5 days per week.

Emission Factors Used for Construction Equipment

References: Guide to Air Quality Assessment, SMAQMD, 2004; and U.S. EPA NONROAD Emissions Model, Version 2005.0.0
Emission factors are taken from the NONROAD model and were provided to e²M by Larry Landman of the Air Quality and Modeling Center (Landman.Larry@epamail.epa.gov) on 12/14/07. Factors provided are for the weighted average US fleet for CY2007.
Assumptions regarding the type and number of equipment are from SMAQMD Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO_2 (lb/day)
Bulldozer	1	13.60	95.742%	5.50	1.02	0.89	0.87	1456.90
Motor Grader	1	9.69	0.73	3.20	0.80	0.66	0.64	1141.65
Water Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	3	41.64	2.58	15.71	0.83	2.55	2.47	4941.53

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO_2 (lb/day)
Paver	1	3.83	0.37	2.06	0.28	0.35	0.34	401.93
Roller	1	4.82	0.44	2.51	0.37	0.43	0.42	536.07
Truck	2	36.71	1.79	14.01	3.27	1.99	1.93	4685.95
Total per 10 acres of activity	4	45.37	2.61	18.58	0.91	2.78	2.69	5623.96

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO_2 (lb/day)
Loader	1	13.45	0.99	5.58	0.95	0.93	0.90	1360.10
Haul Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Total per 10 acres of activity	2	31.81	1.89	12.58	0.64	1.92	1.87	3703.07

Building Construction

Equipment[d]	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c] (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO_2 (lb/day)
Stationary								
Generator Set	1	2.38	0.32	1.18	0.15	0.23	0.22	213.06
Industrial Saw	1	2.62	0.32	1.97	0.20	0.32	0.31	291.92
Welder	1	1.12	0.38	1.50	0.08	0.23	0.22	112.39
Mobile (non-road)								
Truck	1	18.36	0.89	7.00	1.64	1.00	0.97	2342.98
Forklift	1	5.34	0.56	3.33	0.40	0.55	0.54	572.24
Crane	1	9.57	0.66	2.39	0.65	0.50	0.49	931.93
Total per 10 acres of activity	6	39.40	3.13	17.38	3.12	2.83	2.74	4464.51

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/day)	VOC[b] (lb/day)	CO (lb/day)	SO_2[c]	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO_2 (lb/day)
Air Compressor	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77
Total per 10 acres of activity	1	3.57	0.37	1.57	0.25	0.31	0.30	359.77

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.

b) The SMAQMD 2004 reference lists emission factors for reactive organic gas (ROG). For the purposes of this worksheet ROG = VOC. The NONROAD model contains emissions factors for total HC and for VOC. The factors used here are the VOC factors.

c) The NONROAD emission factors assume that the average fuel burned in nonroad trucks is 1100 ppm sulfur. Trucks that would be used for the Proposed Actions will all be fueled by highway grade diesel fuel which cannot exceed 500 ppm sulfur. These estimates therefore over-estimate SO2 emissions by more than a factor of two.

d) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO_x	VOC	CO	SO_2**	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	34	1415.802	87.618	534.137	28.316	86.547	83.951	168011.896
Paving Equipment	1	45.367	2.606	18.578	0.907	2.776	2.693	5623.957
Demolition Equipment	1	31.808	1.886	12.584	0.636	1.923	1.865	3703.074
Building Construction	1	39.396	3.130	17.382	3.116	2.829	2.744	4464.512
Air Compressor for Architectural Coating	1	3.574	0.373	1.565	0.251	0.309	0.300	359.773
Architectural Coating**			0.000					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Example: SMAQMD Emission Factor for Grading Equipment NOx = (Total Grading NOx per 10 acre)*(Equipment Multiplier)

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	14,784,000	339.39	6	(from "Grading" worksheet)
Paving:	0	0.00	0	
Demolition:	0	0.00	0	
Building Construction:	0	0.00	0	
Architectural Coating	0	0.00	0	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

NOTE: The 'Total Days' estimate for paving is calculated by dividing the total number of acres by 0.21 acres/day, which is a factor derived from the 2005 MEANS Heavy Construction Cost Data, 19th Edition, for 'Asphaltic Concrete Pavement, Lots and Driveways - 6" stone base', which provides an estimate of square feet paved per day. There is also an estimate for 'Plain Cement Concrete Pavement', however the estimate for asphalt is used because it is more conservative. The 'Total 'Days' estimate for demolition is calculated by dividing the total number of acres by 0.02 acres/day, which is a factor also derived from the 2005 MEANS reference. This is calculated by averaging the demolition estimates from 'Building Demolition - Small Buildings, Concrete', assuming a height of 30 feet for a two-story building; from 'Building Footings and Foundations Demolition - 6" Thick, Plain Concrete'; and from 'Demolish, Remove Pavement and Curb - Concrete to 6" thick, rod reinforced'. Paving is double-weighted since projects typically involve more paving demolition. The 'Total Days' estimate for building construction is assumed to be 230 days, unless project-specific data is known.

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	8,494.81	525.71	3,204.82	169.90	519.28	503.71	1,008,071
Paving	-	-	-	-	-	-	0
Demolition	-	-	-	-	-	-	0
Building Construction	-	-	-	-	-	-	0
Architectural Coatings	-	-	-	-	-	-	0
Total Emissions (lbs):	**8,494.81**	**525.71**	**3,204.82**	**169.90**	**519.28**	**503.71**	**1,008,071**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Total Project Emissions (lbs)	8,494.81	525.71	3,204.82	169.90	519.28	503.71	1,008,071
Total Project Emissions (tons)	4.25	0.26	1.60	0.08	0.26	0.25	504.04

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM_{10}/acre-month	MRI 1996; EPA 2001; EPA 2006

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier	0.10	(10% of PM_{10} emissions assumed to be $PM_{2.5}$)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM_{10} and $PM_{2.5}$ emissions)	EPA 2001; EPA 2006

Project Assumptions

New Roadway Construction (0.42 ton PM_{10}/acre-month)

Duration of Construction Project	-	months
Area	-	acres

General Construction Activities (0.19 ton PM_{10}/acre-month)

Duration of Construction Project	12	months
Area	339.4	acres

	Project Emissions (tons/year)			
	PM_{10} uncontrolled	**PM_{10} controlled**	**$PM_{2.5}$ uncontrolled**	**$PM_{2.5}$ controlled**
New Roadway Construction	-	-	-	-
General Construction Activities	773.82	386.91	77.38	38.69
Total	**773.82**	**386.91**	**77.38**	**38.69**

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM_{10}/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions From Construction Operations, calculated the 0.19 ton PM_{10}/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM_{10}/acre-month) and 75% of the average emission factor (0.11 ton PM_{10}/acre-month). The 0.19 ton PM_{10}/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particulate (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District as well as the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM_{10}/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

$PM_{2.5}$ Multiplier **0.10**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (EPA 2006). Wetting controls will be applied during project construction.

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Grading Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 339.4 acres/yr (from Combustion Worksheet)
Qty Equipment: 102.0 (calculated based on 3 pieces of equipment for every 10 acres)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 19th Ed., R. S. Means, 2005.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr (project-specific)	Equip-days per year
2230 200 0550	Site Clearing	Dozer & rake, medium brush	8	acre/day	8	0.13	339.39	42.42
2230 500 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	339.39	165.93
2315 432 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	169.70	171.11
2315 120 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	169.70	70.20
2315 310 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	2,300	cu. yd/day	2.85	0.35	339.39	119.03
TOTAL								568.69

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 568.7
Qty Equipment: 102.0
Grading days/yr: 5.6

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Emission Estimation Method: Emission factors from the South Coast Air Quality Management District (SCAQMD) EMFAC 2007 (v 2.3) Model (on-road) were used. These emission factors are available online at http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html.

Assumptions:
Passenger vehicle emission factors for scenario year 2010 are used

The average roundtrip commute for a construction worker =	40	miles
Number of construction days =	240	days
Number of construction workers (daily) =	25	people

Passenger Vehicle Emission Factors for Year 2010 (lbs/mile)

NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
0.00091814	0.00091399	0.00826276	0.00001077	0.00008698	0.00005478	1.09568235

updated April 24, 2008. Available online: <http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>. Accessed 27 May 2009.
Notes:
The SMAQMD 2007 reference lists emission factors for reactive organic gas (ROG). For purposes of this worksheet ROG = VOC

Construction Commuter Emissions

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
lbs	**220.354**	**219.357**	**1983.062**	**2.586**	**20.875**	**13.148**	**262963.764**
tons	**0.110**	**0.110**	**0.992**	**0.0013**	**0.0104**	**0.0066**	**131.482**

Example Calculation: NO_x emissions (lbs) = 60 miles/day * NO_x emission factor (lb/mile) * number of construction days * number of workers