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Bureau of Land Management

Tucson Field Office

Ironwood Forest National Monument Travel Management Plan and Environmental Assessment

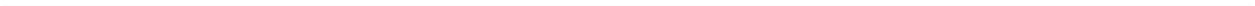


BLM

Prepared By:
United States Department of the Interior
Bureau of Land Management
Tucson Field Office
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**United States Department of the Interior
Bureau of Land Management, Arizona
Ironwood Forest National Monument**

TRAVEL MANAGEMENT PLAN and ENVIRONMENTAL ASSESSMENT

(DOI-BLM-AZ-G020-2013-0033-EA)

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LIST OF ACRONYMS AND ABBREVIATIONS

4WD	four-wheel drive
ADT	Average Daily Traffic
AGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program
FLTP	Federal Lands Transportation Program
FY	fiscal year
I-11	Interstate 11
IFNM	Ironwood Forest National Monument
MAP-21	Moving Ahead for Progress in the 21st Century Act
NEPA	National Environmental Policy Act
NRCS	Natural Resource Conservation Service
OHV	off-highway vehicle
PRMP	Proposed Resource Management Plan
Proclamation	Presidential Proclamation 7320
RAMP	Recreation Area Management Plan
RMP	Resource Management Plan, a.k.a Approved Resource Management Plan
RMZ	Recreation Management Zone
ROW	right-of-way
RTP	Recreation Trails Program
SRMA	Special Recreation Management Area
SRP	Special Recreation Permit
TMA	Travel Management Area
TMP	Travel Management Plan
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

IRONWOOD FOREST NATIONAL MONUMENT TRAVEL MANAGEMENT PLAN and ENVIRONMENTAL ASSESSMENT

(DOI-BLM-AZ-G020-2013-0033-EA)

1.0 INTRODUCTION

1.1 Introduction

The Ironwood Forest National Monument (IFNM) was established on June 9, 2000 by Presidential Proclamation 7320 (Proclamation, Appendix A) to protect objects of scientific interest, including geological, biological, and archaeological resources. The Proclamation directs the Secretary of the Interior “*to prohibit all motorized and mechanized vehicle use off road, except for emergency or authorized administrative purposes for the purpose of protecting the Monument objects.*” It also directs the Secretary “*to prepare a transportation plan that addresses the actions including road closures or travel restrictions, necessary to protect the objects identified in this proclamation.*”

The IFNM Resource Management Plan (RMP) and Environmental Impact Statement (EIS) Record of Decision (ROD) (BLM 2013) identifies land use allocations and management strategies necessary to protect Monument objects while accommodating allowable uses, including access needs related to those uses.

A physical access route inventory was completed for the IFNM in 2003 during preparation of the RMP. The route inventory identified existing access routes, their uses and use patterns, and a variety of facilities, improvements, and public use activity areas along the routes. As part of the development of the RMP, in 2006 an interdisciplinary team completed an evaluation of the access routes and identified alternatives for accommodating motorized and non-motorized access to the Monument. These access alternatives were analyzed concurrently with the land use allocations and management strategies under the alternatives considered in the RMP. Appendix D of the IFNM RMP describes in detail the route inventory and evaluation procedure, as well as the alternative route designations.

This Travel Management Plan (TMP) identifies the management strategies and on-the-ground actions to implement the Monument travel route designations for motorized and non-motorized access for administrative purposes and public use established concurrently with the IFNM RMP ROD, and to implement the resource-specific decisions of the RMP that require access or require protection from impacts related to use, maintenance and operation of the Monument transportation system (Appendix B).

The key elements of this TMP are:

- Transportation maintenance, establishing guidelines for the different intended types of assets (roads and trails) depending on access purpose

- Identify Monument access routes from the public highway system, work with counties on maintenance and signing
- Identify priority road maintenance and restoration projects and signing needs
- Ancillary travelers facility improvements: turnouts for portals, community access, group recreation sites, dispersed recreation sites
- Replace gates with cattle guards
- Implement administrative use restrictions
- Decommission and restore routes
- Restore sites damaged by prior land use activity
- Signing plan
- Identify legal access needs
- Strategize funding opportunities
- Identify minor adjustments to the route designations (Appendix C) to accommodate administrative access to existing authorizations based on input received during preparation of this plan

1.2 Background Information

The IFNM RMP established land use allocations, use restrictions, and management strategies for the multiple resources and uses allowed on Monument lands. Route designations were identified concurrently with the RMP ROD, to accommodate access for those allowable uses, and to avoid, minimize or mitigate potential impacts to Monument objects. The route designations identified a network of motorized and non-motorized access routes making up the transportation system of Roads, Primitive Roads, Administrative Roads, and Trails necessary for the administration of Monument lands, and for the protection of Monument objects listed in the Proclamation (Appendix A).

Concurrent with the RMP decisions, Monument Access Routes were designated as “Motorized Route,” “Non-Motorized Route,” or “Closed.” Additionally, transportation designations identified the transportation Asset Type, Functional Class, Maintenance Intensity, and Access Type. The allowable uses for the different asset types are described below in Section 5.1.2. Travel management designations do not apply to routes on non-BLM lands, unless provided for under cooperative agreements, easements, ROWs or other legal instrument. Routes or segments of routes on non-Monument lands acquired under the Monument’s land tenure adjustment program would be managed according to the area and route designations established in the RMP and this TMP. The proposed plan implements these route designations, and identifies maintenance standards and guidelines for the Monument Access Routes to accommodate their access purposes.

Table 1. IFNM BLM-Administered Transportation Asset Types (Monument routes only)

Asset Type	Total (Miles)	Percentage (%)
Road	42	12
Primitive Road	82	23
Admin. Primitive Road	118	35
Trail-Non Motorized	90	25
Closed for restoration	17	5
Total	349	100

The designated Monument travel route system consists of routes that existed when the Monument was established. With few exceptions routes are unpaved, and most of them have not received maintenance in the past 10 years and are in poor condition. Avra Valley, Silverbell, Pump Station, El Tiro and Sasco roads are infrequently maintained by either Pima County or Pinal County under existing rights-of-way (ROWS). As a result of the delayed maintenance, most of the routes require high-clearance vehicles and many require four-wheel-drive (see Appendix D). Very few Monument routes are accessible to passenger car, recreational or other large vehicles (i.e., truck and combination trailer, bus, or motorhome).

Establishment of the Monument in 2000 attracted increased public use of Monument lands, including additional traffic and vehicles unsuitable for existing road conditions. Most of the existing routes were constructed for resource access related to mineral exploration and mining, livestock grazing, access to private land, or utilities, and have become established access routes for public recreational use. Some access routes lost their access purpose over time, and were naturally reclaiming at the time the Monument was established. Impacts of vehicle use since the Monument was established have occurred on the existing route network, with increased traffic on the route network by the public for recreational purposes, including on routes that were in reclaiming condition. Impacts of vehicle use in desert washes (vegetation damage and loss, reduced productivity of vegetation, oil and gas spills introducing hazardous chemicals into groundwater, disruption of wildlife movement) are an ongoing concern.

Impacts of border related smuggling include cross-country vehicle travel creating new routes and damaging or destroying soils, vegetation, and other objects. The BLM has been restoring these sites as soon as possible to reduce further impacts. Intensive law enforcement activity (BLM Rangers, Border Patrol, and other interagency partners) relies on the existing route network for operational access. Some of those routes were designated in the RMP for non-motorized access only, or for reclamation due to lack of other identified access purpose and presence of sensitive resource values.

In preparing this TMP, the travel route designations established concurrently with the RMP ROD, the land use allocation decisions, and the access purposes were analyzed to define the scope of the initial implementation effort and to ensure that access needs are adequately accommodated. Stakeholder input also contributed to defining the scope of the proposed plan.

1.3 Planning Area Description

The IFNM is approximately 80 miles south of Phoenix and 45 miles northwest of Tucson, in Pinal and Pima counties, Arizona, as shown on Map 3.1. The nearest community is the Town of Marana, and several residential areas are located near or adjacent to the Monument including Green Acres, Silverbell

Estates, Blanco Wash, Arizona City, and Red Rock. Several residential areas are also located on private land inholdings, including Red Hill and several ranching headquarters.

The proclaimed Monument boundary includes approx. 189,000 acres, including Monument lands administered by the BLM, a United States Air Force military withdrawal, Arizona State Trust lands, Pima County land and private property as noted in Table 2. Private lands within the Monument boundary are considered private inholdings and are not under BLM jurisdiction. The intermingled land ownership within the Monument and along access routes presents challenges in managing the Monument transportation system.

Table 2. Land Ownership in the Ironwood Forest National Monument

Ownership	Total (Acres)	Percentage (%)
BLM (Monument lands) ¹	128,759	68
Military withdrawal ²	299	<1
Arizona State Trust land	54,741	29
County land (Pima)	632	<1
Private land	4,549	3
Total	188,619	100

The IFNM is in a relatively remote area accessed from Interstate 10 (I-10) and Interstate 8 (I-8) by an extensive network of county-maintained roads primarily serving rural residential, agricultural, ranching, resource extraction, and recreational land uses. Monument lands are traversed by several county-maintained roads and a system of primitive roads and trails across intermingled ownership. The county-maintained roads important for access to the Monument include Avra Valley, Red Rock, Silverbell, Pump Station, Mile Wide, Manville and El Tiro roads in Pima County; and Sasco, Sunland Gin, Harmon and Night Sky roads in Pinal County. The sections of these roads crossing Monument lands are authorized under ROWs. Connected routes across non-Monument land are not under the jurisdiction of the BLM and are not subject to the BLM route designations. Routes across inholdings remain under the jurisdiction of the land owner, and will be managed in accordance with the designations established in the RMP if the land or interest in the land is acquired.

1.3.1 Physiographic Setting

The Sonoran Desert environment, in which the Monument is located, is characterized by hot summers and mild winter seasons. The existing Monument transportation routes traverse creosote flats, moderate slopes (known regionally as “bajadas”), and steep mountainous terrain. Numerous large to small desert washes that are normally dry, and flow briefly during summer monsoon storm events, dissect the topography. The elevation ranges from 1,540 feet in the Aguirre Valley flats north of the Sawtooth Mountains, to 4,260 feet on Silverbell Peak the highest point in the Monument. Short intense summer storms produce

¹ Area includes 361 acres reconveyed under the Waterman Acquisition project in July 2014 (EA# DOI-BLM-AZ-G020-2013-0037-EA).

² Military withdrawal area is in the process of being relinquished. Upon relinquishment, the area will be managed as part of the Monument.

surface runoff which affects existing roads when intense, short duration events may bring over 2 inches of precipitation within an hour. These storm events cause road washouts at low water crossings, and runoff intercepted by the roadways has downcut the roads significantly in places. The existing Monument roads are in poor condition due to continuing erosion and lack of maintenance.

Vegetation in the Monument is classic Sonoran Desert upland habitat, dominated by saguaro, Bigelow's cholla, and staghorn cholla cacti, ironwood, mesquite, palo verde, creosote bush, brittlebush, triangle-leaf bursage, ocotillo, and white thorn acacia among other plants. Vegetation is sparse in the creosote flats, with little in the way of topographic or vegetation barriers to impede cross-country travel. Cross-country vehicle use creates new tracks and new impacts on Monument resources. In the bajadas and mountainous terrain, topographic barriers and vegetation cover provide barriers to cross-country vehicle travel.

1.4 Public Issues and Concerns

The travel route designations were established concurrently with the RMP to accommodate access for the allowable uses of Monument lands, as well as to protect Monument objects from potential impacts related to the use, maintenance and operation of the access routes. Appendix B of this document lists the specific RMP travel management decisions with access-related needs, issues and concerns, as well as the implementation strategies, best management practices, and specific on-the-ground actions that would be undertaken to achieve the travel management goals and objectives established in the RMP.

Several public stakeholder meetings and individual interviews were conducted in June - August 2013 to gather input for developing the implementation plan. Holders of existing authorizations (grazing leases, ROWs, communication sites, Special Recreation Permits), representatives of the Tohono O'odham Nation, US Border Patrol (Tucson and Casa Grande Sectors), BLM Gila District law enforcement rangers, Arizona Game and Fish Department (AGFD), United States Air Force, Friends of Ironwood Forest, Pima County, and recreational users provided information on their access needs. The input included information on the condition of routes and on the specific type and frequency of access needed. This information would be used to ensure route maintenance and administrative access needs are adequately accommodated while making provisions for public use and protecting Monument objects.

Key implementation planning issues to achieve compliance with the Monument Proclamation, and with the access and resource protection decisions of the RMP, and issues identified by the public include:

- Implementation of transportation route designations identified in the RMP and changing current access and use patterns;
- Accommodating vehicle access for administrative purposes while providing for non-motorized public use of administrative routes;
- Connection of the Monument transportation system to the Interstate, State and County public highway system;
- Drainage and erosion problems on Monument Roads and Primitive Roads is affecting usability and access purpose of designated routes;

- The need to establish standards for consistent maintenance and/or improvement of Roads and Primitive Roads;
- Legal access acquisition needed to allow BLM maintenance and public use on routes essential for the Monument's transportation system across non-Monument lands;
- Implementation of route closures and use restrictions;
- Enforcement of designations and use restrictions;
- Funding for implementation efforts.

The issues above are listed in no particular order. The proposed plan was shaped by these issues.

2.0 PURPOSE AND NEED

2.1 Purpose and Need for Action

The purpose for action is to provide appropriate public and administrative access to the Monument while protecting sensitive resources. Currently, the Monument's road network is in need of strategic and long-term maintenance. Travel route designations were established concurrent with the RMP; however the RMP did not identify the travel management plan components (a sign plan, road maintenance standards and guidelines, a strategy for rehabilitation of decommissioned routes, etc.) needed to support this designated route network. The TMP includes best management practices, projects, and site-specific, on-the-ground actions to achieve the goals and objectives of RMP decisions.

The action is needed to comply with the Monument's Proclamation and to implement the RMP.

2.1.1 Decision to be Made

The decision to be made is whether to approve, not approve, or approve with modifications the travel management plan as described in this document. If approved, the Decision Maker (Field Manager, BLM Arizona Tucson Field Office) may choose to require additional mitigation measures.

2.2 Land Use Plan Conformance

The proposed action is in conformance with the BLM's *Ironwood Forest National Monument Resource Management Plan (IFNM RMP)*, *Record of Decision* (February 2013) through the following decisions:

TM-002: Provide adequate, legal, and safe access for allowable public use and administrative purposes while protecting Monument objects.

TM-003: Improve on-the-ground travel management operations and maintenance programs to protect Monument objects, and to manage visitor access, safety, and recreation opportunities and experiences.

TM-004: Give priority to establishing, improving, or maintaining designated routes or access points to protect Monument objects and accommodate allowable uses.

TM-005: Secure legal and safe access, appropriate for achieving and maintaining Monument management objectives, for both motorized and non-motorized entry into the Monument. Provide and maintain connectivity of the IFNM transportation system with the surrounding public highway system (interstate, Federal, State, and country roads).

The proposed action is designed to help implement specific decisions in the RMP, which are listed in Appendix B.

2.3 Relationship to Other Plans

- Arizona Trails 2010: A Statewide Motorized & Non-Motorized Trails Plan; Arizona State Parks, Approved by Arizona State Parks Board 09/11/2009. Funding is available through grants from Arizona State Parks for projects on trails included in the state trails plan. Under the proposed action, the Sasco trail would be nominated for inclusion in the state trails plan.
- Eastern Pima County Trail System Master Plan (1989): The Master Plan updates identify connecting trails accessing the Monument.
- Pinal County Open Space and Trails Master Plan (2007): Identifies trail routes connecting to the Monument.
- Interstate Highway 11 (I-11): Regional, state and local transportation interests are investigating the feasibility of developing a new interstate highway west of Tucson, with alternative routes near the Monument. The conceptual alignment for the Tucson bypass is southwest of the Tucson Mountains, near the Monument. Feasibility studies for these corridor extensions are scheduled to begin in July 2013 as part of a regional economic development strategy. The BLM will provide input as the I-11 plan develops.
- State and Local Transportation Improvement Plans: The proposed Monument access routes are county-maintained roads on local transportation plans, and eligible for federal funding under the Federal Lands Access Program (FLAP). Funding under this program would be sought with the counties for maintenance and improvements to address deficiencies and safety concerns along these routes. The proposed primary Monument access route is the Avra Valley Road-Silverbell Loop and the proposed secondary Monument access route is the Silverbell-Sasco Loop.

The alternatives analyzed in this TMP and EA are in conformance with the goals and policies of the plans listed above.

2.4 Implementation Goals and Objectives

The purpose of this TMP can be achieved through identifying the management strategies, actions and projects to implement the travel management designations and resolve the issues listed in section 3.2. Initial implementation efforts would focus where the need is greatest for accommodating access and protecting Monument objects (see Section 8.1 Implementation Project Prioritization). Below is a partial

list of goals and objectives that would guide and focus the scope of annual work plans to accomplish implementation. A complete list, including resource-specific decisions that require access, or require protection from impacts associated with travel use and routes, is available in Appendix B.

1. Provide a comprehensive transportation system for the Monument that is protective of Monument objects (TM-001).
2. Provide adequate, legal, and safe access for allowable public use and administrative purposes while protecting Monument objects (TM-002).
3. Accommodate emergency, wildland fire and law enforcement access on the existing physical access route system, including designated vehicle use routes open to public use and routes open to administrative vehicle use only.
4. Work with current authorization holders to accommodate administrative vehicle access needs for the use, maintenance and operation of authorized facilities or improvements, while protecting Monument objects. Work with authorization holders to accommodate non-motorized public use of administrative access routes connected to existing authorizations.
5. Improve on-the-ground travel management operations and maintenance programs to protect Monument objects, and to manage visitor access, safety, and recreation opportunities and experiences (TM-003).
6. Give priority to establishing, improving, or maintaining designated routes or access points to protect Monument objects and accommodate allowable uses (TM-004).
7. Secure legal and safe access, appropriate for achieving and maintaining Monument management objectives, both for motorized and non-motorized entry into the Monument. Provide and maintain connectivity of the IFNM transportation system with the surrounding public highway system (interstate, Federal, State and county roads) (TM-005).
8. Acquire or adjudicate legal access for Monument transportation route segments across non-Monument land to provide for the management, maintenance and improvement as part of the Monument transportation system. Acquisition of access easements or ROWs will be in accordance with BLM policies and regulations.
9. Educate authorization holders, recreational visitors and other agencies about the travel management system and use restrictions to promote compliance.
10. Fund planned work using BLM agency appropriated funds, grants, and voluntary contributions from interested parties or programs. Leverage funding from external sources through cost share assistance agreements and partnerships.

3.0 PROPOSED IMPLEMENTATION ACTIONS

The implementation actions proposed in this plan are designed to achieve progress on specific objectives in the RMP decisions with access and travel management implications, whether it is to provide access, or to protect Monument objects from impacts related to access and use of travel routes. All actions are

subject to availability of appropriated funds and staff. Implementation needs would be packaged for funding through normal appropriations and budget process.

3.1 Transportation Management System – Asset Types, Functional Classes, and Maintenance Intensity Classes

The BLM manages transportation routes, other facilities and real property as assets using the Facility and Asset Management System (FAMS) to inventory, track and program budget needs. The FAMS database for the Monument will be updated to add the designated Monument Roads and Primitive Roads, Trails and Recreation Sites. The BLM transportation asset types, functional classes, and maintenance intensity designations for the Monument routes are indicated in Table D-1 in Appendix D of the RMP.

3.1.1 Types of Access and Vehicle Types

All vehicles traveling on the Monument must be street legal. Access vehicles are addressed in the travel management section of the RMP, and in Appendix G of the RMP, based on the types of vehicles using the Monument route system. Additional information on the access vehicles that need to be accommodated was provided by stakeholders for this TMP. Routes would be maintained, and improved to the minimal extent necessary, to accommodate targeted access vehicles (Table 3). Other vehicles that have similar characteristics or requirements may use a route managed to accommodate the access vehicle, unless otherwise restricted. The access vehicle would be considered the design vehicle for planning, designing and engineering specific road maintenance, reconstruction, or new construction projects.

Table 3. Access Vehicles by Asset Type Designation

Asset Type	Access Vehicle
Road	Truck and trailer transport for construction equipment
Primitive Road (Type A)	Type 6 wildland fire engine, utility line truck
Primitive Road (Type B)	Full size 4WD pick-up truck or SUV
Trail	Equestrian rider, hiker

3.1.2 Monument Transportation Asset Types

BLM transportation asset types consist of Roads, Primitive Roads, and non-motorized Trails necessary for the use and administration of Monument lands, and are managed to accommodate different types of access and varying levels of service depending on the target access purpose(s) and functional characteristics of a route. Monument asset type designations were identified in the RMP travel management section and Appendix D of the RMP. Different asset types require different travel way and geometric characteristics to accommodate the target vehicle type(s). The asset type designations were reviewed during preparation of the TMP, and several minor adjustments are proposed to accommodate administrative access needs related to existing land use authorizations, indicated by new information.

Standards and guidelines for maintenance of the different types of route are proposed to ensure adequate and appropriate access is provided, that maintenance work is consistently performed to the appropriate

standard, and that Monument objects are protected. The standards and guidelines are described in detail in Appendix E.

Roads (42 miles): Monument routes designated as Roads will be managed to accommodate public motorized vehicle use year-round. These routes will provide general access to the Monument and are the principal connection of the Monument transportation routes with the local public highway system. Roads will generally accommodate two-way administrative, recreational and commercial rural traffic and will be maintained to accommodate passenger car and large vehicle types (motor homes, trailer combination vehicles, haul trucks). These routes include the main Monument access roads maintained by Pinal and Pima counties across the Monument, which are authorized under existing ROWs to the counties. The typical travel way width for BLM Roads is 22 feet or wider depending on traffic type, alignment and topography, with or without shoulders; other Road criteria are found in Appendix E. State vehicle laws apply on use of these routes, including operator's license, vehicle registration and liability insurance.

Primitive Roads (82 miles): Monument routes designated as Primitive Roads will be managed to accommodate public motorized vehicle use year-round, and may also be used for non-motorized travel under mixed traffic conditions. These routes will provide primitive access to the Monument from the designated Monument roads for recreational and other land use purposes, and also serve essential administrative access purposes. These routes currently have a very narrow single lane travel way, very narrow side and overhead clearance, rough and steep grades. Most of the routes were constructed for past mineral exploration and range improvements. Due to differing access purposes and functional characteristics among these routes, two types of primitive road maintenance guidelines are proposed for the Monument to accommodate differing access purposes (primitive road Type A and Type B) with the minimum impact on resources. Type A primitive roads will have a 14-ft. wide travel way with 20-ft. side clearance, and a design speed of 25 miles per hour (MPH); Type B primitive roads will have a 10-ft. travel way and 10-ft. side clearance, and a design speed of 15 MPH. The detailed criteria for both types of primitive roads are described in Appendix E. Routes will be maintained to provide their intended access purpose. The access vehicle (see also Section 5.1.3 and Table 3) for Type A primitive roads will be a Type 6 wildland fire engine, while the access vehicles for Type B primitive roads will be a full-size four-wheel drive (4WD) truck and street-legal off highway vehicles. Primitive roads will be maintained to provide access by drivers of average skill and confidence using the target vehicle, and will be open to use by other vehicles according to the discretion of each driver. This serves as an indirect method of regulating use. Existing passing turnouts will be maintained, or new turnouts provided as needed for safety. The proposed initial transportation maintenance projects include primitive roads with a functional class of "local" or "resource". The maintenance projects will focus on correcting drainage deficiencies and stabilizing erosion, and mitigating poor soil conditions.

Administrative Primitive Roads (118 miles): Monument routes designated as administrative Primitive Roads will be managed to accommodate single lane vehicle access related to the use, maintenance and operation of current land use authorizations, including utility ROWs (electric transmission, electric distribution, and natural gas pipeline), grazing leases, communication sites, and other authorized uses. These routes will be available for public use by non-motorized means including mechanized non-motorized modes of transport (foot, horse, or mountain bicycle), and may be authorized for use under a Special Recreation Permit provided such use does not interfere with the administrative purposes of the route. Most of these routes currently have a very narrow single lane travel way, minimal side and

overhead clearance, rough and steep grades. Some of these routes are used as needed by vehicle types used for electric transmission and natural gas pipeline maintenance and repair equipment, for wildland fire suppression, or for maintenance of wildlife or range improvements. Some of these vehicles have special requirements for weight, travel way width, maximum grade, horizontal and vertical clearance, and minimum turning radius. These routes will be minimally improved to accommodate special vehicle types on a case-by-case basis, and subject to specific approval by the BLM. These improvements will meet Primitive Road Type A guidelines (see Appendix E).

Trails – Non-Motorized (90 miles): Monument routes designated as ‘Trails’ concurrently with the RMP will be managed to accommodate non-mechanized, non-motorized use year round (i.e. hiking and equestrian). Most of these consist of pre-existing routes that previously provided vehicle access; they vary in width and overall condition. Physical barriers or restrictive devices and signing will be installed at the access points. Travel ways will be allowed to reduce in width naturally, or will be partially reclaimed/revegetated near access points to restrict the width and indirectly control use. Trails will be posted with signs indicating allowable and restricted uses, monitored for compliance, and conditions inspected annually for maintenance or corrective action needs. Motorized use for administrative access may be allowable on a case-by-case basis, provided such use does not require maintenance or improvement of the route, or interfere with achieving the route’s management objective in the long term.

Routes Closed for Restoration (17 miles): These routes were found to have no access value and will be blocked and restored to natural condition as much as possible through active and passive measures. The routes will be posted with signs indicating they are closed for restoration, monitored for compliance, checked for drainage and erosion problems or damage prior to restoration, and treatments to correct problems will be included as part of the closure and restoration project. Soil compaction will be assessed at each site. Severely compacted soils will be mechanically ripped to allow for regeneration of vegetation. Only hand tools will be used on soils not meeting the criteria for severe compaction. A Class III archaeological inventory will be performed prior to surface disturbance, and impacts to cultural resource values will be avoided.

Overland Vehicle Access: The management of comprehensive transportation and travel needs includes overland access for very infrequent access to existing improvements and facilities (e.g. fence lines, stock tanks, wildlife waters). Currently existing cross-country access routes, or reclaiming routes previously constructed, would be designated in advance to accommodate very infrequent administrative vehicle use for repair or maintenance of improvements, or for emergency access purposes. These are not transportation assets, and they would not be maintained or improved. They would remain in essentially natural or reclaiming condition, and no grading or excavation would normally be done. Vehicles would follow ‘the path of least resistance’ driving over low growing vegetation. Obstructions may be removed with hand tools. No maintenance work would be performed, except that erosion control measures may be taken if indicated by site conditions. If needed, stabilization would be accomplished using hand tools. Vegetation may be trimmed if absolutely necessary to gain access at the time of access need, then allowed to reclaim/revegetate by natural means. Only hand tools (hand saw, loppers) may be used for trimming vegetation.

3.1.3 BLM Functional Classifications

Functional classes indicate the relative importance of a route's transportation and access purpose and function, and are the basis for geometric design standards for maintenance, improvement, or new road construction. The functional classes for Monument routes were identified and noted in the table in Appendix D of the RMP. These functional classifications are consistent with BLM Manual 9113-Roads. The main Monument access routes are identified as BLM Collector and Local routes, while most of the Monument interior access routes are identified as Local or Resource access routes. These classifications were used to identify the proposed initial road maintenance projects targeting the most functionally significant Monument routes.

3.1.4 Monument Transportation Maintenance Intensity Classes

Maintenance intensity classes provide the basis for allocating BLM transportation maintenance funds, and help direct maintenance work to priority needs based on the importance of a route, condition of route, access purpose and objectives, or resource conditions on adjacent lands. The maintenance intensity classes for Monument routes were identified in the RMP, and noted in the table in Appendix D of the RMP. Most of the BLM routes are in poor condition and need corrective maintenance to address drainage and erosion problems, and other concerns. The proposed transportation maintenance program addresses those deficiencies. Most of the routes will be minimally maintained thereafter.

3.1.5 Maintenance Responsibility

The BLM is responsible for maintenance of the Monument transportation system, unless the maintenance responsibility has been granted to others through a ROW or other land use authorization, or shared through a road use or maintenance agreement.

Pima County has several road ROWs on Monument Access Routes (Silverbell, Avra Valley, Pump Station, El Tiro, Trico, Mile Wide, Manville) and conducts annual road maintenance. Pima County also has a ROW on a portion of Manville road, but maintenance has not been provided in the past 10 years. Pinal County has ROWs across BLM lands and maintains Sasco Road, Harmon, and Night Sky Road, which also provide important access to the Monument.

Authorized users (mineral materials operators, grazing permittees, and utility companies) may perform maintenance on access routes related to the authorizations, as provided for in the terms and conditions of the authorization. Under BLM policy, transportation maintenance and repairs may be performed as authorized on BLM routes on a case-by-case basis depending on need.

Routes under easements or ROWs acquired by the BLM will be maintained in accordance with the route designations on adjacent Monument lands.

5.1.5 Proposed Monument Access Routes

The proposed Monument Access Routes consist of existing county-maintained roads that provide the principal access from the local Interstate highway (I-10), and State Highway (State Route 86 – Ajo Highway), to the Monument. The proposed Monument Access Routes will generally set the priorities for acquiring legal access to and across the Monument (or adjudicating existing access rights where they

exist) across non-federal land, and for completing maintenance to correct deficiencies and protect Monument resources.

The proposed strategy identifies the Avra Valley Road-Silverbell Road-Sasco Road loop as the primary access route to the Monument from I-10 (Exit#242) to Red Rock (Exit#226), with connecting side roads to access the rest of the Monument (see Map 3.1). Visitor information and signing would direct Monument visitors to use this route. Proposed directional signing would be coordinated with existing directional signs for Saguaro National Park. The BLM would work with the counties on nominating Monument Access Routes for funding under the Federal Highways Administration's Federal Land Access Program to plan and implement long-term road improvements. Improvements would accommodate passenger car and other vehicle use along the route, with reliable service and mitigation of safety and environmental conditions, and ROW issues.

5.1.6 Other Monument Access Routes:

Secondary and alternate Monument Access Routes on county-maintained roads from I-10 were identified in public input for this TMP. One alternate route uses the Marana I-10 (Exit#236), and the town of Marana as the entryway to the Monument. Another alternate route was identified that uses Red Rock Road from Avra Valley Road at the Silverbell Mine to Sasco Road. This route is open to public use and will remain open under the land owner's permission, but no legal ROW exists for the route west of the mine. This route has issues related to ROWs, mine safety, and haul truck traffic associated with the Silverbell Mine and other quarry operations.

3.2 Proposed Transportation Maintenance Program

The proposed Monument transportation maintenance program includes the road maintenance projects in Table 4 below, minimal improvements at portal sites (Appendix F) and designated group sites (Appendix G), and route closures and restoration projects (Appendix H). The projects are proposed for the most functionally significant routes that provide access to Monument lands from the county-maintained road system (Monument Access Routes). Proposed implementation priorities are based on service level and type of access, the current condition of the route, and Monument resources at risk. Most of the existing routes are in poor condition and have severe drainage problems. The resulting erosion affects the usability of the routes and damages Monument resources on lands adjacent to the route. The initial proposed priorities are listed in Table 4 based on the poor condition of the routes and the type of access they provide. Nearly all of the projects cross Arizona State Trust lands administered by the Arizona State Lands Department (ASLD), and easements or ROWs will be obtained prior to on-the-ground work.

Table 4. Proposed Monument Road Maintenance Projects

Road Maintenance Project	Scope	Total Miles	Jurisdiction/Easement (miles)
Agua Blanca – Agua Dulce	Manville Road ingress to Avra Valley Road	14.23	BLM: 10.87
			Private: 0.56
			ASLD: 2.8
Cocoraque	Mile Wide ingress to Roskruge Mountains	9.8	BLM: 5.6
			Private: 0.14
			ASLD: 3.98
Roskruge	Cocoraque Road to Agua Blanca Road	8.1	BLM: 2.63
			ASLD: 5.46
Samaniego	Silverbell Road to Silverbell Road	7.76	BLM: 7.35
			ASLD: 0.41
Sawtooth	Harmon Road to Aries Road	4.11	BLM: 3.41
			ASLD: 0.70
Waterman	Silverbell Road to Tohono O’odham Boundary	10.96	BLM: 5.79
			Private: 0.02
			ASLD: 2.41
West Silverbell	Silverbell Road to Aguirre Valley	16.30	BLM: 11.23
			ASLD: 5.07

The proposed maintenance projects include local or collector type roads; they provide the main access to the Monument and are the priority for maintenance and repair work over the short term. The scope of work for each maintenance project will be identified, designed, and engineered as appropriate. The roads will be maintained to the appropriate standard following the maintenance and construction guidelines described in Section 4.3 below.

The maintenance projects will address poor route conditions, threats to sensitive resources, side and overhead clearance, and mitigation of safety hazards. The maintenance work will be the minimum required to accommodate the type of access identified for a particular route. Initial maintenance will focus on stabilizing erosion, correcting poor drainage, and mitigation for fugitive dust and muddy conditions. Maintenance work will be completed by BLM crews and equipment, contractors, or cooperators and authorization holders as appropriate depending on the route.

Because these access routes are the most functionally significant routes within the Monument, funding will be sought under the Federal Lands Transportation Program (FLTP), through grant applications under the Recreation Trails Program (RTP) administered by Arizona State Parks, and other programs and sources as applicable.

Along the roads and primitive roads open to public use, existing gates at grazing allotment boundaries or pasture fence crossings will be replaced with cattle guards. This will improve accessibility by eliminating the need for occupants to exit the vehicle to open and close gates. It will also alleviate problems for livestock management caused by gates being damaged or left open. Cattle guards for primitive roads will be 15 feet wide. Existing cattle guards will be maintained as needed.

3.3 Proposed Monument Transportation Maintenance Guidelines and Criteria

The proposed maintenance guidelines (Appendix E, Tables 4 and 5 below) for Monument routes provide for different types of access including primitive roads for very narrow, steep and rough access routes (Type B), improved primitive roads for special access purposes (Type A), and roads maintained for general access by all types of vehicles. The typical vehicle requiring access on a given route largely dictates the physical characteristics required for the route to be useable by that vehicle, and the route will become passable by other vehicle types with similar or lesser requirements. The travel way width, surface, grade, curve radius, side and overhead clearance, and associated physical parameters vary depending on the type of access vehicle and the intended use for a route. Currently, nearly all the existing routes on Monument lands are primitive roads that are unimproved, receive very low traffic volume, and are traveled at low speeds by high clearance, four wheel drive vehicles.

3.3.1 Road Maintenance and Design Criteria, Standards and Guidelines

BLM road design and engineering standards for road construction and maintenance are identified in BLM Engineering Manual 9113 and related handbooks. County-maintained roads are subject to County road engineering standards. Across the Monument, they carry very low traffic volumes, and the Guidelines for Geometric Design of Very-Low Volume Local Roads³ will be considered for the County road improvements.

The appropriate standard will be selected for a particular route depending on the transportation designations identified in the travel management section of the IFNM RMP, and on local terrain conditions. The standards and guidelines for Monument roads will provide the basis for condition surveys, and for developing maintenance or improvement project plans. Adjustments to these standards may be considered where needed due to special access, terrain, or resource conditions. The proposed geometric standards for Monument roads and trails are shown in Table 5 below. The ROW width is indicated to guide route management including cultural resource surveys, and need for easement or ROW acquisition.

Table 5. Proposed Geometric Standards for IFNM Roads and Trails

Asset Type	Terrain	Design Speed (mph)	Travelway Width (feet)	Maximum Grade (%)	ROW Width (feet)	Cuts, Fills
Road	Rolling flats	40	24	8	60	3:1
	Mountainous	30	20	12	60	2:1
Primitive Road (Type A)	Rolling flats	30	14	16	60	3:1
	Mountainous	15	14	12	60	2:1
Primitive Road (Type B)	Rolling flats	15	10	10	60	3:1
	Mountainous	5	10	16	60	1:1
Trail	Rolling flats	NA	3	8	15	2:1
	Mountainous	NA	3	16	15	1:1

³ Guidelines for Geometric Design of Very-Low Volume Local Roads (ADT ≤400), American Association of State Highway and Transportation Officials, 2001.

3.3.2 Speed Limits/Design Speed

Monument transportation routes will be managed to promote low travel speeds to protect monument objects and public safety. This will be accomplished by adopting and posting speed limits, and in the design, construction and maintenance of individual routes. Low speed design will be considered in potential improvement and reconstruction projects. The proposed desired speed for Primitive Roads within the Monument is 15 to 25 miles per hour (see also section 5.6 below).

The Monument transportation routes are traveled by the public at variable speeds depending on a route's physical conditions, the vehicles used and the operator using the routes. Within the Monument, speed limits are posted on county-maintained roads, and there currently are no posted speed limits on BLM routes. Driving speed on BLM lands is generally governed by public land regulations (43 CFR 8365), which make it illegal to exceed posted speed limits, endanger persons or property, or act in a reckless, careless or negligent manner.

Currently, users travel at low speeds, largely limited by travelway conditions: irregular vertical and horizontal alignment, short radius curves, blind curves, steep grades, rough travelway surface, abrupt changes in grade, ruts, gullies, washboards, narrow travelways, narrow side clearance, and other conditions that present obstructions that influence driving speeds. Different users travel at different speeds on the same roads, resulting in passing on narrow roads and leading to widening of travelway sections. Errant vehicles often cause damage to resources along the routes, with speed a probable contributing factor.

3.3.3 Road or Trail Construction, Reconstruction

No new road construction is proposed. The proposed Monument road maintenance projects, described in section 4.2 and Table 3 above, consist of reconstruction of segments of existing roads to correct deficiencies.

The RMP decisions allow for the development of new roads and trails, and the reconstruction or improvement of existing roads to protect monument objects and to meet emerging access needs related to allowable multiple uses of the public lands. New road construction or reconstruction is subject to case-by-case site-specific review for compliance with the TMP, environmental and other laws, and mitigation identified at the time the projects are carried out (cultural surveys, engineering and construction, seasonal restrictions). Transportation improvements will be in accordance with appropriate standards depending on the route-specific designations and management objectives.

The BLM will work with road ROW holders to ensure that maintenance and improvements are consistent with this TMP.

3.4 Proposed Ancillary Facilities to Accommodate Travelers

The RMP decisions guide management of the Monument as an undeveloped area with minimal improvements to accommodate the allowable uses, including public recreation, while protecting Monument objects and maintaining the recreational setting. A Recreation Area Management Plan (RAMP) will be prepared under a separate action to implement decisions for managing recreation

resources, opportunities, uses and experiences. The following improvements are proposed to accommodate travelers along Monument travel routes, consistent with the recreation management objectives in the RMP, to manage primarily motorized visitor use and protect Monument objects:

Monument Portal Sites: Portal sites are proposed near the Monument boundary along public access routes. The portal site improvements consist of parking turnouts, an informational kiosk with visitor information and map, site identification signing, and mitigation of safety and resource conditions as needed depending on the location. The capacity of the portal sites would vary depending on location and anticipated demand. The proposed monument portal sites are described in Appendix F.

Local/Community Access Points: Local or community access points are proposed to provide access to the Monument from residential areas adjacent to the Monument, or on non-federal inholdings, where residents make up some of the demand for recreational access. These points of ingress and egress would typically access Monument lands for non-motorized purposes (hiking, equestrian, mountain bicycle). Gates and informational and regulatory signing would be installed in cooperation with community residents.

Group Recreation Sites: Group sites are proposed along Silverbell Road and at the Waterman Mountains restoration site. These locations are currently receiving recreational group use and activity. The existing sites would be maintained, and expansion would be considered. The group sites would accommodate organized group recreational or educational activities under Special Recreation Permit, and would be open for public recreational use (camping, picnicking). The sites would be designed for a capacity of approximately 10 to 15 vehicles. The proposed group sites conceptual plans are described in Appendix G.

Dispersed Recreation Sites: Existing dispersed recreation sites along the designated roads and primitive roads in the Monument would be monitored. The recreation sites would be maintained in a primitive condition. The only improvements that would be provided are a parking turnout (all dispersed sites are at existing turnouts), signing, and a designated stone fire ring. The sites would be monitored for use levels and associated impacts, and action would be taken to prevent impacts from spreading or damaging Monument objects.

3.5 Compliance with Americans with Disability Act (ADA)

The Monument was designated a Special Recreation Management Area in the RMP, and subdivided into different recreation management zones (RMZs) to preserve its undeveloped character, and to continue providing opportunities for semi-primitive outdoor recreation without improvements or facilities, except the minimum improvements needed to accommodate self-service, self-directed public recreational use. The RMZs identify specific management objectives, including the degree of accessibility for persons with disabilities. The motorized routes of the Monument would provide opportunities for experiences in settings similar to those available to users of the non-motorized routes. Site improvements at portal sites, interpretive sites, and group sites will be designed, constructed and maintained to comply with the 2010 ADA Standards for Accessible Design in order to provide access and recreation opportunities to persons with mobility impairments. Compliance with other types of disabilities would be addressed in BLM planning processes other than the TMP. Site improvements would be designed to address grades, changes

in grade, surfaces, and other design elements to make the sites as barrier-free as possible, except where Monument objects would be substantially harmed or compromised, or where compliance is not feasible due to terrain or prevailing construction practices.

3.6 Compliance with Air Quality Management Areas

A portion of the Monument is located within the Rillito PM₁₀ Non-Attainment Area (NAA) designated by the Arizona Department of Air Quality. Action would be taken to protect air quality from the Monument routes if air quality violation notices are received. Dust control measures in accordance with county permit requirements and guidelines would be applied to maintenance and construction activities which are likely to result in fugitive dust. Additionally, the following dust abatement practices would be implemented to reduce fugitive dust within the Monument to less than 50 tons of particulate matter 10 microns or less (PM¹⁰) per year:

- Provide an aggregate (gravel) surface on roads in dust-prone soils.
- Apply treatments to suppress dust on unpaved roads based on traffic levels, soil conditions and land use.
- Post speed limits on Monument roads to promote low driving vehicle speeds and minimize fugitive dust emissions, and include information promoting low driving speeds in visitor information materials. Posted speed limits will be between 15 and 25 miles per hour.
- Schedule road and trail maintenance when appropriate soil moisture is present. When soils are dry and highly-prone to fugitive dust, apply water prior to and during maintenance activities to reduce dust emissions.
- Reestablish vegetation cover on bare disturbed ground to reduce the potential for fugitive dust. Areas include unplanned parking areas, campsites and other previously disturbed areas. Restoration may require the use of heavy equipment resulting in ground disturbance, thus requiring environmental study prior to breaking ground.

3.7 Access to Existing Land Use Authorizations and Inholdings

There are existing land use authorizations in the Monument which were issued before the Monument was established, and which have associated access needs. Authorizations include transportation and utility ROW communication sites, and grazing permits. Intermingled land ownership in the Monument includes private property, State Trust land, and county land inholdings for which there are also access needs. Land use on non-federal inholdings includes grazing, ranch headquarters, residences, mining, utilities, and undeveloped vacant land.

3.7.1 Access to Existing Land Use Authorizations

The BLM will work cooperatively with existing land use authorization holders in the Monument to accommodate access needs and protect Monument objects. The access needed for maintenance and operation of the utilities authorized is infrequent, but the type of vehicle needed for maintenance and repair of the utilities is a line truck, which requires a 14-ft. improved road to safely accommodate access.

Where appropriate, the existing ROW authorizations will be reviewed and modified if needed to add terms and conditions to protect Monument objects; the modification may be done at the time of expiration of current authorizations, or by initiating a case-by-case review. The existing land use authorizations include ROWs, a Recreation and Public Purpose (R&PP) lease, grazing permits, and Special Recreation Permits (SRPs) (see Appendix I).

Recreational aviation occurs on Monument land under a R&PP lease. The lease holder will continue to maintain interior roads under the terms of the lease. The BLM will work with the lease holder to adjust the lease boundaries to exclude routes that maintain continuity of routes on surrounding Monument lands. The BLM will also work with the lease holders on emergency access needs related to the recovery, clean up and restoration of potential aircraft crash landings.

SRP holders may be authorized to use routes limited to administrative vehicles if the activity furthers Monument goals and objectives established in the RMP.

3.7.2 Access to Inholdings

Access to inholdings will be provided in accordance with BLM policy and the Monument RMP. New ROWs will be issued on a case-by-case basis, and special terms and conditions may be attached to address access and maintenance.

3.8 Proposed Access Acquisition

Acquisition of road or trail easements or ROWs, or adjudication of possible existing rights on roads historically used for public access, will be pursued on a case-by-case basis on routes across non-federal lands that presently lack legal public access. Easements may be acquired through donation or purchase from willing sellers. Priority will be given to routes designated as Monument Access Routes, and other routes assigned a BLM functional class of ‘Collector’ or ‘Local’ (as described in Section 5.1.2 above). The proposed acquisition parcels are listed in Appendix J.

Private Land: Acquisition of permanent easements is proposed for several existing roads totaling approximately 2.1 miles of road across private property, as listed in Appendix J. These routes provide essential access to Monument lands, and acquisition would provide for continuity for the designated Monument transportation system, and for consistent management and maintenance to accommodate access and protect Monument objects.

State Trust Land: Acquisition of permanent 60 ft.-wide ROWs for designated routes across Arizona State Trust lands is proposed to provide for management and maintenance of essential access to Monument lands, provide continuity for the designated transportation routes, and help protect monument objects. The proposed ROWs total 52 miles of existing road or primitive road in various locations shown in Appendix J.

ROW acquisition would be in accordance with the Arizona State Land Department’s regulations, policies and procedures and BLM’s acquisition procedures. A temporary Special Land Use Permit, or temporary

Right of Entry, may be acquired as an interim step towards acquiring a permanent ROW. Appropriate cultural resources surveys and clearances would be conducted as required for each parcel as part of the application and acquisition process. As legal access is acquired, the routes will be managed and maintained by the BLM as part of the Monument transportation system. Routes or segments of routes on non-Monument lands acquired under the Monument's land tenure adjustment program will be managed according to the area and route designations established in the RMP.

Land Tenure Adjustment: Parcels with access routes that are important to the Monument transportation network will be considered priority for purchase from willing sellers in the land tenure adjustment strategy.

3.9 Proposed Route Closures and Administrative Access Controls

The proposed methods to implement route closures and use restrictions will depend on site-specific conditions at the point of closure, and the route designation objectives. Physical barriers such as gates, fencing, boulders, and bollards would be used to restrict vehicle access while accommodating allowable uses. Closure devices would be designed to tie to natural topographic or vegetation barriers.

On administrative routes, access control devices would be designed to safely accommodate non-motorized passage (foot, horse and bicycle), including around locked gates that limit vehicle access to administrative use.

3.9.1 Administrative Access Route Limitations

Administrative access routes (roads or primitive roads) will be available for non-motorized public use. Access to these routes will be controlled with locking gates, designed with a bypass gate for non-motorized user passage. A lock system will be developed in cooperation with users to accommodate access needs under current authorizations (grazing permits, utility ROWs, etc.).

3.9.2 Route Closures

These routes will be signed and physically closed by various means depending on site-specific conditions, or obliterated and reclaimed to restore near natural contours and vegetation cover as deemed appropriate on a case-by-case basis. Project plans, surveys and clearances would be completed before new ground disturbance. Closure devices may include gates, fencing, barricades, posts and signs. Barricades may be made of steel or timber posts, concrete, stone, or boulders as determined during site-specific project planning (see Appendix K). Closed routes, although not specifically identified as non-motorized trails, will typically be open to non-motorized travel for hiking and equestrian access. This use will be accommodated in the design of closure devices. Routes planned for closure will be inspected for drainage and erosion problems, soil compaction will be assessed, and corrective measures will be taken as part of site-specific plans for implementing the closure. Closed routes will typically be allowed to reclaim or re-vegetate naturally. Closures will be designed to leave a short spur or turnout to facilitate parking and maneuvering. Closed routes may be used for non-mechanized non-motorized travel (pedestrian and equestrian), but will not be maintained as trails and will be allowed to reclaim, unless they are added to the transportation plan through an amendment of the TMP (see Section 8.3).

3.9.3 Cross-country Vehicle Travel

The IFNM RMP travel management decisions prohibit cross-country motorized and mechanized vehicle use, except in emergencies. Natural conditions in some areas of the Monument present little or no barrier to the use of motor vehicles, particularly creosote flats with sparse vegetation and large desert washes with open sandy bottoms.

These areas will be monitored for non-compliance and action will be taken as necessary to block vehicles and eliminate impacts. If non-compliance becomes a recurring problem at a specific site, fencing or barrier devices will be installed along the route.

Incidents requiring emergency cross-country vehicle travel (downed aircraft, search and rescue, law enforcement, etc.) will be accommodated using methods with the least impact, and impacts will be restored promptly to natural condition.

3.10 Proposed Restoration and Rehabilitation

3.10.1 Restoration Practices for Routes:

Restoration and rehabilitation is proposed for BLM routes not designated to provide access. Restoration efforts will be designed to achieve proper functioning condition according to BLM Land Health Standards. Routes typically will be allowed to reclaim and revegetate naturally, unless treatment is necessary. Most of these routes receive little traffic and many are reclaiming naturally, with vegetation regrowth in the travelway. The access points for these routes would be posted with signs and/or blocked with barriers to prevent vehicle entry as needed, depending on site conditions. Barriers will be installed 60-200 feet from the intersection with the designated route to allow a spur for parking and turning around, and to allow the barrier to tie in with natural features. Restoration will be at or near the barrier as needed to restrict vehicle access. Heavy equipment, if needed, will be used to install barrier, rip severely compacted soil, or correct drainage and erosion problems. Approximately 20 acres of disturbed area may require the use of heavy equipment. Natural revegetation will be promoted by site preparation treatments as indicated by site conditions. Routes with severe soil compaction may be ripped to loosen the topsoil, ditched to control surface runoff, and re-graded or re-contoured to aid reclamation, using methods with the least impact. New plantings may be established with cuttings from locally-available cactus species. Prickly pear and cholla would be targeted plants for restoration site perimeters due to their barrier effect, combined with ease of propagation from cuttings.

Restoration project plans will be prepared and cultural surveys and clearances will be completed prior to ground disturbance. Restoration work will be monitored during construction, and impacts to Monument objects will be avoided. The restoration sites are summarized in Table 6, and the locations are shown on Map 5.0. New impacts detected through monitoring activities will be restored promptly after being identified.

Table 6. Proposed Restoration and Rehabilitation Projects

Restoration Project	Acres	Description
Sawtooth	0.14	Steep, rocky site on mountain side hill climb closed for safety reason and visual impact.
EPNG-RS	0.37	Cross-country vehicle and camping impacts on flat, sparsely vegetated soils; short cut for access to EPNG pipeline and camping;
Waterman-RS-B	5.54	Existing closed quarry restoration project.
Waterman-RS-A	13.77	Existing quarry and air strip construction restoration project area, on-going. Heavy equipment used for restoration completed to date; heavy equipment may be used for future work.
Waterman-RS-C	0.37	Mineral exploration route on steep slope, with drainage, erosion and visual impacts.
Pan Quemado_RS	0.43	Inactive stone quarry disturbance.
Cerrito-RS-A	11.58	Intensive off road vehicle and target shooting impacts on flat site and hillside, foot slopes. Heavy equipment may be used for soil ripping and restoration.
Cerrito-RS-B	0.57	Intensive off road vehicle and target shooting impacts on flat site and hillside, foot slopes.
Manville-RS	1.48	Intensive off road vehicle and target shooting impacts on flat site, hillside and foot slopes.
Rocky-RS	0.85	Off road vehicle use impacts on open flat soils near and along Manville Portal site.
Redhill Quarry-RS	5.50	Off road vehicle use and target shooting impacts
Avra-RS	0.46	Inactive stone quarry disturbance.
Cerrito-RS-C	0.97	Intensive off road vehicle use and target shooting impacts.

3.10.2 Restoration Practices for Damaged Areas:

Restoration is proposed for areas and sites along travel routes which have been damaged or disturbed by past land-use activity, (illegal cross-country vehicle use, past mining activities, intensive recreational target shooting or other surface-disturbing activities) to achieve land health standards. Restoration treatments would typically include the following:

- 1) Installation of temporary or permanent physical barriers to limit continued vehicle access on the restoration site (may require heavy equipment);
- 2) Installation of signs to identify the restoration site, and prevent or deter entry;
- 3) Treatment to remove non-native invasive plants, with chemical or mechanical methods (all herbicide applications will be subject to approved BLM pesticide use procedures);
- 4) Treatment to disguise the site and avoid attracting continued use (mulching, raking to erase tracks or other evidence of use);

- 5) Ripping to break up compacted soil crust and to promote water infiltration and revegetation. Heavy equipment will be used only where needed. Two areas have been identified where heavy equipment is needed for restoration work (see Appendix H);
- 6) Grading surface contours to promote surface runoff infiltration, stabilize eroded soils and correct channelization and diversions in local drainage patterns;
- 7) Seeding with native plants from adjacent plant cover;
- 8) Transplanting to propagate native cacti and other plants with barrier effect;
- 9) Installation of straw mats, wattles or other organic material for erosion control;
- 10) Installation of rock mats or revetments to stabilize eroding soils;

Class III archaeological surveys would be performed and clearances would be obtained before carrying out ground disturbing activities, including excavation with equipment or hand tools. Restoration work would be accomplished with BLM crews, volunteers or contractors.

3.11 Hunting Access

The area designations and route designations, and related use restrictions, established in the approved RMP apply to all uses and activities including hunting. Monument access routes (motorized and non-motorized) will be available for hunting access, but cross country travel by motor vehicle for hunting related purposes, including retrieval of game or any other purpose is prohibited on Monument lands.

Use of non-motorized human propelled wheeled game carriers to retrieve lawfully taken game is allowed in all areas of the Monument, including on non-motorized routes and cross country, limited only by natural barriers (i.e. topographic, terrain, soils and vegetation) which may obstruct access. Clearing, cutting or removing vegetation, excavating a grade or causing ground disturbance to gain access with a wheeled game carrier is prohibited.

Information on hunting access, and restrictions, will be included in Monument visitor information materials.

3.12 Equestrian Use and Access

Monument roads, primitive roads, administrative roads and non-motorized trails are available for equestrian use. Cross-country equestrian travel is allowed in all areas of the Monument, limited only by natural barriers to equestrian travel (i.e., topography, terrain and vegetation) and rider's interest and ability, unless closed for a specific purpose. Monument portal sites will be designed with parking turnouts and maneuvering space adequate for trailer-towing vehicles to accommodate equestrian users. Equestrian use may be restricted where BLM has determined through inventory and monitoring that such use is adversely impacting Monument objects. Any need for new restrictions on equestrian use identified through monitoring may require amendment of the TMP, and maintenance of the RMP, an appropriate level of review for NEPA compliance, and public involvement.

3.13 Non-mechanized Non-motorized Uses

Monument roads, primitive roads, and administrative roads are available for non-mechanized non-motorized use, including foot, horse and mountain bicycle. Livestock and human-pulled wagons and carts may also be used on these routes provided that the route is physically suitable for passage without improvement or causing damage to Monument objects. Use of non-motorized mechanized methods of transport (bicycles, wagons) is prohibited on non-motorized trails.

3.14 Signing Plan, Visitor Information

Proposed signing for travel management includes: informational kiosks at the proposed Monument portal sites; Monument information at local and community access points; Monument land boundary signs; and other informational, regulatory, or interpretive signs. BLM routes would be identified with route name and/or route number signs. Signs would typically be installed on steel posts driven into the ground, or wooden posts set in excavated holes, in accordance with the BLM Signing Handbook (2004). Informational kiosks require excavation for the steel posts supporting the information display. See Appendix L for details on the proposed signs.

A Monument access guide and map would be produced, showing the designated transportation system. Regulatory, interpretive, safety, and other information of interest would be included to promote awareness of the Monument's protected status, compliance with regulations and use restrictions, low impact land use ethics, and public safety. Monument visitor information would be made available on the internet and other media.

3.15 Visitor Services and Law Enforcement

The Monument transportation system will be patrolled by Monument staff and BLM law enforcement personnel throughout the year, with frequency of patrols depending on seasonal use patterns, threats to Monument objects, availability of resources, and incident reports. Routes most frequently patrolled will coincide with the functional hierarchy of the travel route network, with main Monument roads receiving the greatest presence.

The purpose of the visitor service patrols is to provide information to visitors, monitor use and resource conditions, identify on-the-ground conditions that require follow up, and promote enjoyment of the Monument and compliance with established Monument use restrictions.

Full implementation of some of the routes designated in the RMP as non-motorized trail will be deferred until intensive law enforcement operations along the International Border are no longer required.

4.0 MONITORING AND EVALUATION TO ASSESS PROGRESS TOWARD OBJECTIVES

The Monument's transportation system will be monitored as availability of staff and equipment allows for use (volume and distribution) to estimate public use and visitation of the Monument, effects on Monument objects, and evaluate effectiveness in achieving objectives in protecting those objects.

Monitoring will be used to identify issues and focus management attention to areas that need it most. Route designations may be adjusted if deemed necessary based on monitoring information (see Section 8.3). Monitoring will occur throughout the year, and transportation condition surveys will be timed to identify damage after summer monsoon storms.

The key indicators for monitoring travel routes include:

- Traffic volume, type of use, geographic distribution, temporal patterns;
- Roadway condition and travelway, drainage, and erosion issues;
- Traffic incident (violations, collisions) information, type, location, time;
- Vegetation: clearance (side and overhead), regrowth; encroachment, presence, plants at risk of damage from passing vehicles, damage or loss from errant vehicles, density and spread of and non-native invasive plants;
- Litter and trash related impacts from use along the route and at public use turnouts and dispersed recreation sites (portal sites, dispersed campsites, group sites, access points, etc.);
- Violations of route and area designations; incursions in areas designated 'closed', cross-country vehicle tracks, widening of parking areas and turn-outs);
- Impacts or damage caused by illegal cross-country vehicle use, soil, vegetation, other damage or destruction of Monument objects;
- Road kill species, location and time.

Known sensitive resource areas in the Monument (such as cultural resource values, vegetation management areas) will be given priority for frequency of monitoring visits and follow up.

Monitoring results will be used to program needed road maintenance or repair work, to evaluate implementation progress, to assess the effectiveness of the plan in achieving desired conditions, to identify adaptive measures, and to respond to changing conditions, access and management needs.

Land use activity proposals by internal or external proponents will be reviewed for access needs and potential impacts on the Monument transportation system. Special terms and conditions may be attached to land use proposals to implement access and transportation concerns.

4.1 Proposed Monitoring Strategies

Monitoring will be an integral part of the transportation management program to measure the effectiveness of actions implemented, document actions taken, and document impacts to monument objects. Two monitoring strategies will be used to evaluate implementation progress and effectiveness of management actions.

4.1.1 Implementation Monitoring

Implementation monitoring will be used to determine progress in implementing management actions within the proposed 5-10 year timeframe to complete initial on-the-ground implementation of the

proposed program. The list of IFNM RMP travel management decisions in Appendix B will be reviewed annually and updated to document and track progress until the desired conditions are reached.

4.1.2 Effectiveness Monitoring

Effectiveness monitoring will be conducted on an on-going basis. Results will be evaluated annually to determine if efforts are achieving desired outcomes and conditions, and to identify adaptive measures if adverse impacts on Monument objects are discovered. The monitoring program will be used to measure change in the condition of monument objects, and determine if they are being protected. If monitoring shows that objects are being damaged or destroyed, management action will be taken to stop, prevent and repair the damage as soon as possible given the severity of impacts and workload priorities. This may result in on-the-ground action such as barrier construction, restoration, or signing activities as required by circumstances.

Monitoring will include frequent surveillance patrols to detect litter/trash, vandalism or other impacts, and periodic site visits to check the status of actions previously taken. Specific patrols will take place following severe monsoon storms (over 1-inch precipitation in an hour) to check routes for damage. Periodic patrols will take place on Monument routes to document route conditions, accessibility, safety concerns, presence of non-native invasive plants, levels of use and related impacts. Traffic on Monument routes will be sampled to determine road use levels and distribution patterns. Periodic inspections of portals, group sites, dispersed campsites barriers, signs, route closures, and restoration sites will be conducted to identify maintenance or repair needs

The BLM will work with organized user groups and volunteers to develop a “Monument Watch Program” to help monitor and report conditions on the ground, and to promote acceptable practices. Reports of illegal activity or damage will be followed up with a site visit. Site conditions and changes will be documented with photographs, written descriptions, and Global Positioning System (GPS) coordinates.

Aerial imagery will be periodically reviewed to detect potential non-compliance with area and route designations (trespass, route proliferation, unauthorized activities and impacts). Detections from aerial imagery will be verified with ground examinations.

Effectiveness monitoring will also quantify public user compliance with travel management designations and regulations, applicable federal and state laws and regulations, and management decisions. Incidents will be reviewed annually and evaluated for workload adjustments.

User satisfaction with the transportation network, accessibility, and recreational setting will be assessed periodically. These results will be analyzed together with results of onsite monitoring to determine if RMZ objectives are being achieved.

4.1.3 Traffic Volume

Traffic volume and use pattern on the Monument route system was sampled and characterized during the RMP preparation process in a study completed by the University of Arizona in 2004⁴ and was considered

⁴ Ironwood Forest National Monument Access, Travel Route Inventory and Visitor Use Study Final Report, February 2004; Randy Gimblett, Ph.D., School of Renewable Natural Resources University of Arizona, Tucson, Arizona

in designating the travel routes concurrent with the RMP decisions. The annual Average Daily Traffic (ADT) on routes connected to the Monument transportation system varies from approximately 200 vehicles per day on Avra Valley Road, to under 1 vehicle per day on remote local interior Monument routes, particularly those that receive primarily administrative use. The ADT for most of the primitive access routes is fewer than 20 vehicles per day on average, with seasonal peaks (i.e., quail/dove and javelina hunting seasons, winter off-highway vehicle (OHV) sightseeing season, and spring wildflower season).

Border-related smuggling and intensive law enforcement activities contribute noticeably to the traffic on Monument routes that traverse the Monument northward from the Tohono O’odham Nation. Changes in route use have occurred since the establishment of the Monument. Traffic related to smuggling activities has created impacts on previously reclaiming routes that were not serving an access purpose. Use has also increased on routes that were receiving very little traffic with little impact on resources. Some administrative routes, and some routes designated for closure and restoration, are affected by newly-attracted traffic. Some of these routes have become important for border-related law enforcement operations. The proposed implementation strategy for administrative route closures considers new information on administrative access needs for these purposes.

Traffic sampling will be done on a continuing basis to characterize volume and distribution patterns annually. Traffic volume information will be used to identify impacts and to plan maintenance and related management actions.

5.0 STATEWIDE STANDARDS FOR OHV OPERATION

The Arizona BLM standards and policies adopted for resource management and travel management planning were considered in the travel and transportation management decisions made in the RMP. Those standards and policies are described below, and were also considered in defining the scope of the proposed travel management implementation plan.

Statewide Standard Arizona BLM OHV Regulations & Travel Management Policies

The following Arizona BLM policies have been adopted for travel management on public lands administered by the BLM. They were considered during the route evaluation and designations established concurrently with the RMP, and are reflected in the proposed implementation actions.

1. *Permittees (e.g. for hunting, wood gathering, livestock operators) must comply with TMP route designations. Exceptions may be made by the authorized officer.*
2. *There shall be no motorized access to harvested game cross country or off of a route designated open to the public, although use of a mechanized game carrier off of an open route is permitted outside of designated wilderness areas.*

3. *It is unlawful for a person to camp within one-fourth mile of a natural water hole containing water or a man-made watering facility containing water in such a place that wildlife or domestic stock will be denied access to the only reasonably available water.*
4. *Use of motorized or mechanized vehicles off of the designated route for the purpose of working livestock is prohibited.*
5. *State vehicle laws apply to motor vehicle use.*

The Arizona BLM Resource Advisory Council guidelines for OHV Management (Appendix M) were also considered in the RMP decisions, and in the proposed implementation plan.

5.1 Motorized Vehicle Use, Off Highway Vehicle Use, and Recreation Regulations

The public land regulations that will be enforced to implement travel management and route designations are described in 43 CFR 8340 and 43 CFR 8360, and 43 CFR 9268.3(excerpted in Appendix N). These regulations apply on all public lands generally, including Monument lands, and will continue to be enforced by BLM Rangers to protect public safety, monument objects and resources. These regulations will be supplemented by Supplementary Rules which will be established pursuant 43 CFR 8360 under a separate action to implement use restrictions identified in the RMP decisions.

Arizona State motor vehicle laws and regulations, including OHV regulations, apply on Monument lands, and will continue to be enforced in cooperation with non-federal agencies (AGFD, County Sheriffs, and in some instances the Arizona Highway patrol).

Coordinated interagency efforts will be undertaken to provide an official presence during times of peak use. These efforts may include ongoing border-related and resource protection-related law enforcement operations.

6.0 FUNDING AND PRIORITIES

Funds for labor, supplies and equipment will be pursued through the BLM's normal budget process, and will be subject to availability of agency funds in annual appropriations. Normal appropriations will be used to leverage grants and external contributions to extend the accomplishments of the implementation efforts. Cost share, assistance agreements, or cooperative management agreements will be pursued to target priority needs to the greatest extent possible.

Proposed Implementation Funding Strategy:

1. **BLM Annual Work Plan:** Submittals for annual budget requests will be prepared to implement the Monument's various management programs, including transportation management, as summarized in the Budget Implementation Strategy in Appendix O, which outlines the budget strategy for the 5-10 year initial implementation period. Funding will be requested under all appropriate Program Elements to accomplish the proposed work and projects to support BLM

national and Arizona BLM strategic priorities for National Landscape Conservation System (National Conservation Lands) units.

2. **Federal Highways Administration Programs:** BLM will work with local State and County transportation departments to nominate the proposed Monument Access Routes for funding under the Federal Lands Access Program (FLAP) and the Federal Lands Transportation Program (FLTP).

The FLAP was established by Public Law 112-141 to improve transportation facilities that provide access to, are adjacent to, or are located within federal lands. This supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.

Funds may be used for transportation planning, research, engineering, preventive maintenance, rehabilitation, restoration, construction, and reconstruction of roads, adjacent parking areas, acquisition of necessary scenic easements and scenic or historic sites, provisions for pedestrians and bicycles, environmental mitigation in or adjacent to federal land to improve public safety and reduce vehicle-caused wildlife mortality while maintaining habitat connectivity. Funds may also be used for construction and reconstruction of roadside rest areas, including sanitary and water facilities, and other appropriate public road facilities.

3. **Recreation Trails Program:** Grant applications will be prepared for funding under the Recreation Trails Program (RTP) for primitive road and trail maintenance.

The RTP program authorizes Federal Highway Administration funds administered by Arizona State Parks for recreational non-motorized and motorized trails. These grants require a match of 6% of total project costs, either with in-kind contributions or dollars. A federal agency must provide at least 5% of the total project costs from a non-federal source. The remaining 1% of the total project cost can come from other federal sources

4. **Partnerships, Assistance Agreements, Grants, Voluntary Contributions:**

Opportunities will be pursued to establish partnerships with interested parties and public land users to help implement on-the ground actions. Actions which would be appropriate for others to help with implementation projects may be pursued through assistance agreements, volunteer services agreements, contracts, or under the terms and conditions of current land use authorizations.

6.1 Implementation Project Prioritization

The proposed strategy for prioritizing implementation efforts on the Monument transportation system is guided by several factors mainly related to the location, condition, and type of project sites:

1. Monument objects being damaged or destroyed, or at high risk of damage;
2. Located in an area of known high resource values (cultural, vegetation, biological, visual, recreation setting, other);

3. Access route purpose and significance (access purpose, type of service, high functional class, high maintenance intensity), and condition of the route;
4. High traffic or public use volume;
5. High likelihood of being successful in preventing degradation of Monument objects

The strategy for initial implementation efforts will typically involve the following phases generally in sequence, although some may occur at the same time depending on priorities and resources available:

1. Produce and publish a Monument access guide for recreational visitors; make the information available through multiple media (maps, brochures, flyers, online posts).
2. Install and maintain Monument portal site improvements (kiosk installation, signing).
3. Install route signing (regulatory, guide, informational, route identification).
4. Complete baseline condition surveys, resource inventory, and site-specific information to define the scope of specific projects, or for monitoring.
5. Continue law enforcement patrols and visitor service patrols, with information on access and use restrictions and Monument status.
6. Restore and rehabilitate damaged sites and areas, including routes identified for restoration and newly-created cross-country tracks as they are identified by on-the-ground monitoring.

In all phases, opportunities for developing partnerships will be pursued, beyond normal interagency coordination and consultation.

6.2 Route Maintenance and Construction Costs

The costs to implement the proposed actions include labor, supplies, materials, transportation, and equipment needed for surveys, project planning, procurement and contracting, archaeological and biological clearances, engineering survey and design, construction and inspection, outreach and education, monitoring, sign installation and maintenance, road, trail and facility maintenance and improvements, coordination, and enforcement activities. Project-specific costs will be prepared on an ongoing basis for project packages in accordance with normal BLM procurement procedures.

6.3 Implementation Plan Revision and Amendment

The TMP will be in effect until all actions have been completed, modified or rescinded by future management action. Implementation progress will be reviewed annually, and adjustments made as necessary to achieve progress. A comprehensive review of the TMP will be conducted at the end of the five-year initial implementation period. The RMP will be evaluated every 5 years from approval, and the TMP will be reviewed at that time also. Any revision of the decisions, land use allocations, or allowable uses established in the RMP may trigger revision or updating of the TMP.

Implementation efforts will be monitored, and adaptive management measures will be identified in response to changing conditions. Adaptive management thresholds requiring a change in management, travel system, or plan implementation modification, will be developed within 2 years of this plan. The paramount purpose of the monument will be met by ensuring the conservation, protection and restoration

the monument objects. Factors to consider for warranting further review of the TMP could include the following:

- Changes in route width;
- Dramatic changes in route use levels;
- Increase in route proliferation;
- Increase in vegetation damage, and
- Serious non-compliance with route designations and established regulations and supplementary rules.

Adaptive measures which require a change in route designation (road, primitive road, administrative, trail) or construction of a new route will require amendment of the TMP and maintenance of the RMP. Amendment of the TMP will undergo a public process, and appropriate documentation for compliance with the NEPA and other laws and regulations.

7.0 DESCRIPTION OF ALTERNATIVES

This environmental assessment analyzed two alternatives, the proposed action and the no-action alternative.

7.1 Alternative A – No Action Alternative

Under this alternative, specific land use plan decisions that relate to travel and transportation management from the RMP (Appendix B) would be implemented in an *ad hoc* fashion, in response to emergencies as they arise. Emergencies generally refer to conditions that pose a public health and safety hazard. The relatively intensive proposed implementation plan for corrective road maintenance and necessary visitor management for the Monument would not be undertaken. Without a strategic plan, the BLM would likely be less well prepared to capitalize on funding opportunities.

Roads and primitive roads across sensitive cultural resource sites were avoided in the travel route designations to the extent possible. Cultural resource clearances will be conducted prior to ground-disturbing activity commences.

Rights-of-way on Monument lands would be reserved for the designated travel routes.

Conservation measures in the Biological Opinion for the RMP (02EAAZ00-2012-F-0257, Dec 7, 2012) will be followed.

Monument access routes: Routes will remain in existing condition without proactive efforts to address deficiencies.

Road maintenance: The BLM would continue to carry out transportation maintenance on a case-by-case basis depending on the condition of the travel routes, as determined by annual inspections or damage reports. Road maintenance projects would be implemented when conditions pose a public health and safety hazard. The relatively intensive, strategically prioritized corrective road maintenance proposed in the TMP would not be undertaken.

Portal sites: Kiosks and signs would be installed at existing turnouts. Maintenance to address drainage and poor soil conditions would be done only if the conditions pose a threat to human health and safety.

Group sites: The existing group sites would remain in their current condition. Maintenance would occur only when conditions degraded to pose health and safety issues.

Dispersed campsites: Existing dispersed campsites would be posted with signs, but would be maintained only if conditions pose health and safety issues.

Restoration: Restoration of sites damaged by intensive past use would take place only on a case-by-case basis when conditions pose a public health and safety hazard. Only native plants from local sources would be used for revegetation.

Route closures: On-the-ground actions to control access would continue to be implemented on a case-by-case basis depending on violation and damage reports, and site-specific evaluations. The area OHV use designations and route use restrictions on motorized vehicle use established in the RMP would be posted and shown on maps, and published in the Federal Register, making the designations enforceable. However, a program for installing on-the-ground access controls (fencing, barriers, gates, restoration of routes, signing) within 5-10 years of completion of the RMP decisions would not be undertaken. Reclamation of closed routes would be done using the methods of least impact. Only native plants from local sources would be used for revegetation.

Access acquisition: Legal access would be acquired prior to maintenance or other management activities on routes across non-Monument lands.

Dust control: Dust control will be provided during maintenance and construction activities in dust-prone soils in accordance with county permit requirements and guidelines.

7.2 Alternative B – Proposed Action

Under this alternative, a strategic program would be undertaken to implement the transportation and travel management decisions in the IFNM RMP to support allowable uses and protect Monument objects. Strategic budget planning would seek allocations to undertake proactive management through partnerships/collaboration, fundraising, grants, and adequate staffing.

Monument transportation maintenance would depend on the type of access a route provides, and will be maintained according to the guidelines in Appendix E. These guidelines are proposed to achieve consistency in the way that Monument routes are maintained for the purposes that they serve.

Roads and primitive roads across sensitive cultural resource sites were avoided to the extent possible in the travel route designations. Cultural resource clearances will be conducted prior to ground-disturbing activity commences.

Rights-of-way on Monument lands would be reserved for the designated travel routes.

Legal access would be acquired prior to maintenance or other management activities on routes across non-Monument lands.

Reclamation of closed routes would be done using the methods of least impact. Only native plants from local sources would be used for revegetation.

Dust control will be provided during maintenance and construction activities in dust-prone soils in accordance with county permit requirements and guidelines.

Conservation measures in the Biological Opinion for the RMP (02EAAZ00-2012-F-0257, Dec 7, 2012) will be followed.

Monument access routes: The BLM would work with Pinal and Pima Counties on needed improvements to county-maintained roads providing access to the Monument through the Federal Highways Administration's FLAP and FLTP. Proposed projects include Avra Valley Road-Silverbell Road-Sasco Road loop and other principal access routes.

Road maintenance: The designated Monument roads, primitive roads and trails would be added to the BLM Facility Asset Management System (FAMS) for maintenance budget programming. They are all existing routes, and maintenance projects are initially proposed for the most functionally significant routes in the Monument. Maintenance projects would be designed according to the type of access a route is intended to provide, and to minimize impact on Monument resources. Monument transportation routes would be maintained according to the guidelines and standards in Appendix E. The maintenance guidelines identify the design and construction criteria proposed for the different types of route. Condition surveys and inspections would be completed to define the scope of deferred or annual road maintenance projects, including corrective needs. Road and primitive road maintenance would address drainage problems, soil and roadbed erosion, side and overhead vegetation clearance, mitigation of safety conditions, and mitigation of soil conditions (soils prone to fugitive dust, and/or muddy conditions).

Road maintenance methods: Routes designated as roads and administrative roads would be maintained using heavy equipment normally used for road construction and maintenance. The most heavily traveled roads are maintained by the local county, normally using a motor grader crew, which may include a water truck for dust suppression and compaction, a back hoe or excavator for site excavation, dump trucks and equipment transport trailers. Traffic control would normally be provided whenever heavy equipment is on the roadway for safety, and the road may be temporarily closed. Maintenance work may include reshaping the road bed to the appropriate standards for two-way traffic, grading ditches and shoulders, cleaning and removing ditch obstructions, vegetation trimming and removal, and surfacing with aggregate. Culverts may be installed at major drainage crossings with steep or impassable approaches. The existing disturbance on these roads is currently wide enough to allow the maintenance operations to be accomplished without causing new soil disturbance. Vegetation trimming would be accomplished using hand tools (chain saw, hand saw, loppers.) Vegetation regrowth in the travel way, or in the ditches, may be removed by grubbing or grading with a blade (grader or dozer). Succulents and cacti which may have become established in the travel way would be transplanted within the vicinity.

Primitive Road ‘Type A’ maintenance methods: These roads would be maintained using heavy equipment normally used for road construction and maintenance, power tools, and hand tools. These routes would normally be maintained using a motor grader or dozer crew, which may include a water truck for dust suppression and compaction, a back hoe or excavator for site excavation, dump trucks and equipment transport trailer access to the project site. Traffic control would normally be provided whenever heavy equipment is on the roadway for safety, and the road may be temporarily closed. Maintenance work may include reshaping the road bed to the appropriate standards for single lane, low volume, low speed traffic with inter-visible passing turnouts or widening, grading ditches, cleaning and removing slough, removing sediments and ditch obstructions, trimming and removing vegetation, and surfacing with aggregate. Steep approaches on major drainage crossings would be graded to reduce the grade, or culverts may be installed. The existing disturbance on these roads is narrow compared to that of a designated road (see previous paragraph), but is wide enough to allow the maintenance operations to be accomplished with minimal new disturbance. Vegetation clearance would be maintained using hand tools (chain saw, hand saw, loppers). Vegetation regrowth in the travel way, or in the ditches, may be removed by grubbing or grading with a blade (grader or dozer). Succulents and cacti which may have become established in the travel way would be transplanted within the vicinity.

Primitive Road ‘Type B’ maintenance methods: These roads would be maintained using small earthmoving and excavating equipment, power tools, and hand tools. These routes would normally be maintained using a small trail dozer crew, skid-steer, small tractor, back hoe or excavator. These routes are not intended to be wide enough to accommodate passage by the typical dozer, dump truck and water truck crew used for ‘Type A’ primitive roads. Pickup truck mounted water tanks or trailer ‘water buffalos’ would be used if water is needed for maintenance work. The water would come from offsite sources. Traffic control would normally be provided whenever heavy equipment is on the roadway for safety, and the road may be temporarily closed. Maintenance work may include reshaping the road bed to the appropriate standards for single lane, very low volume, very low speed traffic with inter-visible passing turnouts or widening, grading ditches, cleaning and removing slough, removing sediments and ditch obstructions, trimming and removing vegetation, and surfacing with aggregate if indicated by soil conditions. The existing disturbance on these roads is very narrow, and includes portions where the original construction disturbance has partly re-vegetated. Vegetation clearance would be maintained using hand tools (chain saw, hand saw, loppers). Vegetation regrowth in the travel way, or in the ditches, may be removed by grubbing or grading with a blade (trail dozer). Succulents and cacti in the travel way would be transplanted within the vicinity.

Trails: Existing routes designated as Trails would be maintained according to Monument trail guidelines and standards in Appendix E. Monument trails would be maintained using trail crews with hand tools and equipment (i.e. pick and shovel, mattock and Pulaski, McCloud). Motorized equipment and power tools may be used for trail maintenance necessary due to site conditions (i.e. jack hammer, mini-excavator with blade less than 30” in width). Trails would be maintained for non-motorized non-mechanized travel (i.e. hiking, equestrian) use, and mountain bikes are prohibited. The Ragged Top trail would be maintained to foot path standards only, and not designed for equestrian use. Maintenance work may include reshaping the trail bed to the

appropriate standards, trimming or removing vegetation. Vegetation clearance would be maintained using hand tools (chain saw, hand saw, loppers). Succulents and cacti in the trailway would be transplanted within the vicinity.

Overland vehicle access: These access ways consist of existing cross-country access routes, or previously constructed routes that are naturally reclaiming, which provide essential access for administration of Monument land and maintenance of existing improvements or facilities. Very infrequent administrative vehicle use would be allowed for repair or maintenance or improvements, or for emergency access purposes. These areas would remain in essentially natural condition, and no grading or excavation would normally be done. Vehicles would follow the 'path of least resistance' driving over low growing vegetation, and removing obstructions by hand tools. No maintenance work would be performed, except that erosion control measures may be taken if indicated by site conditions, which if needed would be accomplished using hand tools. Routes previously constructed would be allowed to reclaim/revegetate by natural means. Vegetation clearance would not be maintained, except for trimming that may be absolutely necessary to gain access at the time of access. Any vegetation trimming would be done using hand tools (hand saw, loppers).

Portal sites: Parking turnouts and signing would be provided at Monument access points along the Monument access routes. These sites would typically consist of a parking turnout, site identification and informational signing, informational kiosk, traffic control as needed, and site work to mitigate safety, drainage, poor soil conditions (soils prone to fugitive dust, and/or muddy conditions). The parking turnout would be surfaced with gravel as indicated by soil conditions.

Group sites: Existing dispersed recreation sites along Silverbell Road and near the Waterman Mountains that accommodate multiple parties simultaneously will be managed as group sites. Minimal improvements to accommodate recreational use would consist of parking turnouts, an informational kiosk, signing, designated fire places (stone fire rings), and barriers to delineate the parking areas. Future expansion of the Silverbell group site is proposed to accommodate future growth. Group sites would be added to FAMS.

Dispersed campsites: Existing dispersed campsites would be maintained along the motorized travel routes, posted with identification signs, and monitored. Site management action would be taken to protect Monument objects or resources as needed depending on impacts from use. On-the-ground actions may include signing, cleaning fire places and litter, and installing barriers to limit the disturbance from vehicle use at the site (See TMP Section 5.4, Proposed Site Improvements).

Restoration: Damaged sites and areas caused by cross-country vehicle use, past mining activities, intensive target shooting prior to the ban on this activity on Monument lands, and other land use activities, including approx. 17 miles of physical access route designated for reclamation, would be restored to natural conditions. The initial restoration sites include approximately 42 acres (see TMP Section 5.10 Restoration and Rehabilitation). Restoration methods would depend on site-specific conditions, and may include disguising the site to avoid attracting further impacts; posting the site with appropriate signs to deter entry and further impacts, fencing to physically block entry, ripping to improve compacted soil conditions, regrading or re-contouring to blend in with natural topography, ditching or

grading to correct drainage problems, mulching with organic materials (chipped cuttings and slash from vegetation trimming), seeding with native plants from local sources, plantings of cuttings or other materials. Restoration work would normally be accomplished using hand tools, including power tools. Regrading, re-contouring, and ripping may be accomplished using heavy equipment for efficiency and effectiveness.

Route closures: Routes designated to be closed would be signed and barricaded physically by various methods depending on site-specific conditions. Decommissioned routes (approx. 17 miles) would be obliterated and reclaimed to restore natural contours and vegetation cover. Closure and restoration plans, surveys and clearances would be completed before construction. Closure devices may include gates, fencing, barricades, posts and signs. Barrier installation methods would depend on site specific conditions. Most of the closures would be constructed with hand tools and power equipment. Fencing and most post type barriers would be installed using hand tools and power tools (post pounders, power post drivers) and require no excavation. Excavation for holes to set gates and certain types of barriers may be done using power augers. Boulder barriers would be installed using a back hoe or front end loader.

Access acquisition: ROWs or easement acquisition is proposed for roads across private property (2.1 miles) and across Arizona State Trust lands (52 miles). Acquisition would be in accordance with applicable state and federal regulations and procedures.

Dust control: Dust abatement measures are proposed to prevent fugitive dust from unpaved roads in the Monument. Roads, primitive roads and parking areas in dust-prone soils would be surfaced with aggregate. Priority would be given to routes within the Rillito PM₁₀ area. Dust control would be required for road maintenance and other earthwork construction activities. Dust control would be primarily achieved during maintenance or construction activities by watering the project site. Water for dust control would be obtained from nearby commercial water supplies. In desert tortoise (*Gopherus morafki*) habitat, water without additives would be used for dust control.

8.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The potential impacts of the proposed work plan and the No Action Alternative on the human and physical/natural environment are described below.

Trends and Assumptions for Analysis

The following trends and assumptions were made in assessing the environmental consequences of the alternatives. These are common to all alternatives and are expected to influence management of the Monument road and trail system during the initial implementation period, and into the next 20 years:

Trends

- Development on non-Federal land inholdings and lands adjacent to the Monument will continue, increasing user demand for recreation opportunities.

- Increased traffic will contribute to wear and tear of the Monument Roads, Primitive Roads, and Trails, parking turnouts, trailheads, group sites, and dispersed recreation sites, increasing the need for transportation maintenance.

Assumptions

- Unless stated otherwise, the data used in the following analysis comes from BLM Specialists. BLM provided Geographic Information System (GIS) data files, and/or data collected during the route evaluation process.
- The planning area encompasses approximately 128,398 acres of BLM-administered public lands.
- The area of consideration directly affected by roads, primitive roads and trails, is 30 feet from the centerline of Roads and Primitive Roads and 7.5 feet from the centerline of Trails.
- All new routes and facilities will be properly engineered, planned and constructed to comply with environmental laws protecting natural and cultural resources.
- The number of acres and miles reflect only those on BLM-administered lands.
- The season of the highest recreational use in the IFNM TMP is October through April.
- BLM will have sufficient funding to implement this plan.
- Unless stated otherwise, the area of consideration indirectly affected by Roads, Primitive Roads, and Trails, is 300 feet from centerline.
- The area of consideration indirectly affected by facilities is 300 feet, measured from the edge of the development. Developing of new facilities will require a site specific project plans and additional NEPA review.

Resources Considered but Not Analyzed

Resources not analyzed in this EA (Table 7) include geology and cave resources, paleontology, fire ecology and management, energy and minerals, social and economic conditions, special designations, or lands and realty. These resources listed above were eliminated from detailed analysis as the resources are not present or are not affected by the proposed action or alternatives in this EA.

Table 7. Resources Affected

Resource	Not Applicable or Not Present	Present, But No Impact	Applicable & Present; Brought Forward for Analysis
Air Quality			X
Geology and Cave Resources		X	
Soil Resources			X
Biological Resources (including vegetation, non-native vegetation, wildlife and wildlife habitats, and special status species)			X
Fire Ecology and Management		X	
Cultural Resources			X
Paleontology		X	
Visual Resources			X
Livestock Grazing			X
Recreation			X
Lands and Realty		X	
Energy and Minerals		X	
Travel Management			X
Social and Economic Conditions		X	
Public Safety			X

8.1.1 Past, Present, and Reasonably Foreseeable Future Actions

For purposes of the cumulative impact analysis, the following list of past, present, and reasonably foreseeable future actions were considered. The IFNM Proposed RMP (PRMP) and Final EIS (FEIS) describes past, present, and reasonably foreseeable actions on the following pages: 4-147 to 4-153.

Past Actions (see page 4-148 of the IFNM PRMP/FEIS for a detailed description of each of these actions):

Past actions in the IFNM and surrounding area include historical mining, historical ranching, settlement and development of the area, the formation of Indian Reservations and the establishment of Coronado National Forest and Saguaro National Park.

Present Actions (see page 4-148- 4-152 of the IFNM PRMP/FEIS for a detailed description of each of these actions):

Present actions in the IFNM and surrounding area include current ranching and agricultural activities, vehicle-based recreation, illegal immigrant and drug smuggling activity, the Central Avra Valley Water Storage and Recovery Project on City-owned land near Sandario Road and Mile Wide Road, utilities, urban development, and groundwater withdrawal within the Pinal Active Management Area (AMA) and Tucson AMA.

Reasonably Foreseeable Future Actions (see page 4-152-4-153 of the IFNM PRMP/FEIS for a detailed description of each of these actions):

Reasonably Foreseeable Future Actions in the IFNM and surrounding area include the potential widening of I-10, the potential development of I-11 (see page 7), upgrades of existing utilities, and potential placement of rescue beacons within the IFNM by U.S. Border Patrol.

The extent of the area considered for cumulative impacts varied by resource.

Table 8. Cumulative Impact Analysis Area

Resource/Resource Uses	Cumulative Impact Analysis Area
Air Quality	IFNM boundary and areas within 50 miles
Soil Resources	IFNM boundary and watershed boundaries that intersect the IFNM
Biological Resources	IFNM and the watershed boundaries that intersect the IFNM
Cultural Resources	IFNM and neighboring lands with a high potential for connected resources
Livestock Grazing	IFNM and allotments that extend into adjacent management areas
Recreation	IFNM boundary and areas within 50 miles
Visual Resources	IFNM
Wilderness Characteristics	IFNM boundary and Wilderness within 50 miles
Transportation and Access	IFNM and State, County, and Local access roads
Public Health and Safety	IFNM

8.2 Air Quality

8.2.1 Affected Environment

Under the Clean Air Act Amendments of 1990, the EPA established standards for six criteria pollutants: lead, ozone, sulfur dioxide, oxides of nitrogen, carbon monoxide, and particulate matter. Areas that exceed a federal air quality standard are designated as non-attainment areas. Vehicle emissions include nitrogen oxides, hydrocarbons, fine particulate matter, and carbon monoxide. Vehicle travel on unpaved routes generally produces fugitive dust that increases concentrations of fine particulate matter in the air. The amount of dust generated varies greatly, depending on the qualities and properties of the soils. Soils that are highly prone to fugitive dust were identified for the Monument and analyzed in the RMP using soil surveys, and were avoided to the extent possible during the route evaluation and designation process.

Due to prevailing wind patterns in the region, air quality in the Monument is primarily influenced by pollutants emitted from unpaved roads and barren desert soils within and outside the Monument to the west. Strips or patches of barren soils in the Monument are found on the designated route network, parking turnouts and activity areas, range improvement sites (corrals, waters, salt licks), disturbances from past mineral exploration, and impacts of illegal off road vehicle use. Similar soil disturbances exist west of the Monument on rangeland in the Tohono O’odham Nation. Extensive areas of disturbed sensitive (dust prone) soils are found on agricultural, fallow, and undeveloped rural lands near the Monument in Avra Valley, Santa Cruz Valley, and Aguirre Valley. The Arizona Department of Environmental Quality and Pima County have produced a plan for the Rillito Particulate Matter (PM₁₀) Nonattainment Area (NAA), and one is being prepared for the West Pinal County PM₁₀ NAA. Current

conditions in the West Pinal County NAA produce major dust storm events during the summer that cause public safety problems along I-10.

Throughout the desert southwest, dust causes public safety and health concerns (poor visibility leading to collisions, valley fever, respiratory problems). Public land visitors often use open cab vehicles (i.e. ATVs, UTVs, motorcycles, highway vehicles with open windows), and are exposed to risks from dust inhalation.

A portion of the IFNM, east of the Silverbell Mountains, is within the Rillito PM₁₀ NAA. The West Pinal PM₁₀ NAA lies east of the Sawtooth Mountains outside the Monument. The remainder of the IFNM lies within attainment areas for PM₁₀, and other regulated pollutants. Map 10.1 shows the Monument's sensitive soils, the proposed route maintenance, and the PM₁₀ NAAs.

8.2.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Air Quality

Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would likely result in continued vehicle traffic on all routes, and continued fugitive dust from the unpaved routes. Management and maintenance of a route network keeps routes passable, limits the widening of primitive roads or trails, and marking trails reduces cross-country travel. Under Alternative A, without an established network, the area of soil disturbance and the potential for fugitive dust could expand. Delays and lack of strategic prioritization in road maintenance, installation of barriers to cross-country travel, closing of designated routes, and implementing restoration projects could, over time, result in an increase in the number and miles of non-authorized routes and increase the geographic extent of potential fugitive dust within the planning area. Some unauthorized cross-country vehicle travel would continue, especially on the flat areas where the sensitive soils are located. These areas attract cross-country travel because they lack natural barriers (vegetation, topography, rockiness). Action would be taken to protect air quality from the Monument routes if air quality violation notices are received. The potential amount of dust from unpaved Monument routes would depend on the condition of the route, traffic volume, size and speed of the vehicle, weather conditions (wind, moisture), and soil types. Some fugitive dust would likely be emitted from damaged lands that remain unrestored. Impacts to air quality from Monument sources, primarily unpaved roads, were analyzed on pages 4-5 and 4-5 of the IFNM PRMP, and would contribute an estimated 114-147 tons per year to particulate matter pollutants. Some of the expected emissions would occur within the Rillito PM₁₀ Nonattainment Area within the Monument. Impacts to air quality from Monument sources would contribute to the particulate matter pollutants in the West Pinal and Rillito PM₁₀ Nonattainment Areas outside the Monument, and may contribute to poor visibility conditions along routes that can lead to collisions and resource damage.

Cumulative Impacts on Air Quality

In addition to the traffic on unpaved roads surrounding the Monument, continued traffic over time on routes through dust-prone soils that are damaged, currently over-used, or designated for use restriction or decommissioning, would likely increase the fugitive dust emissions from those segments of route, in comparison to current emission rates. Visible tracks from previous cross-country travel would continue to attract additional cross-country travel, increasing fugitive dust emissions in comparison to current emission rates. The rate of dust emission could grow to exceed the projections analyzed in the RMP.

Alternative B – Proposed Action

Impacts on Air Quality

Impacts to air quality from Monument sources, including impacts from the designated route system, were analyzed on pages 4-7 – 4-8 of the IFNM PRMP. Alternative B would contribute an estimated 47-61 tons per year particulate matter pollutants. Some of the expected emissions would occur within the Rillito PM₁₀ Nonattainment Area within the Monument. Priority would be given in the proposed plan to the projects which have the highest potential to protect sensitive soils and reduce fugitive dust. Priority projects include decommissioning, restricting use, and providing maintenance on designated routes in sensitive soils to minimize impacts on air quality. Implementing the proposed plan (gravelling designated roads and parking turnouts in sensitive areas, restoring soil function and vegetation cover at damaged sites) would reduce the number and area of potential fugitive dust emission sources related to the Monument transportation system.

On-the-ground implementation actions would produce fugitive dust during operations. Construction equipment associated with restoration, road and trail maintenance and widening or reclamation would have localized impacts on air quality during operation within 300 feet of the equipment. Fumes from internal combustion engines and fugitive dust would contribute to overall air quality degradation during operation. Restoring approximately 27 acres of routes and implementing 18 acres of maintenance projects on routes within the PM₁₀ nonattainment area may create surface disturbance. Impacts would not exceed air quality standards. Allowing routes to reclaim naturally would reduce impacts on air quality over time as vegetation stabilizes the soil and creates natural barriers to vehicle travel. Authorizations for activities involving heavy equipment would require the application of water for dust control during maintenance or construction operations. The proposed plan (road maintenance and improvements to access points, portal sites, and group recreation sites, signing, restoration) would help travelers stay on designated routes and areas maintained for that purpose, reducing the likelihood of route proliferation and indirectly reducing fugitive dust and impacts on air quality.

Cumulative Impacts on Air Quality

The proposed implementation plan would reduce the amount of fugitive dust emitted from Monument sources over the length of the plan. The proposed transportation maintenance guidelines define frequency and intensity of scheduled maintenance, which would reduce the amount of fugitive dust emitted from Monument sources over the life of the plan. This would protect the air quality in the Monument and reduce fugitive dust emissions contributing to the air quality in the West Pinal and Rillito PM₁₀ Nonattainment Areas. These areas would continue to be impacted by emissions from population growth and development, agriculture, unpaved roads, and other land uses outside the Monument.

This would protect the air quality in the Monument and reduce fugitive dust emissions contributing to the air quality in the West Pinal and Rillito PM₁₀ Nonattainment Areas. These areas would continue to be impacted by emissions from population growth and development, agriculture, unpaved roads, and other land uses outside the Monument.

8.3 Soil Resources

8.3.1 Affected Environment

The characteristics and properties of soils in the Monument were analyzed in the route designations established concurrently with the RMP. Criteria were applied in designating the Monument Roads and Primitive Roads to avoid, minimize and mitigate impacts to soil from motorized access.

Sensitive or fragile soils in the Monument include soil types that are highly or severely erodible by wind or water, are highly prone to emitting fugitive dust when disturbed, deeply muddy when saturated with moisture, and prone to damage by traffic and surface runoff. Map 10.2 shows the elements of the proposed action (road maintenance, ancillary sites) and sensitive soils. Other sensitive soils in the Monument include desert pavements, biological soil crusts, and soils in xeroriparian areas along desert washes.

Some designated routes are in sensitive soils prone to fugitive dust (Table 8). Desert pavement and biological soil crust occur in the Monument, but have not yet been fully inventoried. Sediments eroded from Monument routes enter directly into desert washes, and in some cases enter runoff collection systems for earthen livestock water tanks. Erosion due to poor road drainage is making roads impassable in places due to incision of the roadbed below the prevailing ground, rutting along the roadbed, gully erosion across the roadbed, and washouts at low water crossings of desert washes. Eroded soil from road cuts and uplands is deposited on travel ways as slough material, mud or debris flows, impeding the usability of the roadways and causing road users to establish bypasses around impassable sections.

Monument roads are eroding and in poor condition. The designated roads and primitive roads intercept surface runoff, and act as ditches diverting runoff away from natural drainage courses, concentrating flows and increasing velocity, causing severe erosion.

Table 9. Miles of Routes in Fragile or Sensitive Soils

Road Type	Miles of Routes	
	Fragile or Sensitive Soils	Xeroriparian Areas
Motorized	68.58	10.19
Non-Motorized	96.29	15.77
Reclamation	6.09	1.36
Total	170.96	27.33

8.3.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Soils

Implementing the transportation and travel management decisions on an ad-hoc basis in response to emergencies would allow continued and unrestricted access and uses in some areas with fragile or sensitive soils, leading to continuation and worsening of current impacts on soils from vehicle access and use.

Soil erosion related to Monument travel routes caused by surface runoff, wind and vehicle use would continue during maintenance delays and road conditions likely would worsen on routes already in poor condition, leading to route users bypassing impassable sections and spreading damage to soils adjacent to the routes. Drainage and related erosion problems would continue on Monument routes. These issues would be addressed on an *ad hoc* or emergency basis.

Cumulative Impacts on Soils

Establishment of the Monument attracted increased public use of Monument lands, including illegal cross-country driving and vehicles unsuitable for existing road conditions. Continued unrestricted motorized travel on sensitive soils would add to those impacts, as well as to impacts of increased recreational use on the Monument resulting from future population growth and development in areas surrounding the Monument. Under the No Action Alternative, when combined with impacts from other past, present, and reasonably foreseeable actions, soils would continue to be impacted by unrestricted motorized travel.

Alternative B – Proposed Action

Impacts on Soils

Current drainage and erosion problems affecting the usability of Monument routes would be corrected in a strategically prioritized order under the proposed plan. The rates of soil erosion and sediment translocation would be reduced on Roads and Primitive roads by road maintenance. Route repairs would solve conditions that currently lead to occasionally impassable sections (e.g. mudholes following heavy rains), thus incidental damage to soils from road users driving around impassable sections would be reduced.

Soil function and vegetative cover would be improved at restoration sites. Primitive Type A road maintenance to accommodate fire suppression, emergency and specialized utility vehicles would widen sections of existing narrow single lane routes, with impacts to 9 feet on either side of centerline. Aggregate surfacing of routes in sensitive dust prone soils would mitigate mud and rutting when wet and dust emission when dry. Approximately 25 miles of route on Monument land, and approximately 11.5 miles on non-Federal lands (subject to access acquisition) would be capped with gravel to compensate for poor soil conditions (dust and mud). Aggregate for surfacing will be acquired from sources offsite, and will be trucked to the project sites. Dust emissions from transporting aggregate will be minimized by dust suppression measures during construction (water, slow travel speed). Portal site and group site barriers would define the parking areas and reduce sprawl of potential impacts on Monument land adjacent to these sites. Public use would become concentrated at sites improved or designated for public use, and impacts from recreational use and activities would become concentrated at those locations. Parking area barriers would prevent soil impacts from spreading where local conditions may be conducive to cross-country vehicle use or travel.

Road maintenance would correct surface drainage problems and minimize diversions from local drainage patterns.

Cumulative Impacts on Soils

The route closures, administrative route use restrictions and restoration/revegetation projects of the proposed plan would reduce the number of acres of soils impacted by past and present roads and road use. Soil function and vegetative cover would be restored on approximately 17 miles of decommissioned routes and on approximately 46 acres of sites damaged by intensive recreation activity and cross-country vehicle travel. Impacts would be reduced on approximately 118 miles of routes limited to administrative vehicle use. The impact of existing routes on natural drainage patterns would be reduced by road maintenance. When combined with impact from other past, present, and reasonably foreseeable actions, soils would continue to be impacted by unmaintained roads in the area, but would be less degraded under the Proposed Action.

8.4 Biological Resources

8.4.1 Affected Environment

Monument lands include Upland Plant Communities, Riparian and Xeroriparian Plant Communities, Non-Native Vegetation, Wildlife and Wildlife Habitat, Non-game species, Migratory Birds, and Special Status Species. These resource values are summarized in the Biological Evaluation (Appendix P). Within the Monument, impacts to wildlife result from vegetation disturbance and from activities that produce visual and acoustic disturbances created by vehicles, recreation activities and road maintenance activities. Roads, and the human activities associated with them, can disrupt wildlife, including amphibians, reptiles, small and large mammals, birds, and ungulates. Drug and human smuggling apprehension activities damage habitat with cross-country travel in motorized vehicles. The Biological Evaluation analyzes the effects of the proposed action on Threatened, Endangered and Candidate species, which in the action area of this plan are Lesser Long-nosed bat, Nichol Turks-head cactus, Sonoran Desert tortoise, and Tucson Shovel-nosed snake. The Sonoran Pronghorn 10(j) non-essential experimental population area was not considered because it is not expected to be occupied in the life of this plan. These resource values were considered in the travel route designations in the IFNM RMP, with avoidance and minimization criteria. The entire monument is foraging habitat for the Lesser Long-nosed bat. Approximately 20 acres of restoration areas and 12 acres of road maintenance projects are in the Desert Bighorn Sheep Wildlife Habitat Management Area. Various projects in the TMP will occur in all three categories of Sonoran Desert Tortoise (*Gopherus morafki*) habitat. Approximately 27 acres of restoration areas and 33 acres of road maintenance projects are in categorized desert tortoise habitat. Approximately 14 acres of road maintenance projects are in Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*) habitat (Map 10.3) and approximately 2 acres of road maintenance projects are in Nichol's Turks head cactus habitat (Waterman Mountains VHA). Surveys would be conducted during project design prior to mobilization for Threatened and Endangered and Special Status species. Interagency guidelines for construction in desert tortoise habitat⁵ will be followed during work with heavy equipment, and no impacts are expected.

⁵ Guidelines For Handling Desert Tortoises During Construction Projects, July 1994 (Revised July 1999);
The Desert Tortoise Council, Wrightwood, California
and

Guidelines For Handling Sonoran Desert Tortoises Encountered On Development Projects, Revised October 3,
2007; Arizona Game and Fish Department

Both Vegetation Habitat Management Areas are encompassed by the desert tortoise habitat and are included in the management of the tortoise habitat.

8.4.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Biological Resources

Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would leave most of the existing routes physically open to vehicle use until action is taken on an emergency basis. This would continue to allow unrestricted use in some areas designated in the RMP to be closed or restricted to protect resources, leading to potential impacts on biological resources, including sensitive plant and animal species (road kill, vegetation loss, spread of invasive nonnative plants). Additionally, the continued lack of barriers and signing along designated routes would leave cross-country travel more likely to occur under this alternative, leading to potential impacts on biological resources away from roads. Cross-country travel would be more likely to occur under this alternative, leading to potential impacts on biological resources (disruption of species movements, displacement of wildlife, habitat loss, habitat fragmentation, reduced habitat quality).

Cumulative Impacts on Biological Resources

Continued unrestricted motorized travel on routes designated for closure or for restriction of motorized use would add to the impacts of increased public use since the establishment of the Monument, and to the impacts of increased recreational use on the Monument resulting from population growth and development in areas surrounding the Monument over time. Degradation of habitat through damage and loss of vegetation (vehicles driving over vegetation, vandalism, theft), soil compaction, and erosion due to drainage issues would accrue and worsen, adding to degradation from past and current impacts.

Under the No Action Alternative, these cumulative negative impacts would accrue faster than under the proposed action, while the offsetting benefits of restricting access along administrative use only routes and restoring disturbed areas in the proposed action would not happen as quickly as in the Proposed Action alternative.

Cumulative impacts to the biological resources present on the IFNM are discussed in detailed in the IFNM PRMP/FEIS on pages 4-154 to 4-155.

Alternative B – Proposed Action

Impacts on Biological Resources

Implementation of the proposed road maintenance projects would concentrate vehicle traffic on designated roads and primitive roads, continuing or increasing impacts on biological resources along the routes. Degradation of habitat quality and potential for road kill or lifecycle disruption would increase along these routes, primarily from increasing vehicle traffic and human activity. Converting designated roadways to trails would reduce impacts associated with motorized travel and allow the current disturbance of the route to partially reclaim. Vehicle traffic would be reduced on administrative and non-motorized routes, reducing disturbance and impact on biological resources.

Human and heavy equipment activity related to maintenance and construction projects would cause localized temporary disturbance (noise, dust, activity) in the project area during operation. Route maintenance and site improvement activities in some areas would widen the disturbed area minimally to accommodate engineering and design requirements. Potential impacts to threatened and endangered species would be avoided or minimized by applying the conservation measures in the Biological Opinion for the RMP. Habitat loss and fragmentation due to the removal of vegetation used as forage and shelter and crushing burrows, reduce the extent of wildlife habitat, although the exact level of reduction cannot be quantified. However, restricting access along administrative use only routes and restoring disturbed areas would help to offset this disturbance as areas are returned to their natural state, decreasing fragmentation, decreasing disturbances and increasing vegetative variety and cover.

Decommissioning routes and restoration efforts on approximately 20 acres in desert bighorn sheep habitat and 27 acres in categorized desert tortoise habitat would improve conditions for biological resources in these areas. Temporary disturbance during construction and restoration activities would have minor localized impacts of short duration.

Maintaining the roads in desert bighorn sheep habitat and categorized desert tortoise habitat would continue to affect habitat quality near the routes due to continuing road use and periodic maintenance activities. Disturbance from human activity and heavy equipment related to maintenance work would have minor localized impacts of short duration. Improvements to access points, portal sites, and group recreation sites could improve access to trailheads, staging areas, and campsites, which could prevent motorized vehicles from traveling on unauthorized routes and creating disturbance. This could indirectly maintain existing vegetation and wildlife habitat in areas adjacent to bighorn sheep and desert tortoise habitat.

Cumulative Impacts on Biological Resources

Vehicle traffic concentrating on maintained designated roads and primitive roads would continue or increase impacts on biological resources along the routes, adding to impacts from past public use and to impacts of increased recreational use resulting from population growth and development in areas surrounding the Monument in the future. Concentrated and increased vehicle traffic would likely increase the potential for road kill or lifecycle disruption, as well as the spread of noxious weeds and invasive species along routes. The route maintenance standards and maintenance frequency cycles proposed in the TMP would likely increase the use on routes providing access from the local highway system, adding to this potential impact to wildlife. Physical closure and restoration of designated routes, regular monitoring and road maintenance, and barriers to restrict motorized use on Administrative routes, would help offset this impact through restoration of soils and vegetation, and through discouraging cross-country motorized travel. When combined with impacts from other past, present, and reasonably foreseeable actions, biological resources would continue to be impacted by unmaintained roads in the area, but would less impacted under the Proposed Action.

8.5 Cultural Resources

8.5.1 Affected Environment

Cultural resource surveys have been conducted in the Monument for various land use projects over time, including several surveys completed during preparation of the Monument RMP. A 21,194 acres Monument-wide inventory that included random sample transects was completed on contract by the University of Arizona in 2006. A 46 linear mile cultural resource survey of Monument access routes was completed on contract in 2007, and a third cultural resource survey of approximately 80 linear miles of access routes was also completed on contract in 2008. In addition, BLM Archaeologists completed several additional acres of survey in support of proposed Monument projects.

Current data derived from the surveys, provides site-specific information on cultural resources located along 126 miles of Monument access routes, which include most of the routes proposed for road and primitive road maintenance. According to Tucson BLM Field Office cultural resource records, approximately 126 miles of Monument access routes have been surveyed. Some of the routes with cultural resource values identified in the surveys were identified as closed in the RMP to public vehicle use to avoid impacts to the sites. Some unsurveyed routes were designated for closure to protect other resource values.

Research in the Tucson Basin and southern Arizona has documented the cultural history of the region. The archaeological record of the region is broken into six periods representing temporal periods of human occupation. These periods include, Paleo-Indian (12,000-8,000 BC), Archaic (8,000-1500 BC), Late Archaic/Early Agricultural (1500 BC- AD 650), Formative (AD 650-1400), Ethnohistoric (aboriginal protohistoric and historic) (AD 1400-1950), and Euro-American (AD 1500-1950) eras.

Cultural resource sites recorded and documented within the Monument reflect most of the above stated periods.

Approximately 300 archaeological and historical sites have been recorded within the proclaimed Monument boundary: approximately 80% are located on Monument lands with the remainder being located on Arizona State Trust and private lands. All cultural resource sites are non-renewable resources, some of which have been affected by past land use activities resulting in loss of site integrity. Some known cultural resource sites are still being damaged by vandalism.

Average site density is 11 sites per square mile on Monument lands, and about 7 sites per square mile on Arizona State Trust and private lands. About 89 percent of the sites recorded within the Monument reflect aboriginal occupation of the region, and seven percent reflect historical Euro-American occupation. Approximately three percent of sites have both aboriginal and Euro-American components.

Based on past survey data derived from recorded sites, one hundred seventy five (175) are recommended eligible for listing on the National Register of Historic Places, and twenty-two (22) sites are recommended not eligible. There are known National Register eligible sites located along designated routes, but the total number cannot be determined because there are 300 miles of un-surveyed routes. Because of this, there is the potential to locate additional cultural resource sites once the surveys are completed.

Cultural resource monitoring data collected at sites has shown that off road vehicle travel, target shooting, looting and vandalism have caused the greatest impacts on cultural resource sites within the Monument. Because preservation of cultural resource values was prioritized in the Monument evaluation process, a greater emphasis would be placed on the protection of known site areas.

8.5.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Cultural Resources

Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would leave routes open to unmanaged public use, potentially leading to degradation of cultural resource sites. Under this alternative, cultural resource sites, which are non-renewable resources, could continue to be damaged by cross-country travel including continued use of existing illegal tracks, and continued unrestricted vehicle use of routes designated for closure or for administrative use.

If ongoing monitoring or reports indicate damage is occurring, management actions would be taken to protect these sites. Examples of management actions that can be used include, restricting access, installation of physical barriers, and installation of educational signage.

Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies and failure to implement the Monument road maintenance program would potentially lead to widening of main and primitive roads. An effect could result in roads becoming eroded and impassable causing travelers to create new roads to bypass impassable sections. This could result in further damage to known as well as unknown cultural resource sites.

Cumulative Impacts on Cultural Resources

Continued unrestricted motorized travel on routes designated for closure or for restriction of motorized use would likely add to the impacts to cultural sites of increased recreational use on the Monument resulting from population growth and development in areas surrounding the Monument over time. Delays in road maintenance and installation of barriers may lead to continued cross-country travel as motorized use increases. Impacts to cultural resource sites, which are non-renewable resources, would accrue and worsen, adding to degradation from past and current impacts.

Alternative B – Proposed Action

Impacts on Cultural Resources

Cultural resource sites can experience direct impacts through road maintenance, constructed improvements and restoration work. Impacts can be mitigated through project design and planning. Implementation of travel route designations would help protect cultural resource sites by reducing overall surface disturbance, routing public use pressure and potential impacts away from sensitive resource values, resource education and awareness in visitor management programs. Roads and primitive roads across sensitive cultural resource sites would be realigned to avoid direct impacts to the sites. Maintenance or improvement activities would avoid excavation where cultural resources are known to be located. Maintenance or construction activities with heavy equipment at or near known cultural resources sites would be monitored by an archaeologist on site during work.

Educational outreach programs combined with regulatory, interpretive, and informational signage can help increase awareness about resource protection among visitors.

Implementation of the Monument road maintenance program would benefit cultural resource management within the Monument. It would also help reduce the risk of continuing resource damage to archaeological sites for the future. Proposed improvements targeted at high public use areas such as access points, portal sites, and group recreation sites would help concentrate public use. Monument visitation would be directed to areas with a lower risk of damaging resources. This would reduce access related impacts in areas that are considered higher risk for resource damage, thereby lowering the overall risk of damage to cultural resource sites.

Cumulative Impacts on Cultural Resources

Under the Proposed Action, the implementation of the route designations would prevent future degradation to cultural resources. As a result the Proposed Action would not add any direct or indirect impacts to current cultural resource degradation that is a result of past and present actions (page 4-155 of the IFNM PRMP).

8.6 Livestock Grazing

8.6.1 Affected Environment

Livestock grazing is permitted on Monument lands under 11 leases that are entirely or partly within the proclaimed boundary, administered in accordance with Section 15 of the Taylor Grazing Act of 1934. The lessees are dependent on the transportation system to access their range improvements such as fences, wells, water lines and stock tanks, as well as monitoring the condition of the rangelands and the condition of their livestock. Most of the grazing leases include use of adjacent Arizona State Trust land under grazing leases administered by the Arizona State Land Department.

Lease operators provided information during the development of the proposed TMP on their administrative access needs related to grazing operations. This information was used to determine the number, type and width of gates needed for administrative access, and identify roads in poor condition.

Several ranch headquarters are located on non-Monument land inholdings, including residences. Some maintenance has been provided by ranchers on routes essential for grazing operations, and to access ranch headquarters.

8.6.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Livestock Grazing

Implementing the transportation and travel management decisions of the RMP on an *ad-hoc* basis in response to emergencies would leave most of the existing routes open to unrestricted vehicle use until action is taken on an emergency basis. Motorized use in areas designated in the RMP for administrative vehicle access would continue to be unrestricted, allowing potential conflicts between grazing operations and public uses. Existing gates would remain vulnerable to damage and to being left open, allowing cattle to move into areas where they are not supposed to be. Cross-country travel would be more likely to occur under this alternative, due to delay in road maintenance, restoration, and installation of barriers.

This would lead to potential impacts on livestock operations (disruption of livestock movements, damage to range improvements, introduction and spread of invasive plant species).

Cumulative Impacts on Livestock Grazing

Continued extended drought could stress native vegetation, making it more vulnerable to invasion by non-native plants and noxious weeds. Continued unrestricted motorized access on designated administrative and designated closed routes could facilitate the invasion through motor vehicles transporting seed along routes, reducing forage for livestock.

Alternative B – Proposed Action

Impacts on Livestock Grazing

Traffic would increase on designated roads, and public non-motorized use would increase on routes limited to administrative motorized vehicle use, increasing the encounters between public visitors and grazing operations.

Implementing route restrictions on administrative routes through the placement of signage and barriers may inconvenience the lessees with gates to unlock to access some of their range improvements.

Cross-country vehicle use by ranchers would be curtailed for grazing-related operations, while vehicle access to range improvements would be accommodated. Potential conflicts between public use and livestock grazing operations would be alleviated. Prioritizing the replacement of gates at grazing allotment and pasture boundary fences with cattle guards would reduce unintentional movement of cattle.

Restoration activities on damaged lands, and abandoned routes, would restore approximately 42 acres of plant cover with forage value. Restoration areas fenced off during restoration may preclude livestock use for short period, with a negligible impact on grazing operations.

Roads, and the human activities associated with them, can disrupt livestock operations through accidental or deliberate interference with livestock husbandry such as pasture rotations and water supplies. Additionally, travel along routes may distribute noxious and invasive species from other areas. However, restoring disturbed areas and replacing gates with cattle guards would help to offset this disturbance as areas are returned to their natural state, decreasing fragmentation and damage to range improvements.

Fencing, gates and administrative access system would be coordinated with ranchers to minimize impacts on grazing operations. Minimal access route maintenance by ranchers may be performed to appropriate standards under individual road maintenance agreements or authorizations, minimizing disruption of access from seasonal damage from storms. Improvements to access points, portal sites, and group recreation sites could improve access to trail heads, staging areas, and campsites, which could prevent motorized vehicles from traveling on unauthorized routes and creating disturbance that could introduce invasive species, and also reduce damage to range improvements.

Cumulative Impacts on Livestock Grazing

Impacts, such as user conflict and vandalism, to designated administrative routes from increased motorized use resulting from population growth and development in areas surrounding the Monument would be alleviated by installation of locking gates to allow motorized access only by authorization holders such as grazing lessees.

8.7 Recreation

8.7.1 Affected Environment

The Monument was designated as a Special Recreation Management Area (SRMA) to be managed for an undeveloped character, and Monument lands were designated under Recreation Management Zones (RMZs) to achieve specific recreational benefits for different parts of the Monument. The Roded Natural RMZ provides opportunities for visitors to engage in scenic road tours in a variety of modes of travel, and in interpretive programs available, with at least 75 percent of visitors realizing the targeted outcomes and/or benefits within the life of the RMP. The Semi-primitive Motorized RMZ provides opportunities for visitors to engage in semi-primitive road touring on off-highway motorized vehicles (4 wheel-drive [4WD], all-terrain vehicle [ATV], and trail motorcycle), with at least 75 percent of sampled visitors realizing the targeted outcomes and/or benefits within the life of the RMP. The Semi-primitive Non-motorized RMZ provides opportunities for visitors to engage in non-motorized touring (hiking, equestrian, mountain bike), with at least 75 percent of sampled visitors realizing the targeted outcomes and/or benefits within the life of the RMP. The Ragged Top Wildlife Viewing RMZ provides opportunities for visitors to engage in primitive recreation activities with a sense of remoteness and solitude, in a naturally appearing landscape with at least 75 percent of sampled visitors realizing the targeted outcomes and/or benefits within the life of the RMP. The different RMZs ensure the physical setting, social and managerial setting, and accessibility to support achieving those recreation objectives (see also Appendix B). Recreational activities visitors engage in include a variety of dispersed recreational activities, driving for pleasure, hiking/walking/running, mountain biking, horseback riding, riding OHVs, sightseeing, wildlife viewing, camping, picnicking, and hunting. Recreational use occurs throughout the Monument, with Ragged Top Mountain the most popular destination for sightseeing, wildlife viewing, and hiking. Recreational aviation occurs on Monument land under a Recreation and Public Purposes lease.

The RMZs are described and shown on Map 7 of the Approved RMP. Map 10.6 of this TMP shows the RMZs, proposed Monument access routes, and proposed road maintenance. Commercial, organized or competitive recreational use is allowed on Monument lands, subject to Special Recreation Permits requirements in 43CFR2930 and BLM policy, and applicable decisions in the Resource Management Plan. The RAMP will be prepared to implement the Monument recreation resources management decisions under a separate action.

8.7.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Recreation

Implementing the transportation and travel management decisions on an ad-hoc basis in response to emergencies would delay road maintenance and implementation of road use restrictions to protect Monument objects, including the targeted recreational opportunity settings. This would allow visitors to

drive vehicles on routes in RMZs intended to provide non-motorized opportunities, delaying attainment of RMZ objectives. Public recreational access and use would continue without a Monument-wide strategy for accommodating access to support the different RMZ objectives, leading to unmanaged use and ad hoc use of available access routes and informal parking areas for trailhead and staging purposes and other dispersed recreational activities. Implementing the transportation and travel management decisions on an ad-hoc basis in response to emergencies would contribute to degradation of the existing physical setting of the Monument, and increase the risk for damage to Monument objects, which would negatively impact visitor experience. The recreational setting may gradually deteriorate without a purposeful effort to implement actions to achieve recreation management benefits and objectives (i.e. implementing use restrictions, implementing road maintenance consistent with the Recreation Management Zones (RMZs)). Not completing ancillary site improvements to accommodate public use could lead to ad hoc parking turnouts and recreation activity areas along the travel routes. Including an informational kiosk with visitor information and maps at portal sites could improve the recreation experience. Existing damaged lands that are not restored could continue to attract public use, perpetuating the damage and possibly spreading impacts onto adjacent land.

Cumulative Impacts on Recreation

Motorized use and associated impacts would continue on routes throughout the Monument, and objectives to provide non-motorized experiences would likely not be achieved. Expected population growth and development over time in areas surrounding the Monument would increase motorized recreational use, which would further increase impacts on recreational setting and experiences.

Alternative B – Proposed Action

Impacts on Recreation

Implementing the proposed plan would improve accessibility and safety of the Monument transportation system, and would support RMZ objectives, preserving the area's undeveloped, primitive, back country character. The proposed road maintenance would accommodate vehicle types depending on the RMZ, with passenger cars and minibus access to the Roaded Natural RMZ, and high clearance 4WD vehicle for the Semi-Primitive Motorized Zones. Motor vehicle use restrictions on routes in Semi-Primitive Non-Motorized or Primitive RMZs would support objectives for those settings. Installation of barriers and access control devices on administrative routes would limit opportunities for motorized recreational use, but increase opportunities for non-motorized recreational use. Interaction between motorized and non-motorized users would decrease on these routes. Site improvements and visitor information (portal sites, group sites, signing, access and recreation guides) would direct recreational use to sites that would be monitored and maintained to accommodate ongoing use, and would help protect Monument objects from ad hoc activity areas or new off road impacts created by users. Public use would become concentrated at sites improved or designated for public use, and impacts from recreational use and activities would become concentrated at those locations.

Restoration activities would alleviate impacts on the recreational setting with bare ground, loss of cover and degraded visual quality of damaged sites.

Road maintenance and site improvements may attract new recreational use by improving the accessibility of the Monument. This would increase visitor encounters among each other, and could cause difficulties achieving low visitor encounters in areas that become popular destinations. The use restrictions on administrative roads would indirectly provide routes for non-motorized mechanized recreational travel with little or no interaction with motorized use. Making improvements to portal sites by including an informational kiosk with visitor information and maps and improving access sites and group recreation sites could improve the recreation experience. The maintained routes and visitor information would establish a defined travel network, which could reduce the potential for user created route proliferation.

Cumulative Impacts on Recreation

The impacts of increased motorized recreational use on the Monument resulting from population growth and development in areas surrounding the Monument over time would likely increase the amount of traffic on maintained roads and improved sites. This could increase difficulties in achieving low visitor encounters in semi-primitive non-motorized settings that become popular destinations, which might require action to limit use.

8.8 Visual Resources

8.8.1 Affected Environment

Visual Resource Management (VRM) Classes were established for Monument lands in the RMP to ensure the visual impacts of management activities protect the ‘quintessential view of the Sonoran Desert’ mentioned in the Monument proclamation.

As shown on Map 5 of the RMP, most of the Monument is under VRM Class II objectives to ensure the existing character of the landscape is retained, and that visual impact of management activities is not evident in the characteristic landscape. A small portion of the Monument is under VRM Class III objectives (see Map 10.7) to partially to retain the existing character of the landscape, to accommodate management activities that may be evident, but not dominate the views. A small portion of the Monument is under VRM Class IV to accommodate existing landscape modifications that are noticeable and dominate the view in portions of the Monument along the electric transmission and natural gas pipeline utility corridors.

The designated Monument travel route system and public use activity areas constitute the viewing locations of greatest sensitivity for managing visual resources, with the Monument landscape and objects visible in the foreground from these locations. The visual impact of Monument roads and ancillary features (signs, cattle guards, gates, parking turnouts, fences, etc.) and road use activity (traveling vehicles, litter, trash, OHV tracks, etc.) is viewed in great detail in the immediate foreground. Monument lands are also an important back drop and skyline feature in the landscape viewed from populated areas and travel routes in Avra Valley, Santa Cruz Valley. Some mining and road related visual impacts on Monument lands or adjacent lands are noticeable in background views due to their visual contrast and

scale (i.e. the Waterman Mountains road cuts, reclaiming airstrip, the Silverbell Mine tailings, leaching fields).

8.8.2 Environmental Consequences

Alternative A – No Action

Impacts on Visual Resources

Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would leave open for public vehicle use some routes that are designated closed to protect Monument objects. The visual impact of routes designated for closure to restore landscape qualities would not be actively reclaimed. Visual impact of other existing or past management activities would continue to be noticeable in places and detract from the natural landscape character. Natural revegetation processes would eventually reduce visual impacts of landscape disturbances from roads on hillsides and past mining (i.e. Waterman stone quarry and airstrip, other disturbances). The visual quality of unmaintained roadways would include erosion patterns, ditches, gullies, and washouts, ruts, braiding tracks, widening travel-ways and eroded bare ground with likely vegetation damage. Though these conditions would be localized along the travel routes, their visual impact on viewers would tend to detract from the natural landscape along the travel routes. Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would allow visual impacts from unmaintained roads to increase over time from travel ways that become widened around impassable sections, and new bare spots and tracks, and new clearings created by unmanaged vehicle use. Some routes may become impassable and inaccessible to vehicles, and natural restoration processes may reduce visual impacts of those routes as vegetation cover colonizes the travel ways. Short-term visual impacts from travel management activities (road maintenance, site improvements, signing, etc.) would be noticeable from the project vicinity as projects are carried out. Visible dust plumes are likely to be generated by traffic producing fugitive dust on routes with unabated soils.

Cumulative Impacts on Visual Resources

Continued unrestricted motorized travel on designated administrative and closed roads, and on unmaintained roads, would add to the visual impact of past uses as well as to visual impacts of increased use resulting from future population growth and development in areas surrounding the Monument. When combined with impact from other past, present, and reasonably foreseeable actions, visual resources would continue to be impacted by unrestricted motorized travel on roads in the area.

Alternative B – Proposed Action

Impacts on Visual Resources

Implementing the proposed TMP would allow for strategic active reclamation of closed routes and restoration of damaged areas, improving the visual resource values of the Monument. In addition to improving visual resource values, the natural landscape character would be enhanced by strategic

implementation focused on areas with the largest amount of visitation, visually sensitive areas, and areas where small and inexpensive projects could make a large improvement. This alternative would supplement natural revegetation processes that would eventually reduce visual impacts of landscape disturbances from roads on hillsides and past mining (i.e. Waterman stone quarry and airstrip, other disturbances). Implementation of the proposed road maintenance and restoration work would improve existing erosion patterns, ditches, gullies, washouts, ruts, braiding tracks, widening travel-ways, and eroded bare ground.

Visual impacts of installing kiosks, signs, barriers, gates, fences, water bars and runouts, and of surfacing roads with aggregate, would be designed to blend in with the landscape so they are not noticeable in the middle ground or back ground views, and would be consistent with VRM Class II objectives. Maintenance projects which address existing transportation-related disturbances (erosion, potholes, cross-country vehicle tracks) with high visual contrast would be prioritized, especially those in areas of high public use or high visibility.

Cumulative Impacts on Cultural Resources

Cumulative impacts of the proposed action are not substantially different from direct or indirect impacts. When combined with impact from other past, present, and reasonably foreseeable actions, visual resources would continue to be impacted by unrestricted motorized travel on roads in the area but would be less degraded under the Proposed Action.

8.9 Lands Managed to Protect Wilderness Characteristics

8.9.1 Affected Environment

Several areas within the Monument were identified for management to protect wilderness characteristics (Map 10.8).

8.9.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Lands Managed to Protect Wilderness Characteristics

The route designations established concurrently with the IFNM RMP ROD avoided impacts to lands managed to protect wilderness characteristics. No roads are within lands managed to protect wilderness characteristics, thus road maintenance would not affect lands managed to protect wilderness characteristics.

Alternative B – Proposed Action

Impacts on Lands Managed to Protect Wilderness Characteristics

The route designations established concurrently with the IFNM RMP ROD avoided impacts to lands managed to protect wilderness characteristics. Proposed TMP projects requiring heavy equipment are

along existing roads and at sites damaged by previous use. Such existing evidence of human activity precluded these areas from designation to be managed to protect wilderness character. The TMP would not affect lands managed to protect wilderness characteristics.

8.10 Transportation and Access

8.10.1 Affected Environment

Most of the Monument lands were designated pursuant 43CFR8340 in the IFNM RMP as “Limited to Designated Roads and Trails” (117,520 acres), limiting motorized vehicle use to designated routes identified in Map 10.9. Several Monument areas were designated “Closed” (10,880 acres) to protect wildlife habitat and cultural resources, prohibiting motorized vehicle use year round. Access needs for the administration of the Monument and public use were evaluated in the RMP, and transportation routes were designated to accommodate motorized access for authorized and allowable public uses, and administrative purposes. The BLM transportation asset types were also identified in the RMP in Appendix D, with roads, primitive roads, administrative primitive roads and trails identified to accommodate the different types of access needs and different purposes in the Monument (see Map 9 of RMP).

The RMP identified:

Road: 42 miles

Primitive Road: 82 miles

Administrative Primitive Road: 118 miles

Trail (Non-Motorized): 90 miles

Reclamation: 17 miles

Monument Primitive Roads have not been adequately maintained since the Monument was established, and most of them are in poor condition. Drainage problems are common, with roadway erosion, and erosion on adjacent lands prevalent throughout the system. Monument routes are all unpaved natural soil surfaced roads, except for the Waterman Peak Rd. and the spur access road for the Titan II Missile Site, which are paved, or chip sealed.

County-maintained roads across the Monument have received maintenance periodically, but sections of roads in poor condition are present due to poor drainage, erosion, alignment, soils traversed, eroded low water crossings, and are prone to annual storm damage. Maintenance of routes under a BLM right of way is typically the responsibility of the right of way holder, with Sasco Road, Silverbell Road, Pump Station Road and Manville Road under county road rights of way. Monument access routes from the Interstates to the Monument are under the jurisdiction of Pinal or Pima Counties, depending on the route. Monument access routes serve general rural land access purposes and are paved or regularly maintained.

County-maintained paved roads include Avra Valley Road and Silverbell Road from the entrance to the Red Hill residential community.

Monument lands are highly intermingled with State Trust land, and to some extent are intermingled with private property. As a result, Monument access routes change in jurisdiction depending on land ownership.

8.10.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Transportation and Access

The route designations established in the Approved RMP would be implemented through signing and visitor information, but on-the-ground actions would be taken on an ad hoc and emergency basis. The Monument road system would remain in largely unmaintained condition, with poor road conditions and legal access issues remaining unresolved. Impacts of delaying road or primitive road maintenance would continue degradation of the travel ways and loss of access to Monument lands. Vehicles could become damaged or disabled by poor road conditions, potentially stranding travelers in an unfamiliar and rugged environment. Without the proposed site improvements, impacts from public use of existing pullouts, recreation sites and activity areas would degrade their function over time. Monument lands damaged by access, cross-country vehicle use, and past land use activities would remain as they are unless conditions create health and safety issues, and impacts on Monument objects would likely spread onto adjacent undisturbed land. Routes designated for use restrictions to protect Monument objects would remain physically open to vehicle use, though such use is prohibited, potentially leading to resource damage that limits access for the authorized user. Use of the existing route system would continue, and poor road conditions would persist, impairing access for administrative purposes and public use. Unresolved legal access issues may result in inadvertent trespass by Monument visitors. Impacts on Monument objects adjacent to unmaintained routes may occur as travelers drive around obstructions and sections left impassable by delayed maintenance, widening travel ways and proliferating impacts of vehicle use.

Cumulative Impacts on Transportation and Access

Continued unrestricted motorized travel on designative administrative and designated closed routes would add to the impacts of past use, as well as to impacts of increased use on the Monument resulting from future population growth and development in areas surrounding the Monument.

Impacts of delaying road or primitive road maintenance would continue degradation of the travel ways and loss of access to Monument lands. Vehicles could become damaged or disabled by poor road conditions, potentially stranding travelers in an unfamiliar and rugged environment. Without the proposed site improvements, impacts from public use of existing pullouts, recreation sites and activity areas would degrade their function over time.

Alternative B – Proposed Action

Impacts on Transportation and Access

Implementing the travel management designations established concurrently with the RMP would protect Monument objects, and provide access for administrative purposes, authorized users, and public use to achieve multiple management objectives. Monument visitor traffic would be concentrated along the designated Monument access routes, increasing current traffic levels on the designated routes.

Road maintenance projects would correct safety, road drainage, erosion, impassable water crossings, and other deficiencies depending on the road, and its access purposes, to accommodate the intended vehicle types. The proposed road maintenance would accommodate vehicle types depending on the RMZ, with passenger cars and minibus access to the Roaded Natural RMZ, and high clearance 4WD vehicle for the Semi-Primitive Motorized Zones. Routes maintained under Road maintenance guidelines would be reliably available to passenger cars, minivans and other vehicles requiring improved roads, expanding accessibility to recreation opportunities in the Monument. Some Monument visitors would encounter seasonally impassable road conditions due to washouts until repairs are made. Maintaining the roads to allow their intended access purposes would keep vehicle use on the roadway and in parking turnouts. Restoration of damaged lands and sites, and the installation of barriers to delineate parking turnouts would prevent further site degradation from transportation-related impacts. Providing and maintaining parking turnouts and signing at Monument portals would help educate visitors about road conditions to be encountered, promoting safety among users, and prevent impacts from unmanaged use. Acquiring legal access (i.e. easements, rights of way) on Monument Roads or Primitive Roads across non-federal land would provide for efficient road maintenance and law enforcement efforts by consolidating jurisdiction. Managing the Monument transportation network would increase the BLM's transportation maintenance responsibilities, and costs.

Installation of gates, barricades, and other closure devices to implement motor vehicle use restrictions would facilitate compliance and enforcement of travel management designations. Implementing route restrictions on administrative routes through a locking gate system would inconvenience authorized vehicle access. Non-motorized access would be safely accommodated in the design of the gates and closure devices.

Cumulative Impacts on Transportation and Access

The impacts of increased motorized recreational use on the Monument resulting from population growth and development in areas surrounding the Monument over time would likely increase the amount of traffic on maintained roads and improved sites.

8.11 Public Health and Safety

8.11.1 Affected Environment

Current Monument travel routes are primitive and conditions include eroded, washed out sections, loose roadbed material, extremely steep grades, impassable natural drainage crossings, obstructed sight

distance, narrow, irregular, rough and uneven travel ways, narrow vegetation clearance and tight horizontal and vertical curves. The condition of Monument roads and primitive roads present hazards that can lead to vehicle accidents that can cause resource damage, vehicle damage, or injury to travelers. The Monument is in the US-Mexico international border zone and within an area of ongoing intensive, interagency law enforcement operations to protect public safety and Monument objects from impacts of smuggling and trafficking. Several inactive or abandoned mine land (AML) sites are found in the monument along travel routes which present potential hazards to Monument visitors. Some of the AML sites have been remediated with gates, barricades and fences, and others are being assessed for remediation.

Potentially hazardous materials may be encountered at restoration sites located at former intensive target shooting sites, potentially exposing clean-up crews to hazardous materials or substances.

Because the Monument road system would be open to public use year round at all hours, it is vulnerable to illegal dumping activities along the access routes, which in the past have included hazardous materials in or near public activity areas. Public land law enforcement is provided by BLM Gila District Rangers. Law enforcement related to Arizona OHV regulations is provided by the Arizona Game and Fish Department and Pima and Pinal county Sheriffs. The nearest emergency medical services are available in Oro Valley and Casa Grande, and Tucson. Local fire suppression is provided by BLM Gila District resources stationed in Safford and Tucson. Local search and rescue, and fire protection districts which may assist with incidents and initial wildland fire response are located in Avra Valley and Tucson.

Unreliable or no cellular coverage is available on parts of the Monument west of the mountain ranges, making it difficult for Monument visitors to call for emergency services.

8.11.2 Environmental Consequences

Alternative A – No Action Alternative

Impacts on Public Health and Safety

Implementing road maintenance projects on an *ad-hoc* basis in response to emergencies would leave routes unable to accommodate fire suppression and other emergency response vehicles. Access for emergency utility work would be accommodated on a case-by-case basis, with guidelines applied to avoid or minimize impacts on Monument objects. Impassable road conditions are likely to persist throughout the Monument road system, increasing the likelihood of incidents compromising the safety of travelers.

Unrestricted access on routes leading to AML sites would continue, but remediation efforts under separate BLM action would protect public safety from AML hazards. Action to remediate potential hazards from illegal dumping would be taken promptly through BLM's normal procedures to prevent exposure to the public and personnel. Implementing the transportation and travel management decisions on an *ad-hoc* basis in response to emergencies would likely result in continued vehicle traffic on all routes, and continued fugitive dust from routes with natural soil surface. Fugitive dust may lead to vehicle collisions by reducing visibility along routes. Breathing in fugitive dust can cause or exacerbate respiratory conditions.

Continued public use on unmaintained Monument roads and primitive roads may result in visitors becoming stuck or stranded in remote areas, exposing visitors to desert heat and other environmental conditions that can threaten human health. Visitor information materials would highlight the risks and hazards of undeveloped primitive roads and areas, and promote awareness, preparation and self-reliance to avoid attracting visitors unprepared for the conditions likely to be encountered.

Cumulative Impacts on Public Health and Safety

There are no past or present actions that have impacted public health and safety. The direct and indirect impacts to public health and safety will continue under the No Action Alternative.

Alternative B – Proposed Action

Impacts on Public Health and Safety

Hazards related to the poor existing condition of Monument roads and primitive roads would be reduced within the next 5-10 years by the Monument-wide transportation route maintenance program. Priority road improvements would accommodate fire suppression and other emergency response vehicles. Installation of access controls or closure devices may introduce roadside objects that present hazards to travelers. Fixed barriers, fences, signs and other road related features or objects would be placed with adequate clearance and set back from the roadway, and would be designed and signed to avoid creating hazards or hazardous conditions. Potential hazards related to former target shooting sites that received intensive use would be identified, and safely remediated and cleaned up as part of the site re-use or site reclamation activities, depending on the location. Access to AML sites for remediation of hazards would be accommodated through phasing and coordination of management efforts, and selecting an appropriate access closure device (gates or barriers, see Appendix K). Information posted at Monument portal sites on the extant risks and hazards likely to be encountered by Monument visitors would promote preparation and safety, and reduce incidence of stranded travelers, road related accidents, and resource damage. Implementing the proposed plan would lower fugitive dust as some routes are closed to motorized traffic and some are converted to administrative use. This would reduce the likelihood of vehicle collisions caused by reduced visibility along routes, as well as the likelihood of health conditions from breathing in fugitive dust.

Road maintenance projects would accommodate access for fire suppression and other emergency response vehicles, and would reduce the likelihood of visitors becoming stuck or stranded and being exposed to desert heat and other environmental conditions that can threaten human health.

Cumulative Impacts on Public Health and Safety

There are no past or present actions that have impacted public health and safety. Under the Proposed Action public health and safety concerns would be greatly reduced on the IFNM.

9.0 CONSULATATION AND COORDINATION

Tohono O'odham Nation

Arizona Game and Fish Department (AZGFD)

Arizona State Lands Department (ASLD)

APS

ASARCO

El Paso Gas

Friends of Ironwood Forest

Humane Borders

Pima County

Pinal County

Tucson Electric Power (TEP)

Trico Electric

US Border Patrol (Tucson and Casa Grande Sectors)

Grazing Permit holders

Right-of-Way holders

Special Use Permit holders

Recreational users

10.0 LIST OF PREPARERS/INTERDISCIPLINARY EVALUATION TEAM

Table 10. List of Preparers/Reviewers

Name	Title	Responsible for the Following Program
Claire Crow	Monument Manager	Project Oversight
Francisco Mendoza	Outdoor Recreation Planner	Recreation, Travel Management, Wilderness Characteristics, Visual Resources
Darrell Tersey	Natural Resource Specialist	Special Status Animals, Special Status Plants, Wildlife, Vegetation, Invasive Species, Range Management
William (Bill) Gibson	Outdoor Recreation Planner (OHV) (Arizona State Lead)	Travel Management
Chris Horyza	Environmental Coordinator (Retired)	NEPA Compliance
Don Applegate	Outdoor Recreation Planner (Arizona State Lead)	Outdoor Recreation
Jackie Neckels	Planning and Environmental Specialist (Arizona State Lead)	NEPA Compliance
Nancy Favour	Planning and Environmental Specialist (Arizona State Lead)	NEPA Writer Editor
Amy Sobiech	Archaeologist	Cultural Resources and Native American Consultation
Amy Markstein	Assistant Planning Team Leader	NEPA Compliance
Dan Moore	Geologist	Air Quality, Minerals, Soils, Water
Keith Hughes	Natural Resource Specialist	Abandoned Mine Lands, Desert Tortoise
Linda Dunlavey	Realty Specialist	Lands and Realty
John Swift	Supervisory Maintenance and Operations	Facility Maintenance
Dan Quintana	Fuels Program Manager	Wildland Fire Access
Laura Olais	Public Contact	Editorial Review

BIBLIOGRAPHY

Averill-Murray, A., and R.C. Averill-Murray. 2002. Distribution and density of desert tortoises at Ironwood Forest National Monument, with notes on other vertebrates. Nongame and Endangered Wildlife Program Technical Report 193. Prepared for Arizona Game and Fish Department, Phoenix. 53 p.

Belnap, J., J. H. Kaltnecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil crusts: Ecology and management. U.S. Department of the Interior, Bureau of Land Management.

Brown, D.E. 1994. *Biotic Communities: Southwestern United States and Northwestern Mexico*. Salt Lake City: University of Utah Press. 342 p.

Brown, D.E., C.H. Lowe, and C.P. Pace. 1979. A digitized classification system for the biotic communities of North America, with community (series) and association examples for the southwest. Appendix I in *Biotic Communities: Southwestern United States and Northwestern Mexico*, edited by D.E. Brown. Salt Lake City: University of Utah Press.

Dimmitt, Mark A., Thomas R. Van Devender, and J.F. Wiens. 2003. Task 1a: Vegetation Analysis. In Biological Survey of Ironwood Forest National Monument, Arizona-Sonora Desert Museum, Tucson, Arizona. Prepared for the Bureau of Land Management Tucson Field Office. July 16.

Fischler, Benjamin R., and Jean W. French. 2007. *Class III Cultural Resources Inventory of Corridors Adjacent to 80 Miles of Primitive Roads within Ironwood Forest National Monument, Pima and Pinal Counties, Arizona*. Baltimore, Maryland: Cultural Site Research and Management.

Hoffmeister, D.F. 1986. *Mammals of Arizona*. University of Arizona Press, Tucson, and Arizona Game and Fish Department, Phoenix. 602 p.

Jansen, B. 2004. Personal communication between Barbara Garrison, URS Corporation Biologist, and B. Jansen, University of Arizona. 2004.

Kade, A., and S. D. Warren. 2002. "Soil and Plant Recovery after Historic Military Disturbances in the Sonoran Desert, USA." In *Arid Land Research and Management* 16:231-243.

Natural Resource Conservation Service (NRCS). 2003. Soil Survey of Pima County, Arizona, Eastern Part.

_____. 1999. Soil Survey of Tohono O'odham Nation, Arizona, Parts of Maricopa, Pima, and Pinal Counties. U.S. Department of Agriculture, Soils Conservation Service (now Natural Resource Conservation Service). 350 p. plus maps.

_____. 1991. Soil Survey for Pinal County, Arizona, Western Part. U.S. Department of Agriculture, Soils Conservation Service (now Natural Resource Conservation Service). 154 p. plus maps.

Phillips, A.R. 1964. *Birds of Arizona*. Tucson, Arizona: University of Arizona Press.

Reid, Jefferson, and Stephanie Whittlesey. 1997. *The Archaeology of Ancient Arizona*. Tucson: University of Arizona Press.

Rosen, P.C. 2003. Biological survey of Ironwood Forest National Monument, Task 2b: Distribution and ecology of amphibians and reptiles at Ironwood Forest National Monument. Desert Iguana, Chuckwalla, and Desert Tortoise. Final report prepared for Bureau of Land Management, Tucson Field Office. 56 p.

Scarborough, Robert 2003. Biological Survey of Ironwood Forest National Monument – Geological Aspects of the Ironwood Forest National Monument. Arizona-Sonora Desert Museum Programs and Research.

Scarborough, Robert. 2002. Geologic Aspects of Ironwood Forest National Monument. Tucson: Arizona-Sonora Desert Museum. 15 p. Available at: http://www.desertmuseum.org/programs/ifnmm_geology.htm.

Shreve F. 1951. *Vegetation and Flora of the Sonoran Desert*. Volume I. Vegetation. Carnegie Institution of Washington Publication 591. 192 p.

Tarango, Luis A., Paul R. Krausman, Raul Valdez, and Robert M. Kattnuig. 2002. Desert Bighorn Sheep Diets in Northwestern Sonora, Mexico. *Journal of Range Management*. Volume 55, No. 6, pp. 530-534.

Whitney, Gregory J., Jeffrey P. Charest, and Michael W. Lindeman. 2008. A Class III Cultural Resources Inventory of Selected Road Segments Within and Immediately Adjacent to the Ironwood Forest National Monument, Arizona. Project Report 07-134. Tucson, Arizona: Desert Archaeology.