ENVIRONMENTAL ASSESSMENT
Drake Cement Limestone Quarry Project
Prescott National Forest

Project proponent:
Drake Cement, LLC

For submittal to:
United States Department of Agriculture
Forest Service
Southwestern Region
Prescott National Forest

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ACRONYMS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
APS	Arizona Public Service Company
AUM	Animal Unit Month
BACT	Best Available Control Technology
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CR	County Road
dB	Decibel
dBA	Decibel A-weighted
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
FR	Forest Road
FSH	Forest Service Handbook
FSM	Forest Service Manual
GLO	General Land Office
ID	Inter-disciplinary
MCL	Maximum Containment Level
MIS	Management Indicator Species
MOU	Memorandum of Understanding
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPS	National Park Service
NRHP	National Register of Historic Places
PIF	Partners in Flight
PNF	Prescott National Forest
PoO	Plan of Operations
PRAMA	Prescott Active Management Area
PSD	Prevention of Significant Deterioration
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Office
SMS	Scenery Management System
SR	State Route
USC	United State Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VMS	Visual Management System
VOC	Volatile Organic Compound
VQO	Visual Quality Objective
WSC	Wildlife Species of Concern

CHAPTER 1 – INTRODUCTION

1.1 Document Structure and Purpose

The U.S. Department of Agriculture (USDA) Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This document consists of an overview of the proposed Drake Cement Limestone Quarry and alternatives to it, as well as a comparison of effects of implementing the proposal and alternatives. Chapter 1 introduces the proposed project, provides information about the project's purpose and need, describes the Forest Service's decision framework, and summarizes the public involvement process. Chapter 2 describes the Proposed Action in detail and alternatives to the Proposed Action. These alternatives were developed based on key issues raised by the public and agencies. This discussion also includes proposed mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative. Chapter 3 describes in detail the affected environment and related environmental consequences that are associated with each alternative. Chapter 4 includes the consultation and coordination efforts that were completed during the NEPA process, and a listing of those persons, agencies, and tribes that have been involved in the project and the preparation of this EA.

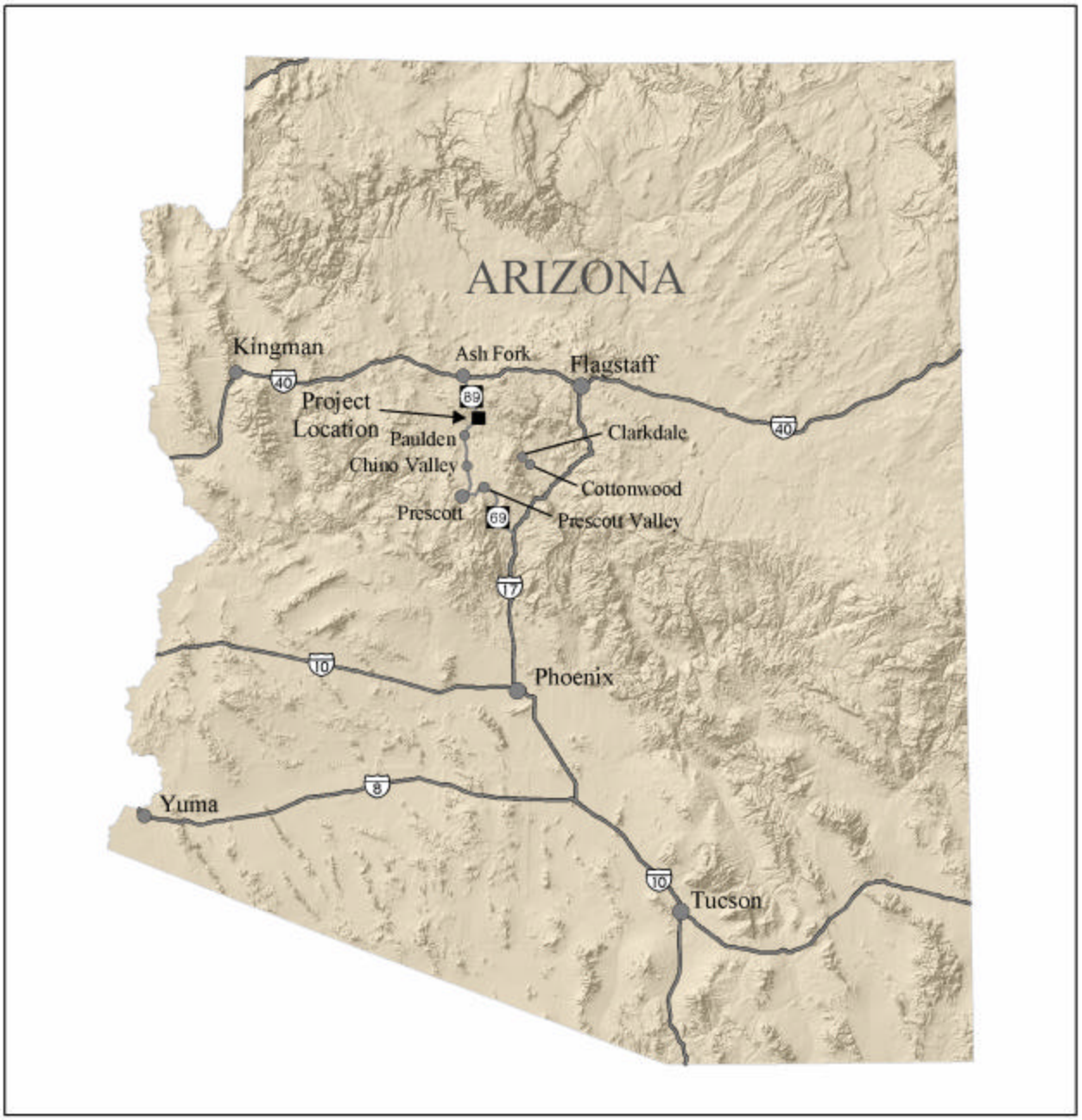
1.2 Project Record Location and Incorporation by Reference

This EA incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports and other technical documentation used to support the analysis and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Cultural Resources Inventory Report, Wildlife Specialists Report, Biological Assessment, and Roads Analysis Report.

This document relies on specialist reports and the project record to implement the Council on Environmental Quality (CEQ) Regulations' provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), and that NEPA documents be analytic rather than encyclopedic and kept concise (40 CFR 1502.2). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The project record is located at the Cortez Office, 344 S. Cortez Street, Prescott, Arizona 86303, and is available for review.

1.3 Background

Drake Cement, LLC (Drake Cement) plans to operate a limestone quarry within the Prescott National Forest (PNF) near Drake, Arizona. The proposed quarry is approximately 5 miles north of Paulden, Arizona, about 1 mile east of Arizona State Route (SR) 89. Portions of Sections 31 and 32, Township 19 North, Range 1 West and Section 5 and 6, Township 18 North, Range 1 West in Yavapai County are involved. The location of the proposed facilities is depicted on the Project Vicinity Map (Figure 1-1) and the Project Area Map (Figure 1-2). The project site is composed entirely of PNF lands, which are currently used mostly for ranching activities, mining activities, and dispersed recreation. Features adjacent to the project area include ranching infrastructure, SR 89, County Road (CR) 71, various Forest roads, a gas pipeline, electrical transmission lines, the Burlington Santa Fe Railroad line, and a flagstone storage and processing facility.



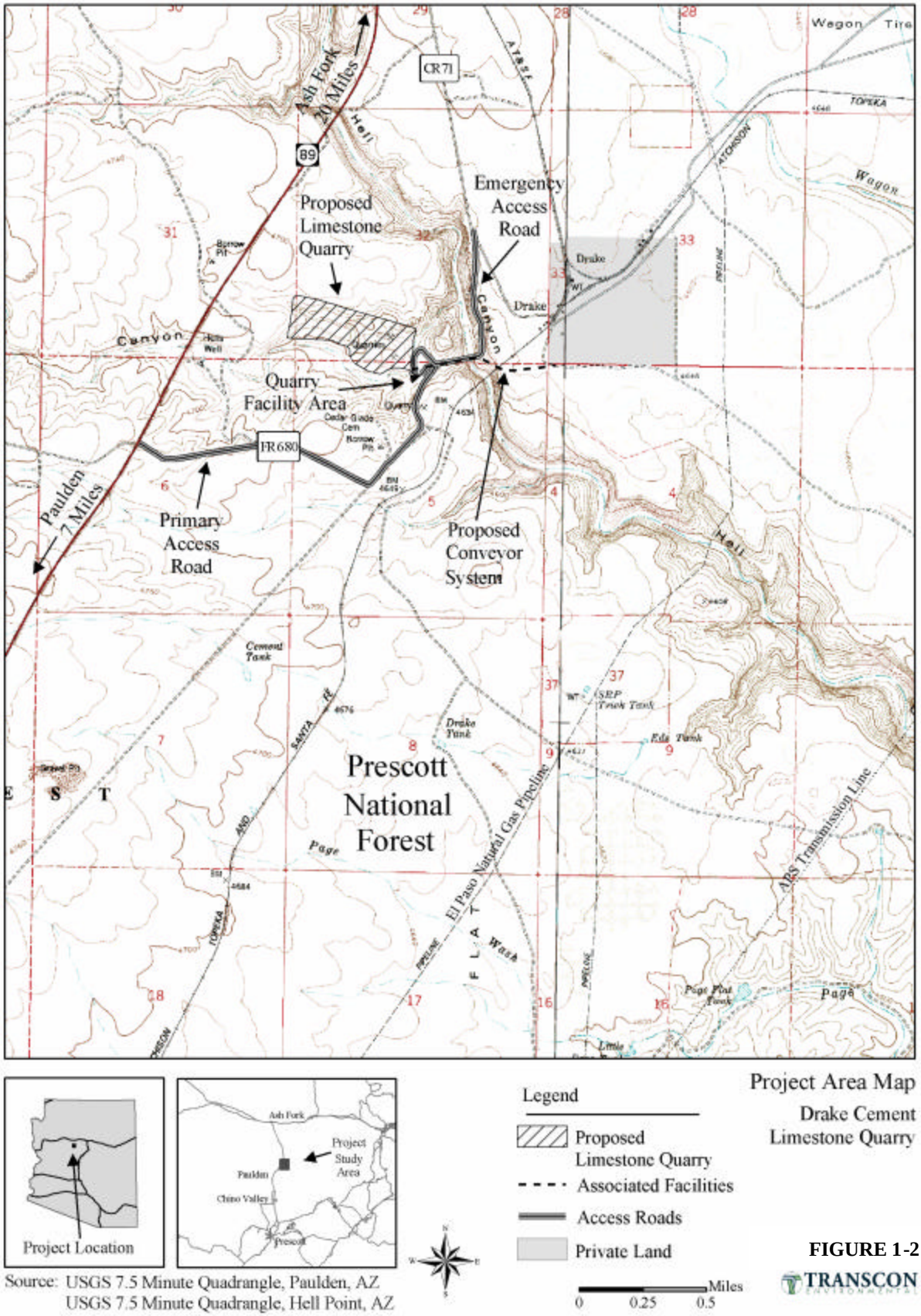
Project Vicinity Map

Drake Cement
Limestone Quarry

0 50 Miles

FIGURE 1-1

TRANSCON ENVIRONMENTAL



Source: USGS 7.5 Minute Quadrangle, Paulden, AZ
USGS 7.5 Minute Quadrangle, Hell Point, AZ

Project Area Map
Drake Cement Limestone Quarry

FIGURE 1-2

TRANSCON

Limestone mining has been conducted in this location since around 1880, and on and off again through 1985, affecting about 10 acres. Historic mining activities (i.e. surface disturbances) and numerous existing roads are evident on and in the vicinity of the limestone quarry. In 2002, an unaffiliated company named Stirling Bridge proposed limestone mining activities at this location and a cement plant and electrical cogeneration facilities on nearby private land. That project was never initiated. Subsequently, Drake Cement acquired the mining claims and private land from Stirling Bridge and has recently prepared and submitted a Plan of Operations (PoO) to the PNF detailing their 10-year plan to mine limestone in this area. This PoO was developed in accordance with the Forest Service surface use regulations (36 CFR 228, Subpart A). Drake Cement proposes to develop approximately 70 acres of mining claims over a 10 year timeframe. The lands occupied by mining claims are currently administered by the PNF Chino Valley Ranger District. Drake Cement has indicated that they are also planning to construct a cement plant on the private land within the Drake townsite, but are not proposing electrical cogeneration facilities at that location.

The Chino Valley District Ranger has reviewed the PoO and has determined the need for NEPA compliance. As lead federal agency for this action under NEPA, the USDA Forest Service is responsible for ensuring that potential adverse environmental effects on federal lands and resources are avoided or minimized. As stated in the PNF Land and Resource Management Plan, management direction for minerals is to "Administer the mineral laws and regulations to minimize surface resource impacts while supporting sound energy and minerals exploration and development" (PNF 1986). The EA is being prepared in compliance with NEPA, CEQ Regulations (40 CFR 1500-1508).

1.4 Purpose and Need for Action

Drake Cement has filed claims for limestone deposits on National Forest System lands. These deposits are defined as locatable minerals and are managed by the Secretary of the Interior. The Forest Service is responsible for examining plans to quarry or mine these materials and ensure that environmental impacts are minimized. As stated in the PoO, the project proponent desires to mine limestone at this site to meet current and projected regional needs for raw material required in the production of cement.

The Mining Law of 1872 states that all valuable mineral deposits in Public Domain lands of the United States are to be free and open to exploration and development (30 USC 22, 28). The Forest Service administers such exploration and development on National Forest System lands under mining regulations defined in 36 CFR 228, Subpart A. Mine operators planning mineral exploration and development activities which are likely to cause significant disturbances to surface resources are required to submit a PoO for review by the District Ranger (36 CFR 228.4(a)). The purpose of agency review of the PoO is to prevent undue and unnecessary disturbances to the surface resources (36 CFR 228.5(a).3) while ensuring the operator may conduct necessary activities for developing mineral resources.

1.5 Proposed Action

As detailed in the PoO, Drake Cement is proposing to conduct limestone extraction activities by reactivating and developing an old quarry and expanding it further to the west-northwest. As proposed, limestone quarried at the site would be crushed and transported across Hell Canyon via a conveyance system to the site of a future cement plant or transfer facility near the former townsite of Drake. In addition to the quarry and conveyor system, other primary project elements include a quarry facility operations area and access road improvements (refer to Figure 1-2).

As described in the PoO, the project would involve the extraction of limestone from an abandoned quarry that would be expanded to approximately 55 acres. Drake Cement estimates that approximately 1,000,000 tons of limestone will be extracted from the quarry on an annual basis. The quarry operation would

consist of several general phases occurring simultaneously: 1) removal of the vegetation; 2) stripping and salvage of the topsoil; 3) stripping and placement of overburden into staging areas or final reclamation areas in the pit; 4) drilling and blasting; 5) loading and hauling to the primary crusher located in the pit; 6) primary crushing; 7) transport crushed raw material (limestone) offsite via an overland conveyor system; and 8) reclamation. Although the quarry area is approximately 55 acres in size, only about 15 to 20 acres would be disturbed at any one time. Reclamation activities would occur throughout the 10-year plan.

An adjacent quarry operations facility would include a designated parking area, a small portable (modular) office-lunch building, portable storage buildings, portable toilets, a 2,500 gallon fuel tank and concrete pad to fuel and service vehicles and equipment, and a 12,000 gallon water storage tank. The quarry facility area would cover approximately 0.5 acre.

As proposed, the conveyance mechanism is approximately 0.6 mile in length and up to 10 feet wide. The conveyor belt is proposed to be approximately 3 feet wide and portions of the conveyor apparatus would include walkways adjacent to the conveyor. The conveyor system consists of three linked conveyers that would be used to move the rock from the quarry to the parcel of private land near Drake. It is proposed that the conveyer system would cross Hell Canyon on the existing, but abandoned, concrete highway bridge and go under the currently used Atchison, Topeka and Santa Fe Hell Canyon railroad trestle. The height of the conveyance system would vary based on the underlying topography and engineering requirements. As it crosses the old Highway 89 Hell Canyon Bridge, it would be 4 feet above the surface of the bridge. A corridor of 10 to 100 feet in width would be required adjacent to the portions of the conveyer located between the quarry and the old highway bridge and between the top of the east side of Hell Canyon and the private property. Based on these assumptions, ground disturbance associated with the conveyor system would be expected to be about 2.6 acres.

Primary access to the proposed quarry would extend from SR 89 via Forest Service Road (FR) 680 and FR 9711F (also known as the old Highway 89). Most of the existing access road to the quarry has been crowned and ditched or graded in the past, although re-grading and improvements at wash crossings would likely be required. Near the quarry, a new access road less than 1,000 feet long is proposed to enable access to the quarry operation facility area. Drake Cement also proposes to improve the existing road near the quarry and another portion of the old Highway 89 on the east side of Hell Canyon as emergency access routes. Drake Cement has proposed to improve the existing roads and construct the new road per Forest Service road specification standards. These road improvements and new construction would cause about 7.0 acres of ground disturbance.

If this action is approved, the Forest Plan would be amended to allow the management of visual resources to be compatible with the existing and proposed activities. Specifically, 63 acres of Partial Retention and 8 acres of Retention would be amended to Modification. The Proposed Action cannot be further modified to decrease the visual impact below the existing Visual Quality Objective (VQO).

1.6 Decision Framework

Based on the analysis disclosed in the EA, the Forest Supervisor (Deciding Officer) of the PNF can: 1) select an action alternative that has been considered in detail, 2) select a modified action alternative, or 3) require that an Environmental Impact Statement be prepared for the project. As required by the NEPA, the Forest Service is also required to evaluate a No Action Alternative; however, the Forest Supervisor cannot select this alternative because, under the 1872 Mining Law, the PNF is obligated to accept and analyze the project proposal and authorize mining activities to occur with appropriate mitigation. The No Action Alternative will be used as a baseline of comparison to which action alternatives can be compared.

The Responsible Official will determine 1) what mitigation measures and monitoring requirements the Forest Service will require; and 2) if additional environmental documentation is needed. Implementing this project will require a non-significant Forest Plan Amendment (changing the existing Visual Management System (VMS) classification for about 71 acres from Partial Retention (63 acres) and Retention (8 acres) to Modification). This amendment has been determined to be a non-significant Forest Plan Amendment and is included in Appendix C.

1.6.1 Applicable Laws and Executive Orders

USDA Forest Service Administration of the General Mining Law of 1872

Mining on public lands is authorized under the 1872 Mining Law (as amended) (30 USC §§ 21-42), the Mining and Minerals Policy Act of 1970 (30 USCA § 21a), Federal Land Policy and Management Act (FLPMA) of 1976 (as amended) (43 USCA §§ 1701-84), and the National Materials and Minerals Policy, Research and Development Act of 1980 (30 USCA §§ 1601-05). The Forest Service's regulatory responsibilities for oversight of mining activities on federal lands are set forth in the Forest Service Surface Use Regulations (36 CFR 228, Subpart A–also known as the 228 Regulations), which provides rules and procedures for use of the surface of National Forest System lands in connection with mineral operations. These regulations direct the Forest Service to prepare the appropriate level of NEPA analysis and documentation when proposed operations may significantly affect surface resources. These regulations do not allow the Forest Service to deny entry or preempt the miner's statutory rights granted under the 1872 Mining Law. The regulations state that an operator is entitled to access in connection with the operation, and that access must be approved in writing before use can begin. The regulations also require the Forest Service to develop mitigation measures to minimize adverse impacts on National Forest resources and include requirements for reclamation.

The Forest Service Manual (FSM) 2800 also discusses specific responsibilities and considerations for dealing with a PoO. It states that the Forest Service should minimize or prevent adverse impacts related or incidental to mining by imposing reasonable conditions that do not materially interfere with operations. It also requires the Forest Service to evaluate proposals for road construction and reconstruction and consider alternatives that may be less damaging to surface resources (FSM 2817.25).

Other State and Federal Laws and Executive Orders

For other specific regulatory programs, the Forest Service operates in compliance with state and other federal regulatory agencies. Shown below is a partial list of other federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Arizona. Disclosures and findings required by these laws and orders are contained in Chapters 2 and 3 of the EA.

- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act of 1976 (as amended)
- Multiple-Use Sustained-Yield Act of 1960
- Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended)
- Endangered Species Act (ESA) of 1973 (as amended)
- Wild and Scenic Rivers Act of 1968, (as amended)
- Wilderness Act of 1964
- Clean Water Act of 1977 (as amended)
- Clean Air Act of 1970 (as amended)
- National Historic Preservation Act of 1966 (as amended)
- American Indian Religious Freedom Act of 1978

- Archeological Resource Protection Act of 1980
- Executive Order 11593 (cultural resources)
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13186 (Migratory Bird Treaty Act)

1.7 Public Involvement

1.7.1 Process and Results

The proposal was first listed in the October 2004 Schedule of Proposed Actions for the PNF. The proposal was provided in writing to the public and other agencies for a 30-day comment period during project scoping in October and November 2004. Thirty-five letters, e-mails, and phone calls were received as a result of this scoping.

A second public comment document (known as the 30-day review document) was prepared for the project. This document consisted of the first 2 chapters (in draft form) of the EA, and included the project proposal, alternatives, and a summary table of the environmental consequences associated with each alternative. The document was provided to the public for a 30-day review period during November and December 2005. During this time, 26 letters, e-mails, and phone calls were received.

1.7.2 Public Issues

Comments received as a result of the scoping process were analyzed by the project Inter-disciplinary (ID) Team to determine issues. The Forest Service's definition of an issue is: "A point of discussion, debate, or dispute with a proposed action based on some anticipated environmental effect." Issues are used to develop alternatives, mitigation measures, or analyze environmental effects.

The Forest Service separates public issues into two groups: those that are significant to the environmental analysis and those that are not (non-significant issues). The CEQ regulations specify that environmental analysis focus on significant issues. Issues determined not to be significant shall be discussed only briefly and eliminated from detailed study [40 CFR 1500.1(b), 1500.4(C), 1501.7(3), and 1502.2(B)].

To be considered non-significant, an issue must meet one or more of the following criteria:

1. The issue is outside the scope of the Proposed Action.
2. The issue is already decided by law, regulation, Forest Plan, or other higher-level decision.
3. The issue is irrelevant to the decision to be made.
4. The issue is conjectural and not supported by scientific (or factual) evidence.

The significant issues are analyzed in Chapter 3 of the EA and will be considered in the decision making process.

1.7.3 Significant Public Issues

Table 1-1 depicts significant public issues resulting from an ID Team review of the public scoping comments.

Table 1-1 Significant Public Issues and Evaluation Criteria		
Issue	**Issue Statement**	**Primary Evaluation Criteria**
Watershed Impacts	The limestone quarry will negatively impact the watersheds of Limestone Canyon, Hell Canyon, and the Verde River, especially stream flow, water quality, plant and animal species, and human culture.	Effects on drainage pattern of the area, including through the alteration of a wash, stream, or river resulting in: 1) substantial erosion or siltation; or 2) substantial increase in the rate or amount of surface runoff. Creation or contribution of runoff water, especially additional sources of polluted runoff. Degradation of water quality. Compliance with Environmental Protection Agency (EPA), Arizona Department of Environmental Quality (ADEQ), and Arizona Department of Water Resources (ADWR) regulations regarding erosion control and storm water management. Effects to the "outstandingly remarkable values" of the portion of the Verde River eligible for Wild and Scenic River designation. Effects to plant and wildlife species.
Transportation Impacts	Increased vehicle traffic (especially truck traffic) on SR 89 due to quarry operations would cause traffic congestion and safety concerns.	Effects on the local population and demographics; impacts on infrastructure, including requirements for improvements and costs; increased risk of accidents. Historic and projected traffic counts for SR 89.
Wildlife Impacts	The project will disrupt and have negative impacts on wildlife.	Nature and extent of impacts on habitat and wildlife as a result of quarry and other facilities construction, operation, and maintenance. Effects of the Proposed Action on ecosystems includes: 1) effects on native vegetation; 2) effects on protected plants and animals (Forest Service sensitive, threatened or endangered species and habitats, management indicator species, migratory birds, and species of concern).
Riparian Area Impacts	The project will disrupt and have negative impacts on riparian areas within the project area.	Effects on wetland areas or aquatic habitat due to changes in stream flow and sediment loadings from quarry construction, operation, and closure; short and long-term impacts on aquatic habitat or wildlife from spills, leaks, or other failures of quarry facilities.
Landscape Impacts	The project will disfigure the landscape.	Effects of the Proposed Action on visual resources include the following: 1) qualitative evaluation of the federal lands' visual quality and whether the foreseeable uses are consistent with established visual quality objectives of surrounding forest lands; 2) effects to views from travel routes and recreation areas; and 3) effects to scenic resources, including historic structures or other locally recognized desirable aesthetic natural feature.

Table 1-1 Significant Public Issues and Evaluation Criteria		
Issue	**Issue Statement**	**Primary Evaluation Criteria**
Air Quality Impacts	Quarrying and associated activities will decrease the air quality, especially in nearby Class I airsheds (e.g., Sycamore Canyon Wilderness Area).	Nature and extent of air quality impacts as a result of quarry and other facilities construction, operation, and maintenance. Effects to sensitive receptors from substantial pollution concentrations. Compliance with local, state and federal regulations regarding air quality.
Public Access Impacts	Access to Hell Canyon (for hunting, hiking, etc.) will be limited at the location of the proposed project.	Effects to recreation and public access. Effects of the potential loss or modification to trails leading into Hell Canyon.
Impacts to Historic Properties	Quarry construction will negatively affect local historic resources.	Evaluation of the number and eligibility of sites impacted on federal lands. Effects of a substantial adverse change in the significance of a historical or archaeological resource. Mitigation for eligible historical or archaeological sites.

Additional environmental components to be considered in this EA include geologic hazards, soils, minerals, wilderness resources, wild and scenic rivers, noise, fire hazards, recreation, land use, and a variety of social and economic factors.

1.7.4 Non-significant Public Issues

One issue identified during the public scoping process was determined to be non-significant. The issue dealt with groundwater depletion and the issue statement is: "The proposed cement plant adjacent to the proposed quarry will pump excessive amounts of groundwater and affect water flow in the Verde River". This public issue was determined to be non-significant because it is outside the scope of the Proposed Action. The proposed cement plant is located on private land and is, therefore, not under the purview of the PNF. Activities on the private land near the Drake townsite, as well as other past, present, and reasonably foreseeable projects in the area will be addressed as cumulative effects in this EA.

CHAPTER 2 – ALTERNATIVES

Chapter 2 describes alternatives the Forest Service considered in addition to the Proposed Action. It also compares each alternative.

2.1 Alternative Development Process

The range of alternatives developed and analyzed by the ID Team was driven by the purpose and need underlying the Proposed Action, and by the significant public issues raised in response to the Proposed Action. An alternative to the Proposed Action should: 1) reasonably respond to the purpose and need, and 2) address one or more key issues. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The ID Team considered three additional alternatives to the Proposed Action. Following internal review, these three alternatives were eliminated from detailed study for the reasons stated in Section 2.2.3.

2.2 Description of Alternatives

2.2.1 Alternative A – No Action

Under Alternative A – No Action, no activity would be undertaken by the project proponent. Although under the 1872 Mining Law the Forest Service cannot deny the proponent the right to work their mining claims, this alternative is analyzed in detail to provide a baseline of comparison for the action alternative.

2.2.2 Alternative B – Proposed Action

Under Alternative B – Proposed Action, project components would include the quarry, a quarry facility area where quarry support activities would be located, an overland conveyor, and access roads. These project components would involve approximately 71 acres, of which about 60 acres would be new disturbance. In year 10 of this plan, the size of the quarry would be approximately 55 acres. Figure 2-1 depicts the proposed project facilities on an aerial photograph of the project area. Each of the primary project elements are described in the remainder of this section. Implementing the Proposed Action would involve a non-significant, project-specific Forest Plan Amendment (Appendix C) changing the existing VMS classification for about 8 acres of Retention and 63 acres of Partial Retention to 71 acres of Modification.

Insert Figure 2-1, Major Project Elements

Limestone Quarry

The proposed quarry would be located in Sections 31 and 32, Township 19 North, Range 1 West, Gila and Salt River Baseline and Meridian on unpatented mining claims (Table 2-1).

Table 2-1 Drake Cement Limestone Quarry Mining Claim Information

Claim No.	BLM AMC No.	Legal Description	Book/Page	Recording No.
37	354001	Section 32, T19N, R1W	3773/976	3281414
38	354194	Section 32, T19N, R1W	3791/317	3301903
39	354195	Section 32, T19N, R1W	3791/318	3301904
40	354002	Section 32, T19N, R1W	3773/977	3281415
45	354200	Section 32, T19N, R1W	3791/323	3301909
46	354201	Section 32, T19N, R1W	3791/324	3301910
47	354202	Section 32, T19N, R1W	3791/325	3301911
66	354212	Section 5, T18N, R1W	3791/335	3301921

Note: Book/Page and Recording No. are Yavapai County Recorder's filings

Drake Cement has identified several types and grades of limestone in the proposed quarry that would meet specifications for the various grades of Portland cement. Drake Cement proposes three to four major sequences delineated primarily by phases when topsoil and overburden are removed from the surface to accommodate the progression of mining. During the 10-year proposed PoO, the quarry or pit would progress continuously from east to west. The overburden and some of the limestone would be placed in staging areas or mined-out areas within the quarry pit. Once overburden is placed in its final configuration it would be graded and reclaimed within the pit. The full extent of the proposed 55 acre quarry is depicted on the PoO map in Appendix A, although the final quarry topography would be different because partial backfilling and reclamation activities would be performed with the progression of the pit.

The quarry operation would consist of the following activities during each sequence:

1. Removing vegetation
2. Removing and salvaging topsoil and overburden
3. Drilling and blasting
4. Loading and hauling material to the primary crusher
5. Primary crushing
6. Transporting crushed raw material (limestone) offsite via an overland conveyor system

Except for dust control, these activities represent a dry process and do not consume any water. As proposed, the mining activities would not involve any type of chemical processing. Total water consumption is expected to be approximately 8 acre feet per year.

The following equipment is proposed for the mining activities:

- Impact crusher with receiving hopper, apron feeder, vibrating screen and dust control
- Two rubber-tire front end loaders
- Three heavy duty haul trucks, and one water truck
- One tracked rotary drilling machine
- Two diesel-powered electrical generators

Removing Vegetation

Trees and vegetation would be removed from areas within the proposed quarry in 5 to 20 acre increments in advance of mining operations. Vegetation would be removed by clearing and grubbing those areas with tracked dozers or crawlers. Cleared vegetation would be disposed of at the time of clearing consistent with Forest Service recommendations, which may include burning or chipping.

Removing and Salvage of the Topsoil and Overburden

At commencement of operations, approximately 10 to 20 acres would be mined on the eastern third of the proposed quarry pit. Approximately 3 acres of this area have already been mined to a floor elevation of approximately 4,550 feet above Mean Sea Level (MSL). The area just to the west and above the existing working faces has only minor quantities of overburden. Since the pit would need to be lowered on this end before backfill or stockpiles can be placed there, the topsoil and any overburden would be excavated and moved into stockpiles.

Once operations requiring a pushback of the working faces of the pit have been completed and the initial phase of the pit has been mined to its floor elevation, another sequence of topsoil and overburden stripping would be undertaken. Previously stockpiled and new topsoil and overburden would then be excavated from the next sequence of the pit. Depending upon material balances of both raw material and overburden, this could include between 5 and 20 acres. Topsoil and overburden would be removed here and either placed on surfaces within the pit that have been completed, or stockpiled or staged for final reclamation in the pit.

The removal of overburden would be performed periodically, perhaps every 1 to 3 years, to make additional limestone strata face available for blasting. Removal of the overburden is expected to vary in depth from 5 to 80 feet. The overburden would be handled by a rubber tire front-end loader and transported by truck to stockpiles or reclamation areas within the footprint of the proposed quarry. Material that meets cement-quality raw material specifications may be processed through a portable screening plant to separate the gravels from the clays. A portion of the undersize clays could be used in the manufacturing process as a source of alumina, silica, and iron; the remainder would be used for topsoil for the reclamation.

Drilling and Blasting

As proposed, two types of drilling would be conducted within the footprint of the proposed 10-year mine: confirmation drilling and blast hole drilling. Confirmation drilling would be conducted in advance of mining to develop more detailed geology of the deposit and would use reverse circulation or core drilling. No blasting is associated with this activity. Blast hole drilling would consist of an array of holes drilled to place explosives and blast the limestone. Drilling and blasting would be conducted during normal working hours. In undeveloped areas, site preparation is required to get the drill into position before drilling commences. This requires a dozer or loader to prepare a road or level pad on which to set the drill rig. The drill patterns consisting of the amount of holes, spacing and number of rows to produce a desired tonnage after detonation would be designed to each specific blast. The geology of the material to be broken is the most important factor in determining the overall blast design. Borehole diameter, hole spacing, and burden would change as varied conditions such as stratification or thick basalt are encountered. Blasting would be conducted approximately once per week or four times per month.

Loading and Hauling

Blasted limestone rubble would be loaded into 2 or 3 heavy duty haul trucks using 1 or 2 front-end loaders. The haul trucks would then transport the limestone to the primary crusher located on the south-east corner of the quarry. Limestone loading operations would normally occur 48 to 50 hours per week.

Crushing

Primary crushing would be done with an impact crusher, or similar equipment. The crusher would initially be located in the southeast corner of the quarry. The crusher includes a receiving hopper, apron feeder and vibrating screen placed on a concrete foundation in the pit. The limestone material would be crushed to about 3 inches in size, and discharged directly onto the overland conveyor belt for transport offsite (conveyor facilities are described below). Primary crushing operations would normally occur 48 to 50 hours per week.

Dust Control

Dust is produced during quarry activities (drilling, blasting, and truck loading), conveying systems, and vehicle traffic on paved and unpaved roads. Drake Cement air permit requires implementation of Best Available Control Technology (BACT) to reduce dust emissions. The technology proposed by Drake Cement and approved by ADEQ involves the following:

- Fabric dust collectors on confined (enclosed) conveyor system transfer points
- Water sprays for unpaved and paved roads
- Vehicle speeds below 20 mph on paved roads
- Vehicle speeds below 15 mph on unpaved roads
- Vacuum paved roads when dry

ADEQ concluded BACT for quarry activities was no control because the operations were mobile and the various options were infeasible.

Quarry Facility Area

Drake Cement plans to construct a quarry operation facility area adjacent to the proposed quarry to support quarrying activities. The quarry facility area would be constructed in a small, partially disturbed area on the south side of Limestone Canyon (Figure 2-2). The quarry facility area would be approximately 0.5 acres.

Figure 2-2. Quarry facility area. View to the southwest.

Drake Cement proposes the facilities area at this location because it is located outside of the quarry area where hauling and crushing activities would be conducted, thereby reducing safety concerns associated with general vehicular access, maintenance and administrative activities. The Mine Safety and Health Administration (MSHA) requires a 36 to 40 inch berm to be built along the edges of the facilities area to protect against vehicle tipping.

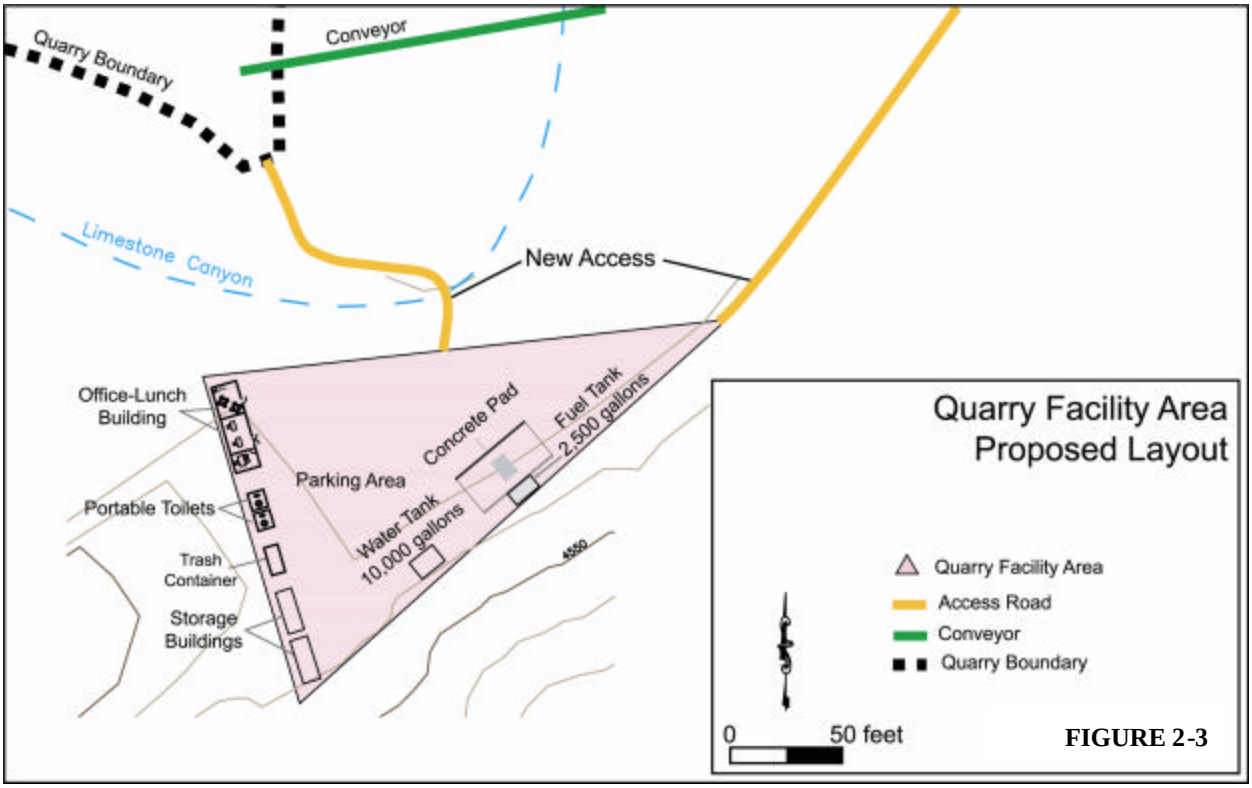


FIGURE 2-3

As depicted in Figure 2-3, the facilities area would include:

- A designated parking area for up to 12 vehicles
- A small portable (modular) office-lunch building on blocks
- Up to 2 portable storage buildings
- Two portable toilets
- One double-walled diesel fuel tank (approximately 2,500 gallons)
- A water storage tank
- A concrete pad approximately 20 feet by 40 feet to service and fuel equipment
- Miscellaneous equipment and materials including waste receptacles, waste oil storage containers, and other facilities
- A security fence

All mining equipment would be operated and stored within the pit areas, except when being fueled or serviced, which would happen at the quarry facility area.

The fuel tank would be an aboveground, fire-resistant (meeting Uniform Fire Code), double-walled storage tank with built-in secondary containment and interstitial monitoring. The tank would be secured and locked during times when Drake Cement personnel are not on site. Placards would identify contents and list emergency procedures and relevant contact information. Fueling and equipment servicing would be performed on a service pad located immediately adjacent to the fuel tank. The pad would consist of 12 to 14 feet of un-reinforced concrete with curbs on two sides and a spill containment sump.

Conveyor System

The 3 inch minus crushed rock would exit the crusher at the quarry site and be transferred onto an overland conveyor system with a 36 inch wide belt. The conveyor system would consist of three separate conveyors (referred to as the First Conveyor, Second Conveyor and Third Conveyor). The system would have 3 transfer points (including the end transfer) and dust collection at each transfer point. In total, the proposed conveyor system is approximately 3,250 feet (0.66 mile) long.

The First Conveyor would extend approximately 1,500 feet from the primary crusher in the quarry, over Limestone Canyon on a suspended structure, up the hill between the quarry and old Highway 89, then proceed along the current footprint of old Highway 89, then across Hell Canyon bridge to approximately 20 feet past the east end of the bridge (Figure 2-4).

Figure 2-4. First Conveyor alignment. View to the east toward Hell Canyon Bridge.

As designed, this conveyor segment would span Limestone Canyon and would not require any fill or structures in the channel. Concrete footings would be constructed on both sides of the canyon to support the steel framework of the conveyor. Vehicular access for conveyor maintenance and emergency ingress and egress would be on the existing bedrock base of the channel bottom.

The first conveyor would range from approximately 10 feet above ground over Limestone Canyon to 3 feet above ground going up the hill from Limestone Canyon. A 300 foot long segment of the First Conveyor corridor would be placed in an excavated trench to optimize the grade up the hill on the west side and then back down the hill towards the Hell Canyon Bridge. This 300 foot long trench of the First Conveyor would be excavated to a maximum depth of approximately 15 feet at the top of the hill. The conveyor would be approximately 5 feet above ground at the bridge. Appendix A contains a map from the PoO that depicts the alignment and cross-sections of the proposed conveyor, including the area of excavation. The First Conveyor would transfer to the Second Conveyor at a point on the east side of the bridge. As proposed, the transfer point, including the dust collector, is approximately 15 to 20 feet above ground.

The Second Conveyor would extend approximately 650 feet southeast upslope along the side of Hell Canyon and under the north end of the Burlington Northern Santa Fe Railroad Bridge (Figure 2-5) to a point approximately 150 feet south of the railroad, where it would transfer to the Third Conveyor. As proposed, the Second Conveyor does not have a roadway for maintenance but would utilize pedestrian catwalks attached to the conveyor framework. The width of this corridor would be approximately 12 feet. Concrete footings would support the conveyor framework.

From the transfer point from the Second Conveyor, the Third Conveyor would extend approximately 1,100 feet north-northeast to its terminus. The last 400 feet of this conveyor would gradually incline to approximately 70 feet in height as it exits National Forest System lands.

Figure 2-5. Approximate proposed conveyor alignment (shown in gray) across Hell Canyon Bridge, up the hillside and under the railroad trestle. View to the southeast.

The 36 inch wide conveyor belt would be connected to a steel framework approximately 6 to 8 feet wide, including structures and walkways. The conveyor structure would be suspended above the ground by vertical and diagonal steel supports spaced approximately 15 to 20 feet apart. Each support point along the conveyor would be anchored into two concrete footings approximately 2 feet by 2 feet. The depth of the footings is dependent upon structural and geotechnical characteristics at any given point along the conveyor. For the portion of the First Conveyor that crosses the old highway bridge, the steel supports would be set onto steel plates, thereby eliminating the need to attach directly to the bridge. The conveyors require a corridor about 12 to 20 feet in width for the conveyor steel framework, including walkways. The width of the conveyor structure would be wider on hillsides where footings may be set out from the conveyor diagonally to meet structural requirements. Surface disturbance also includes the 10 to 12 foot wide access road parallel to and on the north side of the First Conveyor and alongside the Third Conveyor. The Second Conveyor would not have an access road because of the steep terrain up the side of Hell Canyon. Including construction, grading, steel support structures, walkways, concrete footings, activities and access, a corridor of up to 100 feet wide along the First and Third Conveyors has been assumed for calculating surface disturbance. The actual final footprint of the conveyor and access roads would be approximately 20 to 40 feet wide once construction is complete. The footprint of the Second Conveyor is assumed to be less (approximately 15-20 feet) because it is on the hillside and no access road is planned.

Access Roads

Drake Cement plans to use existing roads for primary and emergency access to the quarry and quarry facility area. Locations of roads and gates proposed for improvement or construction are depicted on Figure 2-6. A project-level roads analysis summary for the proposed project was conducted in conjunction with the NEPA process, and information from this analysis has been incorporated into this EA.

Primary Access

Primary access to the quarry would be from the west off SR 89 via FR 680 and then on old Highway 89 (also shown as FR 9711F). Near the quarry, a new access road would be constructed to enable access to the quarry facility area. Additionally, smaller maintenance/access roads (10-12 feet wide) would be constructed alongside certain segments of the proposed conveyor and would be used for maintenance and emergency access to the site. In total, approximately 1.4 miles of existing access roads would be improved and 0.2 mile of new roads would be constructed for this project.

As old Highway 89 approaches the quarry area, a new spur road would be constructed on the west side of old Highway 89 down toward the quarry facility area and the road crossing proposed for Limestone Canyon. The current travel width of FR 680 and FR 9711F is approximately 12 to 15 feet wide. Drake Cement proposes to widen these roads to an 18 to 20 foot travel width and install drainage (road shoulders and water bars), turn-outs and widening on curves per Forest Service road specifications. Old Highway 89, like FR 680 and FR 9711F, would need to be widened to an 18 to 20 foot travel width.

One gate would be installed at the junction of FR 680 and SR 89 and would remain closed and locked the majority of time. However, regular ingress and egress would continue over the existing cattle guard. The new gate would be installed adjacent to the cattle guard to accommodate larger, heavier vehicles at times when mining equipment or supplies are being delivered to or from the site. A second gate would be installed on the access road near the quarry, approximately 1,500 feet south of the quarry on old Highway 89 to control access to the project area.

The second gate would be a 24 foot wide double gate (each gate wing is 12 feet wide). Under normal usage, one side of the gate would be open during quarry operations. The other side of the gate would be opened periodically to accommodate the occasional transport of mining equipment and supplies by larger vehicles. This gate would be locked during non-operating hours. The area would be restricted to Drake Cement personnel, Forest Service staff, and contractors. These roads would be maintained periodically as needed. The access roads would be regularly graded by Drake Cement to maintain the drainage on the travel surface and shoulders.

Maintenance and Emergency Access Roads

Drake Cement also proposes to construct a 10 to 12 foot wide service maintenance road paralleling the First Conveyor and the Third Conveyor. The Second Conveyor is located within Hell Canyon and would not have a service maintenance road due to steep terrain. The First Conveyor road would link to the segment of old Highway 89, which proceeds from the east end of the Hell Canyon Bridge to the intersection of CR 71 (approximately 1,315 feet from the bridge to the intersection). This route would be used both for conveyor maintenance and secondary emergency access, but not for ingress and egress to the quarry. The old Highway 89 segment is currently blocked with an earth berm and trench at the top of the hill; the proposed project would eliminate these impediments and a locking gate would be installed at this location.

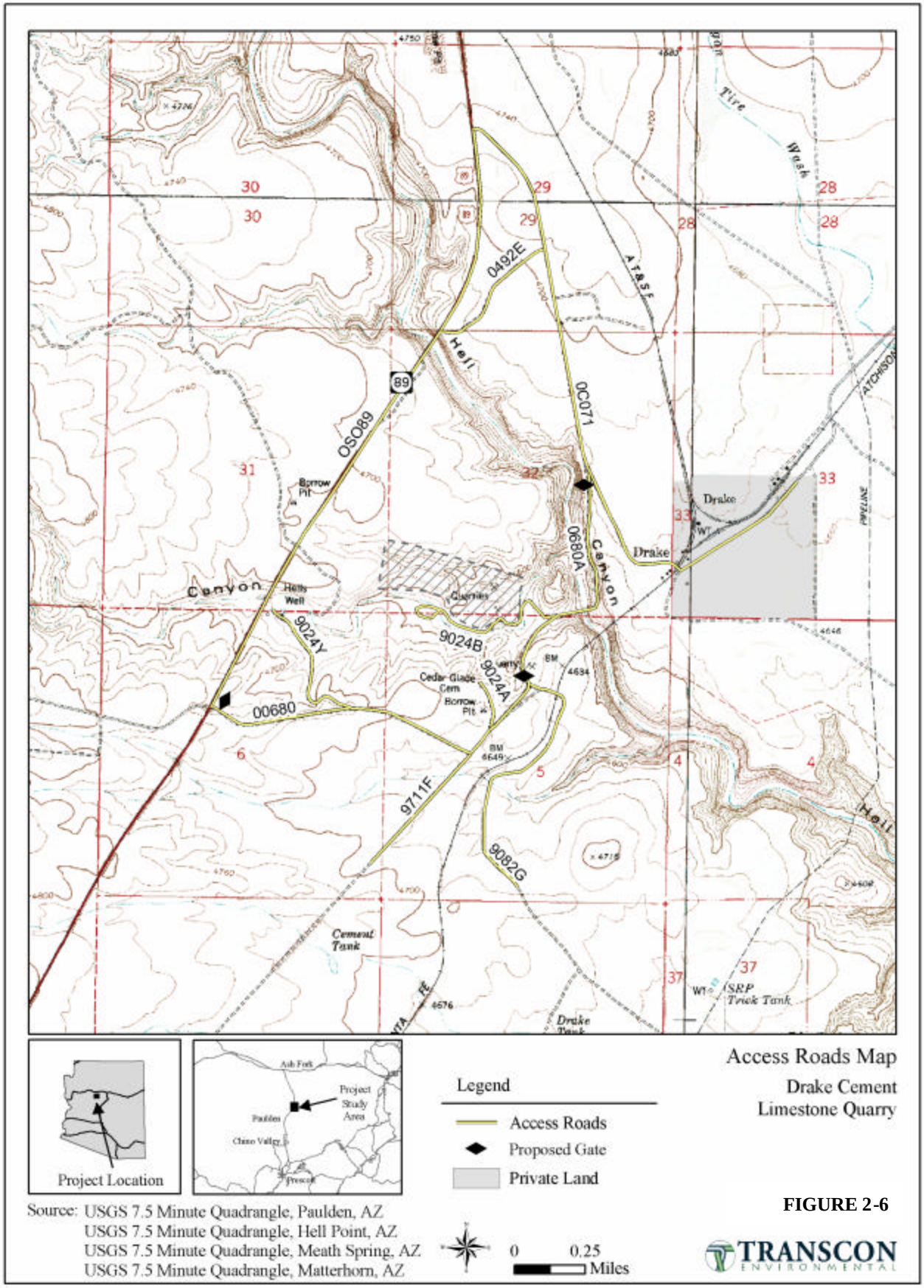

Access Roads Map
Drake Cement
Limestone Quarry
Legend
Access Roads
Proposed Gate
Private Land
Project Location
Source: USGS 7.5 Minute Quadrangle, Paulden, AZ
USGS 7.5 Minute Quadrangle, Hell Point, AZ
USGS 7.5 Minute Quadrangle, Meath Spring, AZ
USGS 7.5 Minute Quadrangle, Matterhorn, AZ
0 0.25 Miles
TRANSCON ENVIRONMENTAL
0492E
0C071
0680A
0S089
9024Y
9024B
9024A
00680
9711F
9082G
Hell
Canyon
Drake
Tire Wash
Borrow Pit
Hells Well
Quarries
Cedar Glade Cem
Cement Tank
SRP Trick Tank
Drake Tank
Ash Fork
Project Study Area
Paulden
Chino Valley
Prescott

FIGURE 2-6

Limestone Canyon Crossing

Drake Cement proposes to access the quarry from the quarry operation facility area via a low-water crossing in Limestone Canyon (Figure 2-7). Portions of this drainage are scoured to bedrock, with only minor amounts of streambed sediment. To provide an even travel surface across the drainage, a shallow layer of coarse and durable native limestone would be placed at the stream channel bottom. This layer is expected to be about 6 to 18 inches deep and would allow stream flow to cross through or over the travel surface of the crossing. This coarse material (with a minimum of fines) would be used to reduce potential sediment loads. The proposed crossing would also entail pulling back material on the banks of the channel to provide properly sloped approaches on each side. The crossing would be approximately 20 feet wide and constructed at-grade. The base would extend horizontally on the approaches to a point above the high water mark for a 25 year design flood frequency.

Figure 2-7. Limestone Canyon road crossing between the quarry and the quarry facility area (in background). The yellow flagging indicates roads alignment. View to the south.

Utilities

Electricity would be supplied to the quarry facilities through an electrical conductor installed within the proposed conveyor system originating at the Drake Cement plant. The cable would be installed underground from the conveyor system to the quarry facilities along the access that connects the quarry to the quarry facilities.

No other utilities are necessary.

2.2.3 Alternatives Considered but Eliminated from Detailed Study

As per 40 CFR 1502.14(a), alternatives to the Proposed Action were considered. Alternatives considered but dropped from detailed study included the following:

Project Location Alternative

Drake Cement representatives considered several alternative quarry locations before deciding to expand the existing quarry. Changing the quarry location would have required moving the proposed limestone quarry and associated facilities. The successful development of the proposed project at an alternate location would depend on a number of geologic, environmental, and economic factors, primarily the existence of marketable quantities of high-quality limestone. Other factors also affecting the feasibility of quarry development on a particular site include the availability of land with a willing seller or lessor, the nature of the mineral deposit, the method of extraction, depth of overburden, and the distance between the quarry and the storage or processing area.

As stated in the Purpose and Need, the objective of the proposed project is to provide limestone and cement products to a regional consumption area. The distance to these markets is important in determining the feasibility of the quarry and associated facilities. Other potential limestone quarry locations have not been identified in close proximity to the Chino Valley area. However, areas of potential limestone deposits have been identified throughout northern Arizona. The quality of limestone reserves found in the region, when compared to the quality of the limestone found on the project site, has not been determined.

After considering these factors, Drake Cement determined that options for suitable alternative quarry sites were limited. Drake Cement filed claims for limestone deposits on PNF lands and determined that the high grade limestone deposits in the vicinity of the existing quarry were ideal for cement production. While other limestone deposits are located in the region, none offered the ease of access and closeness to private land owned by Drake Cement.

Once claims are filed, the claimant retains certain statutory rights under the 1872 Mining Law to develop the claim.

Comparison with the Proposed Project

The proposed project has been designed to minimize the area of disturbance and minimize environmental impacts as described in this EA. The development of the proposed project at an alternate site would result in as yet undetermined environmental impacts. These potential impacts would likely include those described above and would therefore be similar, or greater, to those identified for the proposed site as described in this document. The proposed quarry site is located within 1 mile of Drake Cement's private land, upon which they proposed to develop a facility to process the limestone. Alternative quarry locations are unlikely to be within 1 mile of this private land, and may therefore incur greater development impacts to the environment.

Consistency with Project Objectives

The degree to which an alternative location could meet the project objectives would depend upon the specific site, the available limestone resources, access, and other considerations. This alternative was eliminated from further consideration because the claims are filed under the 1872 Mining Law and the Forest Service does not have the authority to re-locate mining claims. In addition, no other sites in the region would meet the basic project objective of cost-effective mining and processing high quality limestone to feasibly serve the region. Drake Cement has determined the availability of high-quality limestone at the quarry site and has active mining claims for the area.

Reduced Project Area Alternative

Several members of the public commented on the amount of ground disturbance expected to occur as a result of project implementation. While no specific reduction in ground disturbance was suggested, for purposes of comparative analysis it is assumed that a Reduced Project Area Alternative would reduce the area of active mining under the proposed project by 50%. The proposed project would result in the mining of approximately 55 acres of National Forest System land over a period of 10 years. Under the Reduced Project Area Alternative, this acreage would be reduced to approximately 28 acres using the same mining and processing methods and rates. The life of the quarry would also be reduced by approximately 50% to a period of 5 years since the mining and processing methods and rates would not change under this alternative.

Comparison with the Proposed Project

The proposed project would disturb approximately 55 acres in the quarry area and another 10 acres associated with the quarry operation facility area, access roads, and conveyor system. The Reduced Project Area Alternative would result in the quarry size being reduced to approximately 28 acres, and all other elements remaining the same for a total disturbance area of about 38 acres. The types of environmental impacts would be the same as the Proposed Action, although they may be reduced in amount or intensity as a result of the reduction in quarry size. All other project elements and related impacts would be the same.

Consistency with Project Objectives

The development of the Reduced Processing Rate Alternative would achieve only a portion of the project objectives. The Reduced Project Area Alternative would leave approximately 50% known limestone reserves untapped thereby reducing the economic feasibility of the proposed mining project. This alternative, therefore, would be inconsistent with the intent of the 1872 Mining Law. As a result, the alternative was dropped from further consideration.

Raw Material Conveyance Alternative

Under this alternative, the project proponent would transport the crushed limestone materials to their private land near Drake by truck, rather than constructing the conveyor system. Raw materials would be transported from the quarry along the improved Forest roads (FR 9711F and FR 680) about 1.8 miles and onto SR 89. The trucks would the travel north along SR 89 for a distance of about 2.6 miles, exiting at CR 71. The trucks would then travel southeast on CR 71 for a distance of about 2.1 miles to the private land. The trucks would unload the crushed limestone and return to the quarry using the same route. In total, the length of this travel route is about 6.5 miles each direction.

Comparison with the Proposed Project

The proposed conveyor system would extend across approximately 1.8 miles of National Forest System land. Portions of this alignment are already disturbed by previous quarry operations, use of old Highway 89, and public access, or would be disturbed by some other element of the proposed project. Approximately 2.6 acres of land would be disturbed as a result of conveyor construction. In comparison, the truck conveyance method would utilize existing Forest Service, state and county roads, or roads proposed to be improved as a result of some other project element. A new crossing of Limestone Canyon would be required that would allow large trucks access to the quarry.

Under this alternative, the conveyor system would not be needed, and would therefore not be constructed. Potential impacts associated with the conveyor would be reduced or eliminated. Ground disturbance from

construction, operation, or maintenance activities along this alignment would not occur and potential cultural and visual impacts resulting from project implementation would be reduced or eliminated. By transporting the raw materials by truck, some environmental impacts may be greater than that for the proposed project due to the increased traffic and safety issues on National Forest System lands and on SR 89. Other potential impacts could result from truck maintenance activities, truck refueling, truck parking when not in use, elevated noise levels from truck operation, and additional dust generation from travel along non-paved roads.

Consistency with the Project Objectives

Implementation of the Raw Material Conveyance Alternative would generally achieve the project's objectives, although project costs primarily associated with fuel use and vehicle acquisition and upkeep would substantially increase, thereby reducing the economic feasibility of the proposed mining project. This alternative restricts the mining claim operator's ability to develop their mining claim in the manner described in the PoO, and as allowed in the 1872 Mining Law. As a result, the alternative was dropped from further consideration.

2.3 Reclamation and Mitigation

2.3.1 General Reclamation Requirements

Reclamation applies not only to the activities that would be undertaken following the completion of mining activities but also to the measures undertaken on an interim basis. Interim reclamation would be implemented to reduce the potential for erosion by stabilizing road cuts and stockpiles and other disturbances that result from exploration, construction, and operational activities. Interim reclamation measures would include seeding, fertilizing, and mulching in accordance with the Forest Service Best Management Practices included in the Soil and Water Conservation Handbook (USDA 1996).

Reclamation would be performed whenever the project proponent determines that an area is no longer necessary for mining. Once quarry operations are complete, which may include additional time beyond the 10-year mine plan, the remaining reclamation would be performed over a 2 to 5 year period using on-site personnel and equipment, and contractors.

Final reclamation would begin at the final stages of mining operations. Facilities not necessary for the reclamation process, including buildings, crushers, conveyors, and storage tanks, would be decommissioned and either salvaged or demolished. These materials would be removed from the site. After facilities were removed, concrete pads would be broken into pieces and covered with fill material. Compacted areas (excluding the buried concrete pads) would be ripped, and all areas would be graded to blend with the surrounding natural topography. Roads would remain in place as long as required to conduct monitoring activities. Stream crossings would be returned to their original condition.

As proposed by the project proponent in the PoO, reclamation measures would include:

- Removal of mining equipment, materials, and structures.
- Placement of low earth berms around the quarry to serve as drainage control to prevent storm water run-on from adjacent undisturbed areas on the north and west side of the quarry, diverting these flows away from quarry disturbances and into natural drainage ways.
- Constructing the final (upper) vertical quarry benches on the north and west perimeter of the quarry to a 2.5:1 slope during excavation; then ripping, contouring and seeding those concurrent with final stages of the 10-year PoO.
- Placement of unusable basalt and alluvium from later stages of the 10-year quarry development into the mined-out portions of the pit.

- Grading of slopes on overburden placements (in the quarry) to reduce slopes to no steeper than 2.5:1.
- Placement of native surface soils or alluvium on horizontal pit benches and backfilled portions of the pit to facilitate long term revegetation. Materials would be placed during bench construction, so those areas can be safely accessed prior to excavation of the quarry below the benches. Final cover materials would be placed on backfilled areas when those areas have been constructed to their final configuration.
- Grading and contouring of the disturbed bench areas to provide a stable, free-draining surface for revegetation.
- Installation of settlement basins within the quarry boundaries to prevent storm water run-off from flowing out of the quarry.
- Placement of topsoil or other suitable growth medium on benches and backfill areas.
- Scarifying and seeding of benches and backfill areas.
- Appropriate monitoring and maintenance of revegetation and drainage controls.

Overburden

It is estimated that there would be approximately 220,000 loose cubic yards of overburden moved during the10-year mine plan. The actual quantity of overburden could vary depending upon the actual quality of raw material suitable for use in cement production and blending requirements for different grades. However, the capacity of the pit exceeds the estimated amount of overburden which would be produced. As depicted in the PoO, the post-reclamation topography maps show that the quantity of material estimated would be accommodated in the pit and no overburden would be placed outside of the quarry footprint.

Quarry Highwalls

As proposed, quarry walls would be benched with 50 foot wide benches and 33 foot bench heights. Bench slopes would be 70 degrees. At end of the 10-year plan, the pit would have 4 benches on the west wall, and 2 to 3 benches on the south and north walls. The east side of the pit would eventually be partially backfilled and depending on the amount of backfill, could result in one wall. If the quantity of overburden increases, backfill on this end of the pit could be brought up to the elevation of the edge of the pit.

Quarry Benches

Once the pit benches have been excavated, soil or alluvium would be placed on them to facilitate revegetation. Reclaiming each subsequent bench while the pit is being excavated would allow them to be worked on safely. Once the subsequent bench is cut, reclamation activities would become impractical and unsafe. After placement of soil or other suitable growth medium, the benches would be seeded.

Soil Preparation

Once areas have been graded and contoured, each area would be ripped to provide a rough and furrowed surface to hold seed and moisture. In the arid west, rough surfaces on slopes enhance water capture, infiltration and retention of meteoric water. Seeds of different species of plants have different ideal planting depths. As precipitation strikes the furrowed surface or snowfall melts, the soil material collapses on top of the seed.

Seeding

When reclamation is conducted, seed mixes would be adjusted in consultation with Forest Service personnel and based upon availability. Local seed sources would be utilized where possible. Otherwise seed would be purchased from commercial seed suppliers. Most seeding would be accomplished with

broadcast seeding. Seeding would be conducted during the fall months, to maximize utilization of winter rain and cool spring season. Spring seeding may also be conducted if fall seeding is not possible. Certified weed-free straw and/or hydromulch would be applied in conjunction with the seeding effort.

The project area would be inspected the third growing season following initial seeding to determine the success of vegetation establishment. Vegetation establishment would be deemed successful if perennial vegetation is providing adequate groundcover to stabilize soils and dissipate rain impact. If not successful, the area would need to be reseeded following the prescription for the initial seeding.

2.3.2 Mitigation

The CEQ defines *mitigation* as avoidance, minimization, and reduction of impacts and compensation for unavoidable impacts (40 CFR 1508.20). Regulations defined in 36 CFR 228 subpart A require the prevention of undue and unnecessary environmental impacts during mining and related operations. A variety of environmental protection measures have been incorporated into the PoO to meet applicable standards including those of regulatory agencies such as the ADEQ that have review and approval authority over the proposed Project. Table 2-2 presents a summary of mitigation and control measures incorporated into the project description by resource for the Proposed Action alternative. Unless noted otherwise in the decision document, these mitigation measures would become mandatory if the responsible official selects the Proposed Action alternative for implementation.

Table 2-2 Summary of Mitigation Measures

Environmental Factors	Mitigation and Control Measure	Authority
Visual Resources (blocked vistas, building colors and heights)	The conveyor would be installed as low to the ground as possible for most of its length and be painted with neutral earth tone colors to blend with the surrounding landscape. To the extent possible, vegetation clearing associated with the conveyor construction would be minimized to a width of 20 feet. Vegetation clearing of junipers near the second conveyor would be minimized to allow for vegetation screening of the structure as it extends up the side of Hell Canyon. Following construction activities, disturbed areas around and under the conveyors would be reseeded with native seed stock. Muted colors, non-reflective surfaces and "open" structure would be used, to the extent possible to minimize the visual effects of the third conveyor as it reaches its 70 foot aboveground height. Land forming and grading associated with reclamation activities would include topographical variation and grading similar to the existing landscape. Revegetation would include the addition of juniper and pinyon pine trees in selected areas for screening and naturalizing slopes. The PNF Landscape Architect would define quantities and locations of tree plantings.	Forest Service recommendations; PoO

Table 2-2 Summary of Mitigation Measures		
Environmental Factors	**Mitigation and Control Measure**	**Authority**
Heritage Resources (archaeological, historical, architectural)	Minimize or avoid adverse impacts on significant archaeological sites to the extent practicable. Fence sensitive sites during construction. Conduct preventative maintenance and restoration on old Highway 89 bridge. Mitigation may include site testing, treatment, and data recovery, as needed. The specific and appropriate activities will be determined by PNF, in consultation with SHPO and relevant Tribes, as part of a treatment plan.	Forest Service and State Historic Preservation Office (SHPO)
Water Resources (water quality, streamflow, floodplains, wetlands, groundwater recharge)	Maintain drainage patterns, water quality, and water quantity to the extent possible; develop Best Management Practices and Storm Water Pollution Prevention Plans; develop Spill Prevention, Containment, and Countermeasures Plan; groundwater protection measures include storm water controls, tank containment systems, and other features and operations designed to meet Aquifer Protection Plan requirements. Locate quarry facilities outside of the 100-year floodplain.	ADEQ – Arizona Pollutant Discharge Elimination System Permit for storm water discharges; PoO; US Army Corps of Engineers - 404 Permit; State of Arizona's Aquifer Protection Plan Program
Air Quality	The Project would meet applicable state and federal air quality standards. These standards prescribe emission limits, operational practices and administrative requirements. The purpose of these standards is to ensure that emissions are sufficiently reduced so as to prevent any exceedance of health-based, maximum allowable ambient concentrations. Particulate matter would be controlled in the quarry by using water spray. Dust collectors would be used at the primary crusher, and at conveyor transfer points.	PoO; ADEQ Draft Air Quality Permit
Hazards	The quarry area would be closed to the public. Fencing and signage will prevent access to the highwall and alert people of the potential hazards.	PoO; MSHA
Land Use (grazing)	Quarry activities would be fenced to prevent wildlife and stock from entering the project area.	Forest Service Recommendations; PoO
Vegetation (forest, range land, other major vegetation types, threatened or endangered plants, unique ecosystems, plant diversity)	Use plants native to the area and originating near the project area for reclamation to the extent possible. Revegetate and reclaim disturbed areas, including the quarry floor and benches. Prior to ground clearing, surveys will be performed for Forest Sensitive plant species. Seed collection or transplanting may be required.	Forest Service Recommendations; PoO

Table 2-2 Summary of Mitigation Measures		
Environmental Factors	**Mitigation and Control Measure**	**Authority**
Exotic and/or Noxious Organisms (noxious weeds)	Road areas where soil disturbing activities are planned should be coordinated with the PNF weeds specialist. If weeds are present the ground disturbing activities should be scheduled when seeds or propagules are least likely to be viable and spread. If the roadside is weed infested then it is best to blade from areas of the lowest number of weeds to an area of highest weed infestation. Following ground disturbing activities associated with road improvements, conveyor installation and upon reclamation of the quarry the disturbed areas should be planted with a native seed mix approved by PNF. All earth moving equipment brought onto the project area will be cleaned prior to entering PNF. A high pressure hose should be used to clear the undercarriage, tire treads, grill, radiator, and any other areas where mud and dirt may accumulate. Any fill material brought in from an off-site location should be free of invasive weed species.	Forest Service Recommendations
Hazardous Substances Storage, Handling, and Transport	Fuel and other petroleum products used in the operations would be stored in above-ground tanks. Fuel storage and fueling activities and lubricants would be contained on a concrete pad with spill containment. None of this material would be left or disposed of onsite. No explosives would be stored on the National Forest System lands. The explosives for each shot would be delivered down hole and detonated the same day. All materials needed for the blast on the scheduled day of detonation would be delivered to the site on the day of blasting and all unused explosives would be removed from National Forest System lands after the detonation. All safety procedures for drilling and blasting would follow federal and state regulations as well as all environmental requirements. Material Safety Data Sheet information for all explosives would be filed and kept on site for review.	PoO; MSHA

Table 2-2 Summary of Mitigation Measures		
Environmental Factors	**Mitigation and Control Measure**	**Authority**
Roads/Access	Gates would be installed at the junction of FR 680 and FR 9711F and the junction of old Highway 89 and County Road 71 to control access to the quarry. A third gate would be installed adjacent to the current junction of FR 680 and SR 89. This gate would not limit public access and would only be used to facilitate the ingress and egress of equipment too large to pass along the existing route. FR 680, and the segment of old Highway 89 leading to the quarry would be improved from a maintenance level 2 (high clearance vehicle road) to a maintenance level 4 (moderate degree of user comfort) road.	Forest Service Recommendations as part of the Roads Analysis

2.4 Forest Plan Consistency

The 1986 Prescott National Forest Land and Resource Management Plan (Forest Plan), as amended, establishes goals and objectives for multiple-use and sustained-yield management of renewable resources without impairment of the productivity of the land. As stated in the Forest Plan, management direction for minerals is to "Administer the mineral laws and regulations to minimize surface resource impacts while supporting sound energy and minerals exploration and development."

The Forest Plan contains Forest-wide Standards and Guidelines for special-use management, which applies to authorizations such as the Proposed Action. The mission, goals, and objectives for the PNF are attained through applying groups of management activities to specific units of land. Groups of management activities are called "prescriptions" and the land units are called "management areas".

The project area lies within Management Area 2, Woodland. The predominant vegetation in the Management Area is pinyon/juniper and juniper with some inclusions of chaparral. In this Management Area, the emphasis is on wildlife management and on improving and maintaining watershed condition. Range management is focused on maintaining current range conditions. Dispersed recreation is managed to maintain environmental quality and reduce conflicts between users. VQOs in this Management Area are primarily Modification and Partial Retention (PNF 1986).

Consistency with the management directives for Management Area 2 would be required for implementation of the Proposed Action. Current analysis indicates that management guidelines defined in the Forest Plan for Management Area 2 can be met in all areas with exception of visual quality. Wildlife management and range management would generally be unchanged as a result of project implementation. Recreation management in the area would change as a result of the existing quarry area being closed to the public. The PNF has determined that the current VQO ratings for this portion of the Forest are generalized over a larger area and not specific to the project area. As a result, the Forest has prepared a Forest Plan Amendment to assign the appropriate VQO classification to the project area (Appendix C). This amendment has been determined to be a non-significant Forest Plan Amendment.

2.5 Alternative Evaluation Comparison

Table 2-3 depicts a performance rating for each alternative in terms of compatibility with four primary areas of evaluation. A “high” rating indicates the alternative is highly compatible with the elevation item.

Table 2-3 Alternative Evaluation Comparison

Alternative	Forest Plan Consistency	Public Issues	Purpose and Need	Key Environmental Effects
No Action	◒	◒	○	◒
Proposed Action	◒	◒	●	◒
Project Location Alternative	◒	◒	○	○
Reduced Project Alternative	◒	●	○	◒
Raw Material Conveyance Alt.	◒	○	○	○

High=● Medium=◒ Low=○

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This chapter discusses the physical, biological, economic, and social factors that have been considered for the project proposal. Direct and indirect environmental effects for the resources presented have been analyzed for both the No Action Alternative (Alternative A), and the Proposed Action Alternative (Alternative B). Potential cumulative effects were considered for each resource.

3.1 Other Past, Present, and Foreseeable Future Actions in the Project Vicinity

3.1.1 Past Actions

Prehistoric Use of the Project Area by Native American Peoples

The region that includes the proposed project area contains no clear-cut evidence of Paleo-Indian (ca. 12,000–8,000 BC) presence. Post-Pleistocene environmental changes were accompanied by shifts in human subsistence strategies that incorporate various Archaic phases, which can be dated from 8,000 BC to AD 1. Archaic peoples followed a seasonal round of hunting and gathering. Archaic sites are common in the vicinity of the project area. The Archaic phases are followed by several Formative phases characterized by agriculture, the use of ceramics, and greater residential sedentism. Dry farming was complemented by irrigation agriculture and some researchers have suggested an influx of Hohokam peoples or Hohokam culture from the south. Between about AD 900 and 1300, the Prescott Branch of the upland Patayan likely occupied the project area.

Spanish explorers in the late 1500s found the region occupied by Southeastern and Northeastern Yavapai and by Northern Tonto Apache. The Apache were fairly recent arrivals to the Southwest but the Yavapai are likely descendents of the Prescott Culture or other groups indigenous to the region. With Euro-American settlement, the Yavapai and Apache faced new constraints that eventually led to their removal to reservations by the 1870s.

Mining Activities

The existing quarry appears on the 1910 General Land Office (GLO) map as being worked by the Puntenney Lime Company; quarrying activities may have been initiated there as early as the late 1880s, but were shut down by about 1930. Later attempts at quarrying were thought to be attempted sometime between the 1950s and the 1980s although Federal records do not document this. Superior Company actively mined the existing quarry for approximately 3 years between 1980 and 1985. These later efforts appear to have eliminated much evidence of the early quarrying activities.

Road and Railroad Development

The Prescott and Ash Fork Stage Road appears on the 1877 GLO map and is located just west of the project area, in the vicinity of Hells Well. It forded Hell Canyon approximately 1 mile upstream from its current crossing by SR 89. The 1910 GLO map suggests that by then, this route had been mostly abandoned possibly made redundant by the railroad. In 1910 a new, local road identified as the "Road to Cedar Glade" crossed the bottom of Hell Canyon at the mouth of Limestone Canyon; much of this roadway is still visible. This was replaced in 1923 by a paved automobile road that crossed the canyon on a concrete bridge. This alignment was abandoned in 1954 when the current SR 89 was constructed to the west of the project area.

In 1891, construction on the Santa Fe, Prescott & Phoenix (the "Peavine") Railway was begun between Prescott and Ash Fork, running about 2 miles to the west of the project area. A Cedar Glade Siding was located 3.5 to 5.0 miles to the west of the town of the same name and, presumably, lime and sandstone

was hauled there by wagon from the project area. In 1898, the 23 mile-long Hell Canyon realignment was designed and construction began in 1901. The new reroute cut the number of trestles needed by thirty but required the enormous 165 foot high, 647 foot long steel trestle over Hell Canyon at Cedar Glade. This trestle was completed in November 1901 and is still in regular service. At about that time (1901), a depot was also built at Cedar Glade and this location was used as headquarters for the construction of the cut-off and trestle. Presumably a temporary work camp was also located at this location. In 1912, Cedar Glade also became the junction for the Verde Valley Railroad, which accessed a copper smelter near Clarkdale. In 1920, Cedar Glade was renamed Drake and, by that time, approximately 20 structures had been built there by the railroad including a depot, agents house, water tank and a number of section houses, bunkhouses, and freight warehouses. The railroad kept a small staff on in Drake through the 1950s.

Land Use

By the 1820s, fur trappers had moved up the Verde River drainage to near the project area. Later, in the 1840s through the 1860s, expeditions were directed across this region to identify transportation corridors connecting California with the East. Gold was located in Yavapai County by the early 1860s and a number of small mining communities were established in the region. Prescott was made the first territorial capital in 1863, military posts were established, and soon homesteaders moved into the region, often to provide farm produce to the mining communities. With the removal of the indigenous populations in the 1870s, Euro-American settlement increased and mining and cattle ranching became the dominant economic forces.

Beginning in the late 1880s, extensive limestone and sandstone deposits attracted quarrying operations to this area. After building two smaller limekilns to the south and west, the Puntenney family built a large one on the south side of Hell Canyon and the town of Puntenney rose around it. This site is located within 1 mile of the proposed quarry area. The community was extensively built up during the early part of the 20th century and the ruins of several industrial facilities as well as a cemetery are still present. Another town, named Cedar Glade, was developed immediately north of the canyon to provide a home base for sandstone quarrying in the region. In addition, several homesteads, a number of which became the hub of ranching operations, were patented in the vicinity starting in 1889 (GLO patents). In 1918, the southwest quarter of Section 33 (excluding the railroad property) was patented as Homestead Patent #622662. In 1920, Cedar Glade was renamed Drake and, in addition to the railroad facilities, a hotel, general store and restaurant were constructed and a small community developed. These facilities closed down in the next several decades, and when the railroad removed staff from the area in the 1950s, the town was uninhabited.

3.1.2 Present Actions

Road and Railroad Maintenance

This category includes State, County and Forest road reconstruction and road maintenance, and maintenance of Burlington Santa Fe Railroad facilities. Maintenance activities usually involve mowing or other forms of vegetation management and maintenance of ditches and culverts on both sides of these transportation corridors for many miles. Generally, roadside mowing and railroad vegetation management does not include extensive ground disturbance. Ditch reshaping and culvert replacement does create some ground disturbance, although this disturbance is typically site specific. Road and railroad maintenance is usually accomplished with heavy equipment including bulldozers, road maintainers, tractors, and crawler equipment. Road and railroad maintenance activities in the region are expected to continue in the foreseeable future.

Vegetation Management

Noncommercial thinning activities include work to improve a resource area (such as a wildlife habitat improvement project) or a timber stand. While some of the work is done with handtools, some heavy equipment may also be utilized. One known example of vegetation management near the project site is the Bear Siding Juniper Treatment Project, located about 6 miles southeast of the Proposed Action. The primary goal of this activity is to reduce juniper density by felling live trees, thereby improving habitat for wildlife, fish, and rare plants. Other similar projects have occurred immediately south of the project area. Vegetation management activities in the region are expected to continue in the foreseeable future.

Range Management

The project area lies within the West Bear/Del Rio and Limestone grazing allotments. As a result, range improvements such as fencing and water tank development occur in the area. Range permittees frequently access lands in the vicinity of the Proposed Action to manage their livestock or to maintain existing range improvements. Range management activities in the region are expected to continue in the foreseeable future.

Recreational Use

Thousands of people visit the PNF each year to recreate and enjoy the natural resources. While most people that visit the PNF are simply traveling through the area to other destinations, many use the Forest for recreational purposes. In the areas adjacent to the project area, the primary recreational uses include dispersed hiking, camping, hunting, and the use of Forest Roads and CR 71 for sightseeing purposes. Off-highway vehicles, including jeeps, trucks, all terrain vehicles, and trail motorcycles, are used extensively along roads and trails in the area near the proposed project. Some cross-country travel occurs with all vehicles, but all terrain vehicles and trail motorcycles comprise most of this impact. The quarry is also used for target practice. Recreational opportunities and uses in the region are expected to continue in the foreseeable future.

Mining

There are active rock quarries where flagstone is removed on the PNF. The closest of these large flagstone mining operations are located about 6 miles northeast of the project area, near the Prescott and Kaibab National Forest boundary. Much of the flagstone mined in the area, including that from the Diamond 7, M.C. Canyon Quarries, and Rock House Quarries, is transported to the Drake area for dimension processing and loading onto trucks for shipment to regional distribution centers. Mining and associated activities in the region are expected to continue in the foreseeable future. Additional operations on the Prescott include prospecting and placer mining for the removal of gold or other precious or semiprecious metals, and active pits where volcanic cinders are being removed. No prospecting or placer mining occurs in the project area. The operations of these pits and quarries involve some use of heavy equipment.

Utilities

Existing utilities in the project vicinity include an Arizona Public Service 69kV transmission line that is located about 3 miles southeast of the proposed limestone quarry and an El Paso Natural Gas high pressure pipeline located about 1.5 miles east of the proposed quarry.

There has been substantial and continuing growth in Yavapai County in recent years. Prescott and Prescott Valley have experienced the bulk of this growth, but areas like Chino Valley and Paulden are also experiencing population growth and associated residential, commercial, and industrial construction. Population growth rates are expected to continue in the foreseeable future.

Community Growth

As indicated by population data and growth indicators, there has been substantial and continuing growth in Yavapai County in recent years. Community profile data collected for the nearby towns reflect growth in new building permits, taxable sales, and net assessed valuation figures from 2000 to 2004. Population growth rates are expected to continue in the foreseeable future.

3.1.3 Future Foreseeable Actions

In addition to those present actions listed above that are likely to continue into the future, several other planned, proposed, or reasonably foreseeable actions have been identified.

Proposed Cement Manufacturing Facility at Drake

Drake Cement has proposed constructing and operating a Portland cement plant on private land near Drake. The cement manufacturing facility would be provided limestone from the limestone quarry analyzed as the Proposed Action, or from other sources outside of the immediate study area. The cement plant would be constructed south of the existing railroad tracks and would initially involve about 20 acres. Drake Cement has estimated that the plant would generate about 98 truckloads of processed material leaving the site per day. The plant is expected to employ about 60 persons full-time. It is expected that the plant will generate air emissions and will use up to about 62 acre feet of groundwater per year from a private well located on-site. As described in Drake Cement's Air Quality Permit Application (ADEQ 2005), the plant would consist of the following operations.

Raw materials to be received for the production of Portland cement include two grades of limestone, an iron source, an aluminum source, coal, and gypsum. The limestone and part of the low-grade aluminum source material would be obtained from the limestone quarry analyzed as the Proposed Action, or from other off-site sources. The other raw materials (iron ore, pure aluminum source, coal, gypsum or alternative imported limestone) would be delivered to the site by truck or railcar. Raw materials that reach the site via the overland conveyor belts, truck, and rail would be temporarily stored in piles that would be completely enclosed in a building. Gypsum would be stored in open piles. The proportioned raw materials are dried, pulverized and size-classified in the raw mill circuit. The raw mill circuit includes an impact hammer crusher which works in negative pressure, a static separator, 4 cyclones, a fan and a ball mill. The static separator would insure the desired particle size cut that the mill requires. Hot exhaust gas from the pyroprocessing system is fed to the impact hammer crusher to dry and convey the ground materials. The resulting ground raw material, called "raw meal," would be delivered to a blend silo. From the blend silo, the raw meal would be conveyed to the six stage pre-heater tower. The formation of Portland cement clinker starts with the blended raw meal metered into the six stage pre-heater.

Calcined solids collected in the cyclone are introduced to a rotating cylindrical kiln. It is this kiln, lined with refractory material, in which the chemical and physical processes leading to formation of "clinker" reactions are completed. The hot clinker falls from the lower end of the kiln onto the moving grate of the clinker cooler where it is cooled by incoming air. The clinker then passes through a roller crusher prior to final grinding and storage. The clinker discharged from the clinker cooler is conveyed to an enclosed storage structure. Clinker is then reclaimed using a ground level conveyor system and is conveyed to a finish mill feed silo. This clinker, as well as gypsum and limestone, are transferred in appropriate proportions via weigh-belt feeders to a conveyor belt feeding the finishing mill system. The finish mill system consists of a complete Roller Press installation working in series with a ball mill. The Portland cement product would then be transported to a cement silo for final storage before being loaded into trucks and/or rail cars.

Land Exchange/Development

On November 22, 2005, Congress passed the Northern Arizona Land Exchange and Verde River Basin Partnership Act of 2005, P.L. 109-110. This Act is commonly referred to as the "Yavapai Land Exchange". This legislation would provide a framework for the exchange of approximately 50,000 acres of private and public land, consolidating the largest remaining checkerboard property ownership in the state (Kyl 2006).

Through this land exchange, Yavapai Ranch would convey approximately 35,000 acres of land north of the Juniper Mesa Wilderness Area to the Forest Service. In exchange, the Forest Service would convey approximately 21,250 acres to Yavapai Ranch. These parcels include 15,300 acres of lower-elevation grazing lands that would continue to be ranched, and approximately 5,850 acres in the Verde Valley, Flagstaff, Williams and Prescott areas (Yavapai Ranch 2006). The land exchange would allow cities and towns involved in the exchange (Flagstaff, Williams, Camp Verde) to expand commercial and residential development, in addition to meeting other municipal needs, through private land acquisition. The land exchange also provides for measures for water management, calling for the establishment of a conservation easement in the Camp Verde area that limits water use, and also encouraging the creation of the Verde River Basin Partnership to examine water issues over the long term (Kyl 2006). The closest parcels of this land exchange are approximately 25 miles from the project area.

Mining

In addition to existing mining operations that are expected to continue into the future, other hardrock, mineral, or volcanic mining would likely occur in the project vicinity. Based on limited limestone exploration drilling completed to date, potential raw material reserves of limestone exist within the area bounded by Hell Canyon on the northeast, old Highway 89 to the east, by FR 680 on the south and by new SR 89 to the west. Future development of this or other areas is dependent on geologic, market and economic conditions. Although forecasting for such eventualities is not reliable or practicable beyond 10-year increments, it is possible that additional limestone mining would take place in the project vicinity. Any proposed large-scale mining operation would require a PoO and appropriate environmental compliance.

Utilities

Several electric transmission lines and pipelines have been proposed to be constructed in the project vicinity. Transwestern Pipeline has proposed a 42 inch natural gas pipeline lateral that would extend from their existing facilities near I-40, through the project area, to Pinal County. Although the precise location of this pipeline is not yet known, it is expected to parallel the existing El Paso Natural Gas Pipeline. Arizona Public Service is proposing to construct a 69 kV transmission line to improve electrical availability to the Chino Valley and Paulden area.

A natural gas pipeline lateral and electric transmission line may also be required if the proposed cement plant were to be constructed on the private land at Drake. It is assumed that the transmission line would extend from the existing APS transmission line and the pipeline lateral would extend from the El Paso Natural Gas Pipeline east of the project area. However, the type, size, and location of these facilities have not yet been identified.

3.2 Response of Alternatives to Significant Public Issues

Table 3-1 provides a summary of potential impacts of the Proposed Action Alternative and the No Action Alternative by the significant public issues identified during the public scoping process. For a more detailed discussion of environmental effects, see Sections 3.3 and 3.4 that follow.

Table 3-1 Summary of Potential Impacts of Each Alternative by Significant Public Issue	
***Issue:* The limestone quarry will negatively impact the watersheds of Limestone Canyon, Hell Canyon, and the Verde River, especially stream flow, water quality, plant and animal species, and human culture.**	
Alternative A **No Action**	No change from current conditions.
Alternative B **Proposed Action**	The proposed conveyor system and associated access roads would cross Limestone Canyon and Hell Canyon. In addition, the quarry operation Facility area would be located immediately adjacent to Limestone Canyon and primary access between the quarry facility area and the quarry would require a crossing of Limestone Canyon. As proposed, there would be minimal effects on drainage pattern of the area. Alteration of the banks of Limestone Canyon to allow the at-grade crossing between the quarry facility area and the quarry could result in increased erosion or siltation. This at-grade crossing would not require diverting any portion of the wash. Therefore, surface run-off would be unchanged. No runoff into either Limestone Canyon or Hell Canyon is expected from quarry; construction of the new access road and quarry facility area would increase runoff into Limestone Canyon. Project facilities would comply with ADEQ, EPA, and ADWR regulations and Forest Service requirements regarding erosion control and storm water management, which would minimize watershed effects. Approximately 60 acres of vegetation and potential habitat would be removed by the proposed project, resulting in potential impacts to wildlife. Some wildlife would be expected to move from the area and avoid project features (see Section 3.4.2). People do not reside within or in the immediate vicinity of the project area. Human use of the area is minimal and is primarily associated with recreational activities. The project would not affect the "outstandingly remarkable values" of the portion of the Verde River designated as a Wild and Scenic River, because segments of the Verde River designated as Wild and Scenic are over 50 river miles from the project area.
***Issue:* Increased vehicle traffic (especially truck traffic) on State Route 89 due to quarry operations would cause traffic congestion and safety concerns.**	
Alternative A **No Action**	No change from current conditions.
Alternative B **Proposed Action**	Truck traffic on SR 89 would not increase as a result of quarry operations under this alternative. No hauling of extracted quarry materials and subsequent increase in traffic will result because materials will be transported via the conveyor system. Daily access to the quarry area by employees would incrementally increase traffic levels in the project area, although total traffic to the project area may decrease as a result of eliminating non-authorized activities. Cumulative traffic levels and safety impacts on SR 89 may result due to increased truck traffic associated with the planned cement plant near Drake if rail transport is not used (see Section 3.3.12).
***Issue:* The project will disrupt and have negative impacts on wildlife.**	
Alternative A **No Action**	Wildlife in the project area would continue to be minimally affected by current public use of the project area.
Alternative B **Proposed Action**	Approximately 60 acres of vegetation and potential habitat would be removed by the proposed project, resulting in potential impacts to wildlife (see Section 3.4.2). In general, wildlife in the project area would likely be displaced from activities associated with the quarry. Impacts to wildlife would result from direct loss of habitat associated with expansion of the quarry and construction of new facilities. Indirect impacts associated with quarry operation, such as increased human activity, elevated noise levels, and increased dust levels, would generally decrease the quality of habitat for wildlife. In general, some wildlife species are expected to be displaced from the project area as a result of disturbance created by the project. No direct or indirect effect to Forest Service sensitive species would occur. No direct effects to federal

Table 3-1 Summary of Potential Impacts of Each Alternative by Significant Public Issue	
Alternative B Proposed Action (continued)	threatened or endangered wildlife would occur. No noticeable changes in population trends for Management Indicator Species are expected. No impacts to migratory birds are anticipated. Groundwater drawdown associated with this project would result in immeasurable reduction to surface flow to the Verde River. Correspondingly, effects to threatened or endangered fish in the Verde River would be immeasurable (see Section 3.4.3).
***Issue:* The project will disrupt and have negative impacts on riparian areas within the project area.**	
Alternative A No Action	No change from current conditions.
Alternative B Proposed Action	The project would not result in impacts to wetland areas or aquatic habitat, because riparian areas were not identified within the project area. Potential changes to stream flow and sediment loadings in Limestone Canyon from the quarry, quarry facility area, or other project elements would be minimized because project facilities would comply with ADEQ, EPA, and ADWR regulations and Forest Service requirements regarding erosion control and storm water management.
***Issue:* The project will disfigure the landscape.**	
Alternative A No Action	No change to current conditions. Disturbance associated with the existing quarry would remain.
Alternative B Proposed Action	The proposed project would disturb approximately 65.5 acres and would permanently alter the existing topography in the proposed quarry and along a small section on the conveyor alignment. The proposed conveyor system would be an added feature on the landscape for the life of the project. Impacts to visual resources are generally localized due to topographical and vegetation screening associated with the project area. There are no residences or designated recreational areas within or near the proposed project. Views from SR 89 and CR 71 to the quarry area are generally momentary in nature and constrained by topography and vegetation. The project elements would not be consistent with the Forest Service VQOs for the area and would therefore require a non-significant Forest Plan Amendment (changing the existing VMS classification for about 71 acres from Partial Retention and Retention to Modification). The project would not substantially impact scenic resources, including historic structures or locally recognized desirable aesthetic natural features, because views to the project area are limited and the project area is a small portion of the entire viewshed.
***Issue:* Quarrying and associated activities will decrease the air quality, especially in nearby Class I airsheds (e.g., Sycamore Canyon Wilderness Area).**	
Alternative A No Action	No change fromcurrent conditions.
Alternative B Proposed Action	Emission sources of particulate matter associated with the operation of the limestone quarry include drilling, blasting, material handling, and crushing. Fugitive emissions would also result for the use of vehicles in the quarry. Emissions would also result from the conveyor systems, especially at the transfer points. PM_{10} generation from these activities would be reduced through the use of water spray and dust collectors; therefore, the dust generated from these activities would not affect sensitive receptors. The project would comply with local, state and federal regulations regarding air quality.

Table 3-1 Summary of Potential Impacts of Each Alternative by Significant Public Issue	
***Issue:* Access to Hell Canyon (for hunting, hiking, etc.) will be closed at the location of the proposed project.**	
Alternative A **No Action**	No change fromcurrent conditions.
Alternative B **Proposed Action**	Under the Proposed Action, current unofficial access to Hell Canyon at this location would be eliminated. Although this access point would be closed to the public, other access to Hell Canyon exists. Elimination of access to this area does not affect applicable Forest plans, policies, or regulations regarding recreation and public access.
***Issue:* Quarry construction will negatively affect local historic resources.**	
Alternative A **No Action**	No change from current conditions.
Alternative B **Proposed Action**	Construction and operation of the quarry, quarry facility area, conveyor system, and access road improvements may result in impacts to historic and prehistoric sites. Within the project area, 5 historic or prehistoric sites have been identified as eligible for the National Register of Historic Places (NRHP). An additional 25 Isolated Occurrences (IOs) were identified during field surveys, but were determined to be ineligible for listing. Analysis and consultation with relevant agencies concluded there would be no effects to the narrow gauge railroad site. In addition, it was determined there would be no adverse effect to the Hell Canyon Railroad trestle, Cedar Glade/Drake townsite, and a segment of old Highway 89 including the Hell Canyon Highway Bridge. The prehistoric site located within the proposed quarry boundary would be destroyed by quarry activities and require mitigation through a treatment and data recovery plan developed in consultation with SHPO and Forest Service staff (see Section 3.3.6)

3.3 Physical Factors

3.3.1 Topography and Geology

Affected Environment

Elevation of the project area ranges from 4,550 to 4,800 feet. The topography is varied. The most prominent feature is Hell Canyon, which bisects the project area. The canyon has moderate to steep slopes and cliffs dropping over a hundred feet into a major ephemeral drainage. The topography of the project area on the eastern side of Hell Canyon is gently sloping flats, while the topography on the western side is composed of a hilly-rolling topography divided by various ravines and ephemeral drainages and includes the presence of the existing limestone quarry. Limestone Canyon is a tributary canyon of Hell Canyon. It forms the eastern boundary of the project's quarry area and divides the quarry from the quarry facilities area. Surrounding mountains, including Big Black Mesa located approximately 3 miles to the west, rise to an elevation of over 7,000 feet.

The area is located in the transition zone between the Basin and Range Province and the Colorado Plateau, and exhibits regional structural features diagnostic of both provinces (Langenheim, et al. 2005). The geology of the project area consists primarily of sedimentary rocks overlain by younger volcanic rocks and alluvium (stream-deposited sediments). Sedimentary rocks consist of the Devonian age Martin Formation and the younger Mississippian age Redwall Limestone. These units were deposited intertidal to open-marine conditions approximately 380 – 300 million years ago (Beus, 1989). Younger clastic sedimentary rocks (sandstones) outcrop north of the study area. Volcanic rocks generally consist of young (4 – 8 million years old) basalt flows which overlie the limestone in areas and cover much of the surface on the east side of Hell Canyon. Quaternary aged alluvium deposits are the youngest rocks in the area and

are the product of the erosion of older rock units. These deposits are generally confined to existing or ancient stream valleys.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the project activities would not be implemented and topographic and geologic resources within the project area would remain undisturbed. Natural processes would continue to modify the topography of the landscape and geologic composition.

Alternative B – Proposed Action

Under the Proposed Action, the topography and geology of the project area would change. The project components would involve about 65.5 acres, 60 acres of which would be new disturbance. In year 10 of the planned operations, the size of the quarry would be approximately 55 acres (The Mines Group 2004).

The topography of the project area would be modified, with the most permanent and long-standing direct impacts to topography occurring to the area where the quarry is proposed. The 10-year mining plan involves the extraction of approximately 1,000,000 tons of limestone annually, which would cause the land surface of the quarry area to be lowered. During the 10-year proposed PoO, the quarry, or pit, would progress continuously from east to west. Projected topography of the quarry area after the 10-year plan would range between 4,482 and 4,614 feet, approximately 100 to 200 feet lower than the original topography, with a range of variation depending on the specific location within the quarry. Between the highest and lowest points of the quarry area would be a series of benches engineered to progressively taper downward to the lowest elevation (4,482 feet) at the bottom of the quarry.

Hell Canyon topography would not be modified as a result of project implementation. The project's conveyor system and access roads would cross over the Canyon using the old highway bridge and not require any fill. Limestone Canyon would require slight alteration to allow the at-grade crossing between the quarry facility area, which could result in increased erosion or siltation, and minimal long-term topographic impacts. The at-grade crossing would require no fill in the wash associated with Limestone Canyon. Topographic impacts would also occur at the quarry facilities area, which would be partially leveled and would be surrounded by a 36 inch berm.

The first conveyor would require a 300 foot long and up to 15 foot deep trench near the top of the hill located between the quarry and the old Highway 89 bridge. This trench would result in long-term topographic impacts. Other minor topographic impacts could include minor surface leveling activities for the quarry facilities area and quarry, the remaining segments of the conveyor systems, and access roads.

Modification to the topography would cause indirect impacts to the existing visual setting of the area. Ongoing reclamation to the project area would help to minimize the visible topographic intrusion caused by the project. Materials that are treated as non-usable, or overburden, would be placed in staging areas, or mined out areas of the pit. Once overburden is placed in its final configuration it would be graded and reclaimed within the pit. Additional visual impacts are described in Section 3.3.5.

The existing quarry contains a highwall from the past excavation, which is not fenced nor signed. The planned activities would increase the highwall; however, public access would be restricted and the area would be fenced and signed as outlined in the PoO.

Geologic composition of the quarry area would be modified permanently. Raw limestone materials that are extracted would not be replaced. Mining operations would utilize the majority of the limestone, although some of the upper limestone may remain at the quarry because the presence of other minerals

diminishes cement quality. Therefore, this material and the basalt would be treated as non-usable (overburden) and placed in staging areas or mined out areas within the pit (The Mines Group 2004). The remaining geologic composition of the remainder of the project area (i.e. the conveyor system and access road locations) would remain unchanged.

Cumulative Effects

A review of past, present, and reasonably foreseeable future actions was conducted to evaluate potential cumulative effects that could occur to topographic and geologic resources. The area of analysis considered for cumulative effects to topographic and geologic resources is limited to the project area and immediate vicinity. Based on the review of cumulative actions, the following were considered in the analysis to topographic and geologic resources:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above have previously occurred or would occur independent of the Proposed Action. Past mining activity in the area contributed to topographic changes to the landscape and geologic changes caused from the extraction of mineral resources. Current extraction activities continue to modify the topography, but are not connected to the Drake facility. The proposed cement manufacturing plant would be constructed on private land. The cement manufacturing facility is not expected to alter topography, except for minor grading or surface leveling that would occur for site facilities to be built. Geologic composition changes of the site would not occur. The Proposed Action would contribute minor effects to the cumulative actions identified above; together, these cumulative effects are expected to be small when compared to the surrounding landscape because of the relatively small areas of disturbance.

3.3.2 Climate

Affected Environment

A large portion of Arizona is classed as semiarid and long periods often occur with little or no precipitation. The air is generally dry and clear, with low relative humidity and a high percentage of sunshine. April, May and June are the months with the greatest number of clear days, while July and August, as well as December, January and February have the cloudiest weather and lowest percent of possible sunshine. Humidities, while low when compared to most other states, are higher throughout much of Arizona during July and August, corresponding with the thunderstorm season (WRCC 2006a).

Most precipitation occurs in winter with storms originating in the Pacific Ocean, and during the late summer monsoon season with intense late afternoon thunderstorms bringing moisture to the region from the Gulf of Mexico and Sea of Cortez. From November through March, storm systems from the Pacific Ocean cross the state. These winter storms occur frequently in the higher mountains of the central and northern parts of the state and sometimes bring heavy snows. The gradual melting of this snow during the spring serves to maintain a supply of water in the main rivers of the State (WRCC 2006a).

Chino Valley, where climate data has been gathered and is closest available for the project area, is approximately 8 miles away. It has an average maximum temperature of 72.2 degrees Fahrenheit (F), with the hottest months being July (averaging 92.3 degrees F) and August (averaging 89.5 degrees F). There is an average minimum temperature of 37.3 degrees F, with the coldest months being December (averaging 21.0 degrees F) and January (averaging 21.5 degrees F). Average total precipitation is 11.84 inches, and snowfall averages 7.0 inches (WRCC 2006b). Stations for these data are located at approximately 4,670 and 4,750 feet in elevation, which falls within the elevation parameters of the project area. The

topography in Chino Valley is typical of valley areas and is relatively flat. The topography of the project area is more mountainous, with hills and canyons, which can account for some minor temperature variations.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, activities associated with the proposed quarry would not occur and climate would be unaffected. There would be no effect to climate as the project would not be approved.

Alternative B – Proposed Action

The Proposed Action would cause no direct or indirect impacts to climate because the project would not change the existing temperature patterns or precipitation distribution for the project area, or on a larger scale, in an area that extends outside of it. Regional and local climate patterns would continue.

Cumulative Effects

Because there are no direct or indirect effects to climate from the Proposed Action, this project would not contribute to cumulative effects to climate.

3.3.3 Soils

Affected Environment

Soil data was obtained from soil survey information for the PNF from the Natural Resource Conservation Service. Data was gathered by map unit number. The soils in the project area are comprised of three major units: 1) Limestone/Basalt Alluvium (Unit 456), 2) Basalt/Cinders/Ash (Unit 463), and 3) Mixed Source Alluvium (Unit 471). In addition, three, non-major inclusion units occur within this area and include: 1) Basalt Colluvium (Unit 430), 2) Colluvium/Residuum, Limestone (Unit 466), and 3) Alluvium/Colluvium/Residuum, Mixed Sources (Unit 474) (NRCS 2000). A description of these units is provided in Table 3-2.

Table 3-2 Soils Present in the Project Area

Map Unit and Name	Soil Length (ft)	Elevation (ft)	Description
430-Typic Argiustolls (Colluvium/Residuum, Basalt)	15	3,000-5,400	Moderately deep soils with high surface rock fragments, rock outcrop and steep to very steep slopes (40-120%). Soils considered unstable on basalt bedrock.
456-Calcic Ustochrepts (Alluvium, Limestone/Basalt/SS)	105	3,900-4,500	Soils occur on elevated plains with 0-15% slopes with ephemeral streams present within map unit, moderately deep, gravelly loam moist soils.
463-Typic Haplustalfs (Residuum, Basalt/Cinders/Ash)	45	3,930-5,070	Soils subject to damage (compaction, puddling and displacement) when wet, low bearing strength, clayey textures, high surface rock fragments, ephemeral streams present within this unit, slopes are level to gently sloping (0-10%).

Table 3-2 Soils Present in the Project Area			
Map Unit and Name	**Soil Length (ft)**	**Elevation (ft)**	**Description**
466-Rock Outcrop, Lithic Ustochrepts (Colluvium/ Residuum, Limestone)	30	3,150-5,925	Shallow soils, high surface rock fragments, rock outcrops and very steep slopes (40-120%), soils considered unstable.
471-Petrocalcic Paleustalfs (Alluvium, Mixed Sources)	465	3,900-4,575	Ephemeral streams present within this map unit, occur on level to gently sloping plains (0-10%).
474-Lithic Argiustolls (Alluvium/Colluvium/Residuum, Mixed Sources)	45	3,900-5,400	Shallow soils, high surface rock fragments, moderate steep slopes (15-40%), moderate erosion hazard, limestone bedrock.
Source: NRCS, PNF Soil Survey Data			

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and additional soil disturbance would not occur.

Alternative B – Proposed Action

The Proposed Action would result in direct, long-term impacts to soils. This would occur throughout the 65.5 acre area of disturbance. Most prominent impacts would occur at the quarry, where drilling and blasting operations would occur, in addition to stripping and salvaging of topsoil and overburden. Once topsoil and overburden have been excavated and moved into stockpiles, the raw material would be displaced, excavated, crushed, compacted, and relocated. Remaining soils within the quarry would be generally poor and retain low-productivity. Soils may contain minor amounts of chemicals after blasting activities. In addition, operational activities that include fuels and oil and gas derivatives may discharge minor amounts of these substances onto the soil. Fuel storage, fueling activities and lubricants would be contained on a concrete pad with spill containment. None of this material would remain on the site after mining operations are complete. Reclamation activities, including replacement of topsoil in the quarry pit, may improve soil quality and increase productivity over the long term.

As previously described, alteration of the bank of Limestone Canyon would occur to allow at-grade crossing between the quarry facility area and the quarry. This could result in minor amounts of increased soil erosion. No runoff and soil deposition into either Limestone Canyon or Hell Canyon is expected from quarry operations because surface drainage can be contained within the quarry. Although construction of the quarry facility area would include 36 inch tall berms surrounding the area, the leveling and grading of the area would result in increased surface runoff into Limestone Canyon. However, because the relatively small size of the quarry facility area (0.5 acre), this runoff is expected to be minor.

Soils would also be disturbed during construction of the conveyor systems and access roads. Impacts to soils for these activities would result from surface leveling activities and minor surface displacement. Reclamation activities required as part of the PoO would minimize soil disruption and therefore result in minor long-term impacts.

Cumulative Effects

A review of past, present, and reasonable foreseeable future actions was conducted to evaluate potential cumulative effects that could occur to soil resources. The area of analysis considered for cumulative

effects to soil resources is limited to the project area and immediate vicinity. The following cumulative actions were considered in the analysis to soil resources:

- Past, present, and future mining activities
- Recreational use
- Proposed cement manufacturing plant at Drake

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. Past mining activity that has occurred at the proposed limestone quarry area has caused disturbance to soil resources. Current mining activities are suspended and future activities would only occur as part of the Proposed Action. Soil had been displaced and redistributed. Recreational use of the area is primarily related to firearm shooting that currently occurs and causes disturbance to the soil from human contact with the ground, as well as any bullets or other discarded materials that are left at the project area, or lodged into the soil. The proposed future cement plant on private land would disturb soils when construction of the facilities occurs and ongoing operations and work in the project area results. Topsoil may be removed, and or relocated, and soils would be redistributed. The Proposed Action would contribute to the cumulative modification of soil resources from these other activities in the general area. Increased soil disturbance may increase potential for soil erosion from wind or water; however, past mining activities and recreational uses have not contributed substantially to increased soil erosion. The proposed cement plant is located on a flat area and is subject to regulations to control loss of soil from wind and stormwater.

3.3.4 Minerals and Energy Resources

Affected Environment

Mineral and energy resources in the general area include locatable and leasable minerals. Locatable minerals include both metallic minerals (gold, silver, lead, etc.) and nonmetallic minerals (fluorspar, asbestos, mica, gemstones, limestone, etc.). Leasable minerals include oil and gas, oil shale, geothermal resources, potash, sodium, native asphalt, solid and semisolid bitumen, bituminous rock, phosphate, and coal (BLM 2006).

As indicated in the PoO, the project area contains limestone. Limestone is only considered locatable under the 1872 Mining Law when "suitable and used, without substantial admixtures, for cement manufacture, metallurgy, production of quicklime, sugar refining, whiting, fillers, paper manufacture, and desulfurization of stack gases" (36 CFR 228.41.d.2). Other locatable or large quantities of leasable minerals may exist within the project area but have not been identified. The area is generally not considered conducive to metallic mineralization.

In general, the PNF has low potential for energy resources, including hydroelectric power, fossil fuels and geothermal energy, and biomass and bioenergy. Existing energy infrastructure in the project area includes natural gas and petroleum pipelines and electrical transmission lines.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the limestone quarry would not be mined and minerals and energy resources within the project area would remain undisturbed.

Alternative B – Proposed Action

Under the Proposed Action, direct and permanent impacts to locatable mineral resources (limestone) would occur. As previously described, there would be an extraction of 1,000,000 tons of limestone annually throughout the 10-year plan. The limestone would not be replaced.

Implementation of the Proposed Action would not be expected to directly affect hydroelectric, fossil fuels, geothermal, or biomass energy resources in the project area because there are none present. However, energy resources would be indirectly affected because quarry operations would consume, from outside sources and providers, energy resources that include oil and gas and their derivatives. Consumption would primarily be related to the use of vehicles, and other mechanical operations. Operations that occur at the quarry and conveyor systems would also require use of energy resources from the use of fuel products to power generators. Project operations would expend these resources throughout the life of the plan; however, this use is not expected to strain the existing capacity of the service providers and would not detract from other customer uses or existing price levels.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to evaluate potential cumulative effects that could occur to minerals and energy resources. The area of analysis considered for cumulative effects to minerals and energy resources is the project area and an approximately 5 mile area around the project area. Based on the review of cumulative actions, the following actions were considered in the analysis to minerals and energy resources:

- Land exchange/development
- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake

The land exchange/development that is north and west of the project area would indirectly affect energy resources through consumptive activities. These would include use of electricity, and oil and gas products and their derivatives for any homes or development that may result. There are no existing or proposed extraction activities planned for this resource in the study area. Past mining activities at the quarry area have contributed to a direct loss of mineral resources. The proposed cement manufacturing plant would be located on private land at Drake. The cement manufacturing facility that is proposed would also indirectly affect energy resources through consumption of electricity and oil and gas products. This would occur for operations at the facility, as well as employee travel to and from the work site. The impact on consumption of energy resources by the Proposed Action would be very minor when added to the potential larger use of these resources by these activities. The Proposed Action would contribute to the cumulative withdrawal of minerals (i.e. high-calcite limestone) from this general area.

3.3.5 Visual Resources

Affected Environment

Visual resources on the Forest Service lands are managed according to the Scenery Management System (SMS). This visual management program was introduced in 1995 and replaced the VMS. The SMS involves characterization and grading of the landscape related to visual resources and the establishment of objectives to ensure Forest Service decisions are in harmony with the desired visual setting. Because the Forest Plan was completed prior to the introduction of the SMS, it uses terminology from the VMS. In order to be consistent with the Forest Plan much of the terminology used in this analysis comes from the VMS. The actual analysis, however, follows the system outlined in the SMS, which is current standard for visual resource analysis on National Forest System lands

A visual inventory was mapped by the PNF in the mid-1980s. This inventory was conducted under the VMS. The inventory was used as a baseline for establishing VQOs in the current Forest Plan. The project area is composed of three unique topographic landforms with different landscape characteristics. These are Limestone Canyon/Big Black Mesa, Hell Canyon, and Wagon Tire Flat Area/Town of Drake (Figure 3-1).

Insert Figure 3-1, Landscape Character Map

Limestone Canyon/Big Black Mesa

Limestone Canyon is bordered on the north by Big Black Mesa and to the east by Hell Canyon. This area consists of rolling hills, small valleys and ravines dominated by homogenous stands of junipers. The vegetation is interspersed with open range meadows of seasonal grasses and patches of chaparral. The existing limestone quarry is also part of this landform and is unique because of the vertical cliffs and exposed white limestone rock. This area contains SR 89, the main transportation corridor through the region and primary viewing area within the study area. FR 680, the main access to the limestone quarry from SR 89, also extends through the area.

The Forest Plan concluded that the variety class in this area was typical or common to the region. The variety class is a classification of scenic importance of a landscape based on human perception of the intrinsic beauty of visual elements. The Forest Plan also identifies the VQO as Partial Retention. A rating of Partial Retention requires development to be subordinate to the natural setting.

Hell Canyon

Hell Canyon borders the quarry on the east and bisects the study area. Hell Canyon is a narrow, steep canyon trending from the northwest to the southeast. Hell Canyon is an ephemeral drainage that eventually empties into the Verde River. The canyon is visually unique and distinctive from the surrounding landscape for its steep slopes, cliffs, and diversity of plants. The microclimates of the canyon provide semi-riparian conditions and support vegetation different from the juniper-dominated uplands of the surrounding landscape.

Hell Canyon is also visually unique for the historic Hell Canyon Bridge, which is currently abandoned and the Atchison Topeka and Santa Fe Railroad Bridge. These two structures add variety and scale to the landscape character and create a focal point within which views of the canyon are defined. The combination of the bridges and the canyon is a unique and distinctive view from the surrounding landscape. However, because these features are located within Hell Canyon they are not easily viewed from a distance. Brief views of the railroad bridge are visible from a few locations along SR 89, and the old Hell Canyon Bridge is not visible from SR 89.

The Forest Plan identifies the variety class of Hell Canyon as typical for the region and its VQO is Retention. Retention requires development activities to maintain the form, line, color, texture, and pattern common to the landscape so that changes are not evident.

Wagon Tire Flat Area/Town of Drake

A third landform associated with the project area is found on the eastern and northern side of Hell Canyon surrounding the town of Drake and is composed of a large mesa. The area is flat with some low rolling swells. Large stands of junipers cover much of the area creating a continuous stand of trees. Some large tracts have been treated to remove trees and create grassy open areas. Near Drake, there are various forms of infrastructure including historic structures, maintenance and storage buildings associated with flagstone mining activities, electrical distribution lines, radio tower and building, fences, and railroad grade and tracks. CR 71 passes through this area and provides back road access north to Williams and south toward Perkinsville. CR 71 is the main access road to local limestone quarries.

The Forest Plan indicates the variety class of this area is indistinctive from the region and its VQO is Partial Retention.

In general, the entire project area is mostly natural appearing; however, there are elements that alter the general natural appearance of the area including electrical transmission lines, pipeline facilities, various two track roads and improved roads, the railroad grade and tracks, assorted occupied and abandoned structures, a radio tower, and the existing limestone quarry. The project area is typical of the region and generally lacks unique scenic qualities with the exception of Hell Canyon, which provides variation in landform and elevation, and adds visual interest. The Forest Plan identifies VQOs for the project area as Partial Retention and Retention; however, portions of the project area are likely more consistent with a rating of Modification due to development elements described above. Modification, as described in the SMS, is landscape where the valued landscape characteristics appear moderately altered.

There are no designated scenic roads, scenic byways, overlooks, visually protected viewsheds, developed recreational sites, or residences in the project area. The majority of visitors are travelers along SR 89 or users of dispersed recreation activities such as target shooting, hunting, sightseeing, and photography.

Environmental Consequences

Alternative A – No Action

The No Action Alternative would not impact visual resources. Visual management directives would remain the same for the area.

Alternative B – Proposed Action

Assessment of visual resource impacts is based on the level of visual contrast the proposed project would have to the existing landscape character as viewed from Key Observation Points in or along specific use areas. The SMS measures the level of contrast that the visual elements of the Proposed Action would have in comparison to existing landscape character and the VQOs. Consistency with Forest Plan Management Area VQOs is required for implementation of the Proposed Action.

After field investigation and review, the PNF determined that the current VQO ratings for this portion of the Forest are generalized over a larger area and do not reflect the specific conditions of the project area. As a result, a Forest Plan Amendment (Appendix C) is necessary to assign the appropriate VQO classification to the project area. This change would modify the VQO for a small amount of each of the affected designations (less than 1%), and would more closely approximate the current management conditions of the area.

SR 89 passes within approximately 0.25 miles of the eastern edge of the proposed quarry limits and is located within the Limestone Canyon/Black Mesa and Hell Canyon landscape character descriptions. The VQO for this area is Partial Retention throughout the majority of the area except within Hell Canyon where the VQO is Retention.

Views to the proposed quarry, conveyor system, and associated infrastructure from SR 89 are limited by screening from topographical relief and vegetation. Views to the proposed quarry area from SR 89 are generally limited to two locations where the topography opens up. Views from these areas are only seen for brief moments (approximately 3 seconds for each Key Observation Point). One of these openings is at Limestone Canyon and the second is a small drainage to the north of Limestone Canyon. Most views of mining activities at the quarry fall within middle ground views (0.5 miles) from these two locations. Existing views from the Key Observation Points along SR 89 appear generally intact to slightly altered to the landscape character being viewed.

The conveyor system, associated dust collectors, and other infrastructure would be visible; however, most views of the conveyor from SR 89 would be limited by localized screening from vegetation and

topography. In places where it would be visible from SR 89, the views would be distant (approximately 1 mile at its nearest location), fleeting, and would generally be absorbed by the vastness of the landscape.

The quarry activities would remove vegetation, expose light colored soils and rocks, and the lower the existing landform. Additionally, during the operation, infrastructure would be added to the landscapes such as conveyors, dust collectors, buildings, storage tanks, roads, equipment, and fences. The construction activities and associated infrastructure would result in the introduction of new lines, forms, colors, textures, and patterns that are different from much of the existing landscape. While the project is operational, these elements would detract from the natural/semi-natural setting and would not be consistent with the current VQOs of Partial Retention and Retention. The proposed project would be consistent with a Modification rating.

After the Proposed Action is completed and contouring, seeding, and restoration of the landscape are finalized it is anticipated that views from SR 89 would be consistent with that of the surrounding landscape and would not be readily discernable to the casual Forest visitor along SR 89. Once the conveyor system and associated infrastructure is removed, impacts to viewsheds from SR 89 would return to pre-construction conditions.

County Road 71 is located on the northeastern side of the project area and is located within the Wagon Tire Flat Area/Town of Drake landscape character description. The VQO for this area is Partial Retention. Existing views from Key Observation Points (C and D) appear moderately to heavily altered to the landscape character being viewed.

Views to the proposed quarry and associated infrastructure associated with the Proposed Action from CR 71 would be limited by screening from dense junipers that line the road as well as topographical features adjacent to the quarry. The exception is near the town of Drake where the conveyor would be visible from the portions of CR 71 in the vicinity if Drake. Based on the PoO, the conveyor would rise above the tree line to a height of approximately 70 feet as it enters the private land. Foreground views (0.5 miles) of the facility would be negatively impacted, while views in the middle ground would be less impacted by the project because of localized screening by topography and vegetation.

The conveyor and its linear form and color and would have a negative impact upon the views from CR 71. Impacts would somewhat lessened due to the similar nature of other infrastructure near Drake including railroad infrastructure, an electrical distribution line, an approximately 100 feet tall radio tower, and flagstone storage and processing facilities. The raised conveyor would result in the introduction of new lines, forms, textures, and colors from much of the existing landscape and would change the visual integrity of the area. These visual elements, while they are in operation, would detract from the semi-natural setting and would not be consistent with the current VQOs of Partial Retention. The proposed project would be consistent with a Modification rating.

Once the conveyor system and associated infrastructure is removed, impacts from CR 71 would be expected to return to pre-construction conditions.

In summary, during the project's operation the visual elements associated with the project would alter the existing landscape character and would not be consistent with the current Forest Service VQOs for the area. However, they would be consistent with a VQO of Modification which more closely represents conditions of the existing quarry area and associated Drake infrastructure. The project, therefore, requires a non-significant Forest Plan Amendment (Appendix C) to change the existing VQOs for about 71 acres from Partial Retention (63 acres) and Retention (8 acres) to Modification to more closely represent the existing conditions. Analysis of the project area revealed that existing VQOs were not accurate and therefore this amendment is to correct the Forest Plan (PNF 2006). With this amendment to Modification, impacts from the project would be consistent with the management of visual resources in the project area.

There are no residences or designated scenic or recreational areas within or near the proposed project. As described in the PoO, the removal of project infrastructure, the recontouring and revegetation of disturbed areas at the conclusion of the project, and implementation of mitigation would further limit impacts to visual resources. Therefore, the Proposed Action would only minorly impact scenic resources after reclamation activities are completed.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to visual resources. The area of analysis considered for cumulative effects to visual resources was the proposed limestone quarry area, the proposed cement plant area in Drake, as well as the view associated with the project area. Based on the review of cumulative actions, the following actions were considered in the analysis of cumulative effects to visual resources:

- Past, present, and future mining activities
- Road and railroad development and maintenance
- Proposed cement manufacturing facility at Drake
- Proposed electrical transmission line

The Proposed Action would introduce contrasting visual elements to the landscape that would be seen in conjunction with other visual elements of these existing and proposed activities. All activities identified as part of cumulative actions identified above would occur independent of the Proposed Action. These potential impacts include the permanent modification of the landscape, removal of vegetation, and addition of infrastructure. These other past, present and future actions contrast with the natural setting of the region at varying degrees in their line, form, color, texture, and pattern with the natural setting of the region.

With the Forest Plan Amendment changing portions of the project area to the Modification rating, the proposed project would be consistent with VQOs for the area (Appendix C). As a result, the other past, present and future activities located on the PNF would be generally consistent with VQOs for their areas. Those projects located on private land such as the flagstone processing activities near Drake and the proposed cement production plant would not be subject to PNF VQO requirements. However, they do not contribute to cumulative visual changes in the general area.

Past mining activities have contributed to visual modification of the landscape where the proposed quarry is located. The flagstone mining east of the project area has modified the visual landscape and is identifiable from the proposed project site and in some locations along SR 89 and CR 71. Flagstone processing activities near Drake are visible from CR 71 and are currently contributing to visual differences in the landscape. The proposed cement manufacturing plant would result in the greatest modification to the visual landscape as a result of the proposed project's height and mass. In addition, the facility would be expected to generate steam plumes and have nighttime lighting that may be seen from long distances. The proposed cement plant's remote location minimizes the numbers of viewers, lessening the overall visual impact. The proposed 69kV transmission line would be required if the cement plant were to be constructed. This line would add incremental visual impacts, although be subordinate to the primary cement plant facilities.

The visual impacts caused by the Proposed Action would generally be low and incremental, primarily because of the relatively small scale of the project in vastness of the landscape and the limited visibility of the project activities. In addition, the project site would ultimately be re-contoured, seeded, and infrastructure removed at the termination of the permit authorization. Other mining activities, road and

railroad development and maintenance, and the electrical transmission line would add to the cumulative effects of the Proposed Action. In addition, the proposed cement plant could result in potentially substantial visual impacts. The visual impact of the Proposed Action would contribute somewhat to the effects of these other past, present, and reasonably foreseeable future actions. However, after reclamation activities are complete, the contribution of this project to cumulative effects would be reduced as it would then be in compliance with the Modification VQO.

3.3.6 Heritage Resources

Affected Environment

The project area was subjected to an intensive Class III non-collection, non-disturbance cultural resources survey and site assessment that covered 201.2 acres (119.9 acres on PNF land, 81.3 acres on private and non-project federal land). The survey work was completed to determine if historic or archaeological sites were located in the project vicinity and how they may be affected by the project (Bassett 2005). As a result of the survey effort, five archaeological sites were identified in addition to 25 IOs.

The five sites include the following: the 1923 US Route 89 Hell Canyon highway bridge and two associated stretches of original roadbed (all parts of AZ I:3:10 (ASM)/AR-03-09-01-810 (PNF)), the adjacent 1901 Santa Fe, Prescott & Phoenix Railway trestle over Hell Canyon (part of AZ N:3:32 (ASM)), the location of the historic Cedar Glade/Drake townsite (AZ N:3:69 (ASM)/AR-03-09-01-680 (PNF)), a narrow gauge quarry railroad (AZ N:3:73 (ASM)/AR-03-09-01-1195 (PNF)) and a multicomponent prehistoric/historic artifact scatter with associated rock clusters (AZ N:3:70 (ASM)/AR-03-09-01-1156 (PNF)). All five sites are considered eligible for listing on the NRHP and are considered to be Historic Properties.

In addition to the archaeological sites, 25 IOs were identified. Of this total, 14 are individual or concentrations of prehistoric lithic debitage including one with an obsidian projectile point fragment (undiagnostic arrow point), two with ceramic sherds, and two with groundstone fragments. Eleven IOs are historic artifacts or features, or the secondary deposition of historic trash. IOs are considered ineligible for listing on the NRHP.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the limestone quarry and associated facilities would not be constructed. The majority of heritage resources would be unaffected, although the historic highway bridge would continue to deteriorate through unofficial activities.

Alternative B – Proposed Action

Impacts to heritage resource sites that would occur as a result of the proposed project are summarized in Table 3-3. Site significance and impacts have been agreed to through consultation with Forest Service and SHPO through a letter dated October 24, 2005. There would be no effect to site AZ N:3:73/AR-03-09-01-1195. The project would result in no adverse effect to three sites: AZ I:3:10 (ASM)/AR-03-09-01-810 (PNF), AZ N:3:69 (ASM)/AR-03-09-01-680 (PNF), and AZ N:3:32 (ASM) when the prescribed mitigation measures are carried out. There would be an adverse effect for site AZ N:3:70 (ASM)/AR-03-09-01-1156 (PNF) because the site would be destroyed by quarry activities. The IOs that were identified have no significant historic value that warrants preservation.

Table 3-3 Cultural Resources within the Project Area				
Site No.	**Site Type**	**Status**	**Avoidance Measure/ Mitigation**	**Potential Impact**
AZ I:3:10(ASM) AR-03-09-01-810(PNF)	1923 Highway 89 Hell Canyon highway bridge and two associated stretches of original roadbed	Eligible	Restoration activities; periodic inspection	No effect (portions), no adverse effect (portions)
AZ N:3:32(ASM)	1901 Santa Fe, Prescott & Phoenix Railway trestle over Hell Canyon	Eligible	Unnecessary	No adverse effect
AZ N:3:69(ASM) AR-03-09-01-680(PNF)	Cedar Glade/Drake townsite	Eligible	Fencing during construction activities; limited testing, analysis, research, scraping	No adverse effect
AZ N:3:70(ASM) AR-03-09-01-1156(PNF)	Multicomponent prehistoric/historic artifact scatter with associated rock clusters	Eligible	Treatment and data recovery plan	Adverse effect
AZ N:3:73(ASM) AR-03-09-01-1195(PNF)	Narrow gauge quarry railroad	Eligible	Fencing during construction activities	No effect

A treatment and data recovery plan would be prepared to mitigate potential impacts to site AZ N:3:70 (ASM)/AR-03-09-01-1156 (PNF).

There would be no effect or no adverse effects to the remaining four sites, when mitigating measures (such as fencing during construction, etc.) are implemented during and after construction activities (see Section 2.3.2). Included with these measures is a program of periodic monitoring for AZ I:3:10 (ASM)/AR-03-09-01-810 (PNF), the Hell Canyon Highway Bridge.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to evaluate potential cumulative effects that could occur to heritage resources. Based on the review of cumulative actions, the following actions were considered in the analysis to heritage resources:

- Past, present, and future mining activities
- Road and railroad development and maintenance
- Range management
- Recreational use
- Proposed cement manufacturing facility at Drake
- Land exchange/development

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. Past mining activities that occurred at the proposed quarry area may have disturbed historic or archaeological resources. Similarly, road and railroad development has likely affected prehistoric resources, although these impacts were rarely documented. Recreational use of the project area, specifically firearm use, has caused deterioration of the historic highway bridge. The proposed cement manufacturing facility would contribute to cumulative effects to heritage resources,

primarily as a result of additional impacts to the Drake townsite on private land. Cedar Glade, subsequently known as Drake, was patented in 1918. The remains of several of the railroad facilities at the townsite would potentially be affected by the cement plant construction. In addition, a cemetery is located on the parcel slated for development.

Over time, heritage resources are subject to attrition as cultures change, and archaeological and historical sites weather and erode. The past and present actions have degraded and destroyed heritage resources, and the Proposed Action as well as other future actions would further degrade heritage resources in the area. However, the heritage resource base of the region is quite extensive. It is estimated that several thousand archaeological and historical sites have been recorded in the region, and there are likely to be hundreds of thousands that have not been discovered and recorded. The Proposed Action would not contribute in a large way to the cumulative effects to heritage resources from these other activities. Therefore, the contribution by the Proposed Action to this ongoing attrition is minor considering the extensive heritage resources in the general area and the mitigation measures that would be employed.

3.3.7 Wilderness Resources

Affected Environment

There are five wilderness areas that fall within approximately 30 miles of the proposed project (Figure 3-2). They include the Sycamore Canyon Wilderness, Woodchute Wilderness, Granite Mountain Wilderness, Apache Creek Wilderness, and Juniper Mesa Wilderness. These wilderness areas are all managed by the Forest Service.

The Sycamore Canyon Wilderness (approximately 13 miles from the project area) was designated by Congress in 1972 and has 55,937 acres. The wilderness lies within three national forests: Coconino, Kaibab, and Prescott. This area encompasses all of Sycamore Canyon, which winds for over 20 miles along Sycamore Creek (Wilderness 2006a).

The Woodchute Wilderness (approximately 16 miles from the project area) was designated by Congress in 1984 and it now has a total of 5,833 acres. The area lies entirely within PNF, and is small and easily accessible (Wilderness 2006b).

The Granite Mountain Wilderness (approximately 22 miles from the project area) was designated by Congress in 1984 and it has a total of 9,762 acres. The area lies entirely within PNF about 8 miles away from Prescott (Wilderness 2006c).

The Apache Creek Wilderness (approximately 26 miles from the project area) was designated by Congress in 1984 and has a total of 5,666 acres. The area lies entirely within PNF and is small, remote, and relatively rugged (Wilderness 2006d).

The Juniper Mesa Wilderness (approximately 27 miles from the project area) was designated by Congress in 1984 and has a total of 7,406 acres. The area lies entirely within PNF (Wilderness 2006e).

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed limestone quarry and associated facilities would not exist and there would be no impacts to wilderness resources.

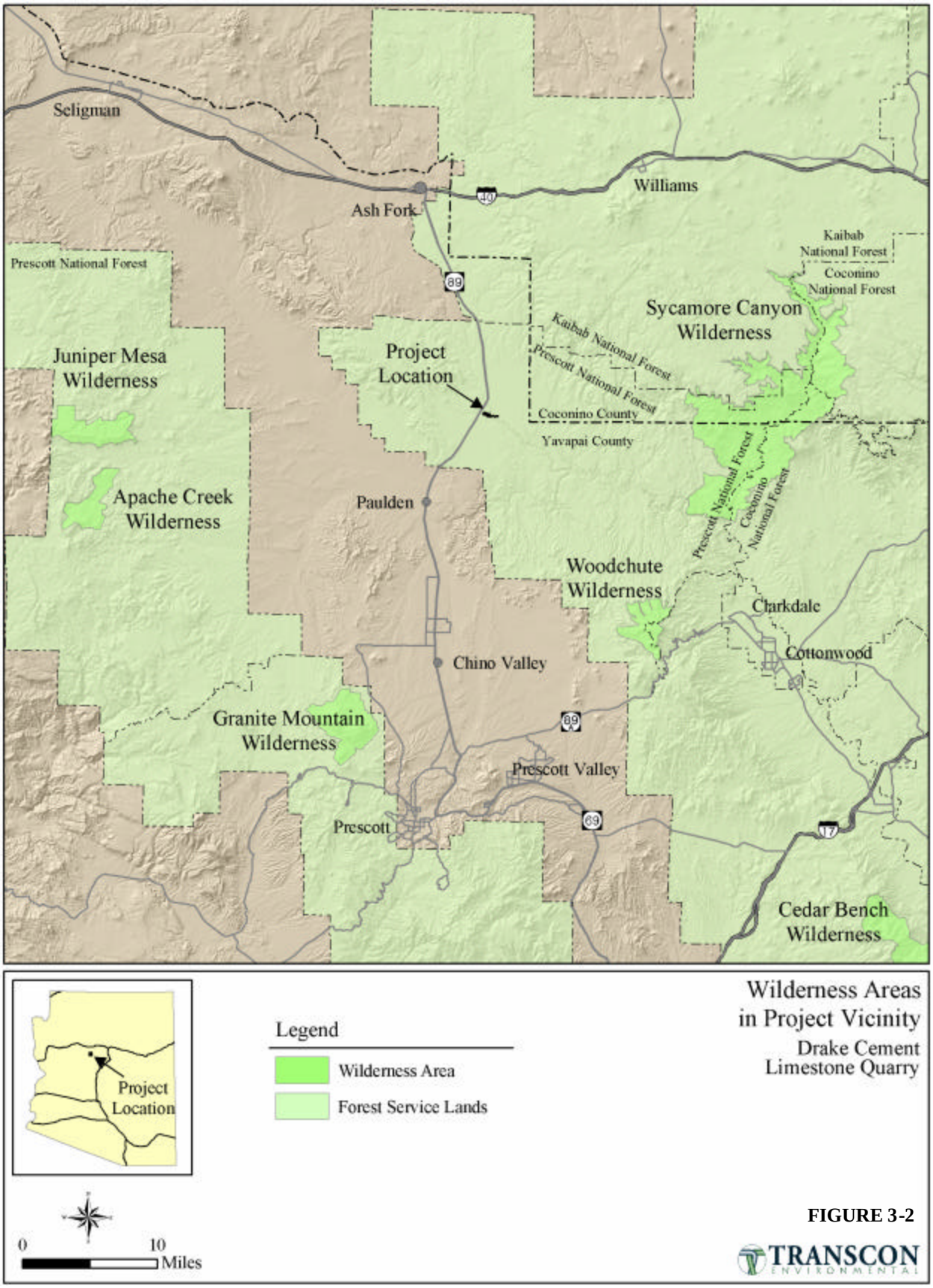

Seligman
Ash Fork
Williams
Prescott National Forest
Kaibab National Forest
Coconino National Forest
Sycamore Canyon Wilderness
Juniper Mesa Wilderness
Project Location
Kaibab National Forest
Prescott National Forest
Coconino County
Yavapai County
Apache Creek Wilderness
Paulden
Prescott National Forest
Coconino National Forest
Woodchute Wilderness
Clarkdale
Cottonwood
Chino Valley
Granite Mountain Wilderness
Prescott Valley
Prescott
Cedar Bench Wilderness
Project Location
Legend
Wilderness Area
Forest Service Lands
0
10
Miles
Wilderness Areas in Project Vicinity
Drake Cement Limestone Quarry
TRANSCON ENVIRONMENTAL

FIGURE 3-2

Alternative B – Proposed Action

The Proposed Action would have no direct impacts to Wilderness resources. Because the project would not be located within a designated wilderness area, operations would not affect the resources in these areas. There may be indirect impacts to the wilderness experience of visitors of these areas if the project area and operations can be viewed from these wilderness locations. This is expected to be minor, and depending on the air visibility, may only involve limited sighting of the quarry, blasting operations and localized dust and particles from the project site. Operations at the quarry would not result in substantial impact the air quality of these wilderness areas because they are all distant (more than 13 miles) and dust is expected to be localized. Additional analysis of air quality impacts is described in Section 3.3.10.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions occurred to considered potential cumulative effects that could occur to wilderness resources. The area of analysis considered for cumulative effects was the Sycamore Canyon Wilderness, Woodchute Wilderness, Granite Mountain Wilderness, Apache Creek Wilderness, and Juniper Mesa Wilderness. Based on the review of cumulative actions, there are no direct cumulative effects to wilderness resources as none of the actions occur directly within designated wilderness areas. Indirect visual cumulative effects could occur from the following actions:

- Land exchange/development
- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above would occur independent of the Proposed Action. The existing and proposed flagstone mining and cement plant could potentially be viewed from the wilderness areas, depending on vantage point, but are at least 13 miles from these areas. As a result, impacts to the wilderness experience are expected to be minor. Potential air quality impacts are addressed in Section 3.3.10, and have been determined to meet air quality standards, although regional haze impacts may infrequently exceed Forest Service concern levels at Sycamore Canyon. The incremental impacts of the Proposed Action when combined with other past, present, and reasonably foreseeable future actions would be extremely small, given the distance from the wilderness.

3.3.8 Wild and Scenic Rivers

Affected Environment

The Verde River is approximately 9 river miles downstream from the project area (Figure 3-3). A portion of the Verde River was designated as a Wild and Scenic River by Congress in August 28, 1984, and is part of the National Wild and Scenic Rivers System (NPS 2006). The remaining portions of the river within the PNF boundary are considered eligible for designation as Wild and Scenic. The designated segment of Wild and Scenic River is over 50 river miles downstream of the confluence of Hell Canyon and the Verde River. This classification applies to 40.5 miles of the River's length. Of this total, 22.2 miles is classified as "Wild", and the remaining 18.3 miles is classified as "Scenic". The Scenic River area (containing about 5,692 acres) is 50% within the Coconino National Forest, 38% within the Prescott National Forest and 12% within the Tonto National Forest. The Wild River area (containing about 6,824 acres) is 7% within the Coconino National Forest and 93% within the Tonto National Forest (NPS 2006). Additionally, Wild and Scenic River designation has been proposed for the segment of the Verde River from the Forest Service boundary north of Paulden downstream to approximately Clarkdale.

Ash Fork
Hell Canyon
Limestone Canyon
Drake
Project Location
9.4 River Miles
Hell Canyon
Verde River
Verde River
Paulden
89
Prescott
Project Location
Project Location in Reference to the Verde River
Drake Cement Limestone Quarry
Legend
Proposed Limestone Quarry
Railroad
Rivers
Highways
0
5
Miles
TRANSCON ENVIRONMENTAL

FIGURE 3-3

The Verde River is situated in Central Arizona. The river headwaters are at Sullivan Lake in the Big Chino Valley (south of Paulden) in Yavapai County, and flows generally south for 170 miles through private, state, tribal, and National Forest System lands to the confluence with the Salt River. The cities of Camp Verde, Cottonwood, and Clarkdale are the primary population centers located along the river (NPS 2006).

Two Bureau of Reclamation storage reservoirs are located near its terminus. Water is stored in these reservoirs before being discharged into the Salt River for use by downstream municipal, agricultural and industrial entities (NPS 2006).

The river and associated riparian vegetation provide high-quality habitat for many wildlife and fish species. Thirty-one native and sport fisheries occur in the Verde River. Many aquatic, terrestrial, arboreal and aerial animal species depend directly or indirectly upon the river and its tributaries. Included within the Verde River's flora and fauna are plants and animals listed as threatened or endangered (NPS 2006).

The Verde River is one of the largest perennial rivers within the state. Sullivan Lake, an artificial reservoir at the confluence of the Big Chino and Williamson Valley Washes, is the headwater. From Sullivan Lake, the Verde flows freely for 125 miles before encountering Horseshoe Reservoir.

The Verde River is perennial, although flow varies considerably during the year. Flows are affected by changes in precipitation, upstream diversions, ground-water pumping, and evapotranspiration. Precipitation in the Verde watershed, and consequently runoff, are bimodally distributed. High runoff occurs from winter cyclonic storms, and (to a lesser extent) from convectional monsoon storms in later summer (July, August, early September). Flows peak irregularly in the winter and spring months of January through April, and reach a minimum in the summer months of May through July when precipitation is low to non-existent and irrigation diversions are high (NPS 2006). Limestone and Hell Canyons are usually dry, flowing only in response to floods.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no impacts to the Verde River because the proposed project would not be approved.

Alternative B – Proposed Action

As part of quarry operations, Drake Cement plans to pump approximately 8 acre-feet per year of water from an existing well located on the north side of Hell Canyon. A hydrogeologic review was conducted by the USGS for the proposed project (Wirt 2005). The report found that ground water associated with the well is part of a larger aquifer which has a regional flow trend toward the Verde River. The report concluded that, based upon the amount of water being extracted, any impact to flow of the Verde River would be too small to measure.

The Wild and Scenic Rivers Act (P.L. 90-542) requires that the managing agency of a designated Wild and Scenic River administer the designated area in such a manner as to protect and enhance the identified outstandingly remarkable values. Forest Service policy requires "that management prescriptions for eligible rivers assure that: 1) free-flowing characteristics are not modified, 2) ORVs are protected; and 3) management and development activities do not affect eligibility or classification. Therefore, projects with the potential to affect free flowing character, ORVs or river classification must be assessed specific to impacts to river classification or eligibility" (FSH 1909.12). The outstanding remarkable values of the Verde River within the PNF are Cultural/Historical and Fish/Wildlife. Because of the distance from the project area to the Verde River, no impacts would be expected to cultural or historical values for the

designated or eligible portions of the Verde River. Potential impacts to fish and wildlife are not expected because the project facilities are located over 5 miles from the Verde River and the relatively small amount of groundwater required for quarry activities would have no measurable effects to the base flow of the Verde River, based on the USGS review.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions occurred to consider potential cumulative effects that could occur to Wild and Scenic River resources, specifically the Verde River. The area of analysis considered for cumulative effects extends beyond the confluence of the Hell Canyon drainage and the Verde River, which is approximately 9 river miles from the proposed quarry site. Based on the review of cumulative actions, the following actions were considered in the analysis of cumulative effects to the Verde River:

- Past, present, and future mining activities
- Range management
- Proposed cement plant facility at Drake
- Land exchange/development

All activities identified above have occurred or would occur independent of the Proposed Action.

No water withdrawals are currently approved for other existing mining activities in the area, however future mining claims made in the area could require water withdrawals for operation. These activities could impact water resources in the future but there is no way to determine the degree of those possible impacts. The Gipe, Bean, Hell, and Glidden wells will continue to provide water for livestock and wildlife and therefore will continue to have impacts.

The pumping currently proposed by Drake Cement for their cement plant is approximately 62 acre-feet per year. This is less than 1% of the 50th percentile daily mean flow duration of 25 cubic feet per second at the USGS streamflow gauging station near Paulden. Such an impact on the Verde River would be impossible to discern based on the accuracy of discharge measurements at the USGS streamflow gauging station on the Verde River near Paulden. The proposed Drake Cement ground-water withdrawals would be impossible to differentiate from larger ground-water withdrawals (both current and proposed) that may reduce base-flow discharge of the upper Verde River in the future. Possible local impacts to permit-holder stock wells and King Spring may result (Wirt 2005). Impacts are difficult to predict but could result in decreased well productivity.

Land development in areas surrounding the PNF would result in impacts to ground water levels. While there is no way of knowing the amount of residential, commercial, or industrial development that may ultimately take place, these developments could result in substantial impacts to regional ground water levels. The majority of these developments would affect both the Big and Little Chino basin-fill aquifers. The Little Chino basin-fill aquifer lies within the state-designated Prescott Active Management Area (PRAMA), which regulates ground-water withdrawals. In 1999, the ADWR determined that the PRAMA no longer maintained a long-term balance between the amount of water withdrawn and the amount of water naturally and artificially recharged to the system. In order to resolve this imbalance PRAMA has made attempts to augment its water supplies from outside its watershed. Recently, the City of Prescott purchased a ranch in upper Big Chino Valley with the intent of building a pipeline to import 8,717 acre feet per year into the PRAMA (Southwest Groundwater Consultants 2004). These developments may contribute to cumulative effects to the Verde River flow levels.

In sum, human activities such as surface-water diversions and large-scale pumping of ground water may have a direct impact to the base flow of the Verde River. Potential use measurements have not been forecasted or studied where future water use is predictable. Therefore, the cumulative impacts from past,

present, and reasonably foreseeable future actions can not be adequately determined. However, it is reasonable to predict that base flow in the Verde River would decline relative to its current state and may have the potential to be cumulatively impacted from continued and additional human use in the area. The magnitude of this impact, however, is difficult to determine based on current available information.

According to the USGS, the Proposed Action's contribution to water based effects to the Verde River would be immeasurable, and the small withdrawals from this action would be impossible to differentiate from other withdrawals in Big and Little Chino Valley (both ongoing and future) (Wirt 2005).

3.3.9 Water Resources

Affected Environment

Ground Water

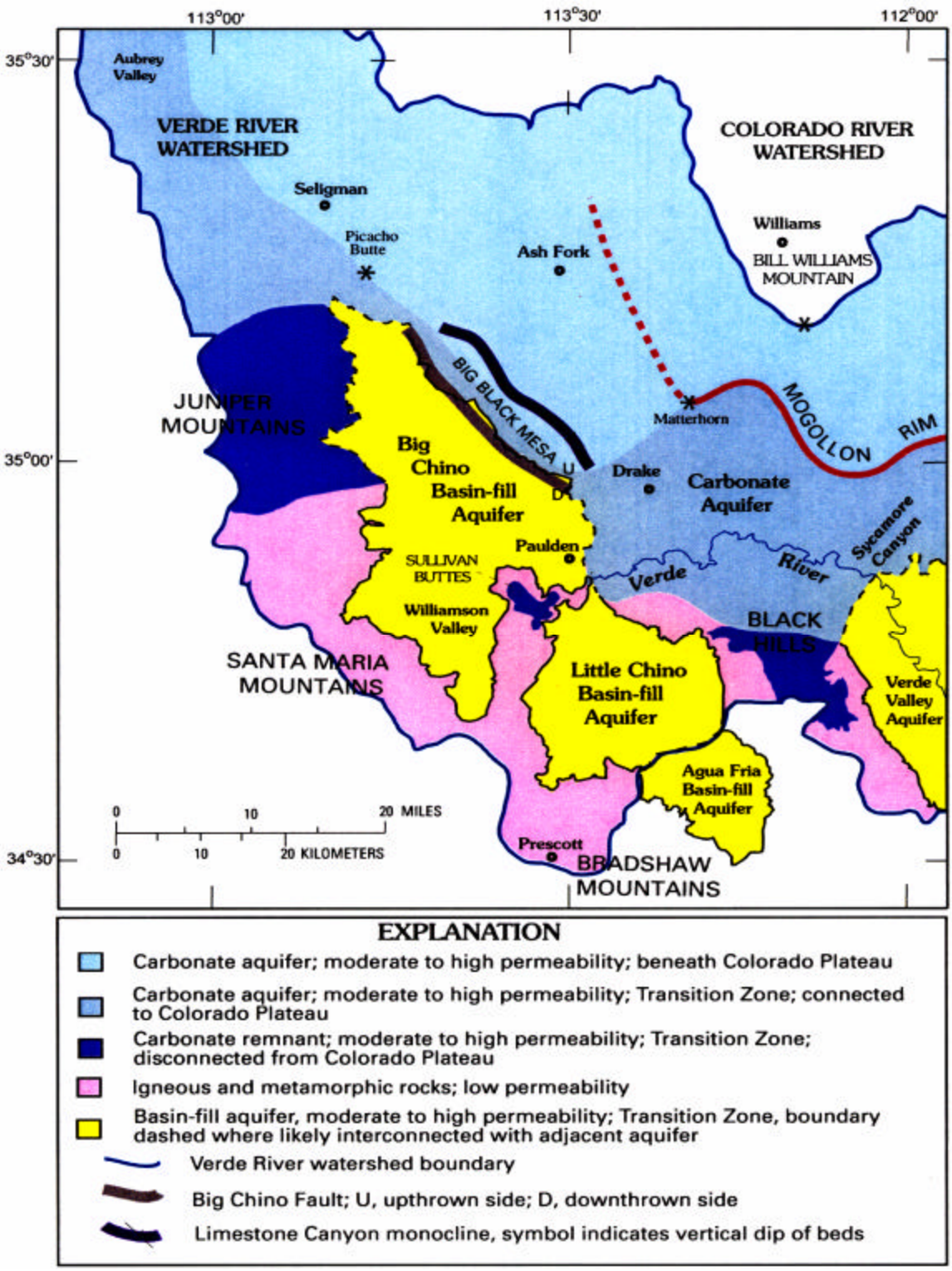
A stated objective of the PNF is to manage ground water for the long-term protection and enhancement of the Forest's streams, springs and seeps, and associated riparian and aquatic ecosystems (USDA 2001b). Ground water is an important source of water for recreation, livestock, wildlife, domestic supply, irrigation, mining, construction and other purposes within and adjacent to the Forest (USDA 2001b).

The project area occurs within the Upper Verde River Watershed, as delineated in Figure 3-4 (Wirt 2005). The Verde River traverses a distance of about 140 miles eastward from Sullivan Lake Dam to Perkinsville, then southeastward to its confluence with Fossil Creek where it continues southward until it joins with the Salt River. Total area as derived from the Arizona Land Resource Information System, GIS database, using NRCS boundaries for watershed area, is approximately 4,350 square miles. Figure 3-4 depicts watersheds and groundwater basins within Yavapai County.

The Upper Verde River watershed drains the Transition Zone geologic province along the southwestern edge of the Colorado Plateau geologic province. Alluvial basins in the Transition Zone such as Big and Little Chino Valleys and Verde Valley tend to be smaller and shallower than Basin and Range valleys further south and west. Major aquifers contributing to the upper Verde River include: 1)the two Big and Little Chino basin-fill aquifers and adjoining carbonate aquifer underlying Big Chino Valley and Big Black Mesa; and 2) the part of the carbonate aquifer directly north of the upper Verde River between Big Black Mesa and Hell Canyon.

The Big and Little Chino basin-fill aquifers have considerable storage capacity and serve as ground water reservoir and distribution systems. Recharge and discharge are the inflow and outflow terms of the storage system. Recharge (or inflow) is the percentage of precipitation that becomes ground water. The amount of recharge that occurs is dependent on many factors including climate, runoff characteristics of the soil and rock, and the amount and type of vegetation. Discharge refers to the flow in a stream as well as to the outflow from an aquifer. Discharge in a stream is naturally derived from ground-water discharge, precipitation runoff, or a combination of both. The discharge in a stream during low-flow conditions is entirely from ground-water discharge and is referred to as "base flow".

The water that comprises the Upper and Middle Verde River hydrologic system enters the system as precipitation, predominantly in the higher elevations and upper reaches of the watershed. In the upper part of the watershed, precipitation enters the subsurface through the soil and fractures in the rock, and in the mountainous areas, it emerges a short distance later as springs. The creeks typically flow for some distance in the stream channel before the water percolates down to the water table. In the project area, ground-water movement flows through the basin-fill sediments and volcanic rocks of such valleys as Chino Valley, Williamson Valley, and Little Chino Valley driven by gravity to points of discharge such as springs, natural lakes and ponds (for example King Spring), or streams. These points of discharge comprise the base flow of the Verde River.



Schematic diagram of basin-fill aquifer boundaries in relation to geologic provinces and different parts of the regional carbonate aquifer, upper Verde River watershed.
Base is from USGS digital data1:100,000. Source document: Wirt 2005, p.7, fig. 5.

FIGURE 3-4

The proposed limestone quarry is located just south of Hell Canyon and the conveyors cross the canyon and extend up the north side of the canyon. Hell Canyon is a tributary to the Verde River. Although Hell Canyon receives as much as 25 inches of annual precipitation near its headwaters near Bill Williams Mountain, the Verde River experiences no change in base flow at its confluence with Hell Canyon. This suggests that ground water does not travel beneath Hell Canyon to reach the Verde River (Wirt 2005).

Drake Cement would use groundwater as part of their mining operations (8 acre-feet per year). The primary source of the water would be from a well that is located on private land at Drake. This well is located in the Transition Zone geologic province in the regional carbonate aquifer north of the Verde River. The well is expected to penetrate thick basalt layers and produce from the water bearing zone near the base of the Martin Formation. The ground water at the site is tributary to the upper Verde River.

At Drake, the top of the water table is about 400 feet below ground surface, although in Hell Canyon it is expected to be a short distance below the stream channel. Test well drilling at this location indicated that the aquifer is under confined or artesian conditions. Water level gradients indicated that the most likely sources of ground water recharge in the area are Limestone Canyon and Hell Canyon (Wirt 2005).

The regional flow direction of the carbonate aquifer near Drake is southeast or east, along Hell Canyon toward King Spring, and ultimately toward the Verde River. Natural discharge predominantly occurs at King Spring and may also occur at several small unnamed springs.

Surface Water

There are no springs, seeps or other perennial water sources within the project area. The primary water sources near Drake include the upper Verde River, King Spring, and several stock wells used by grazing permit holders (Wirt 2005). Stock wells near Drake in the regional carbonate aquifer include the Gipe, Bean, Hell, and Glidden wells. The Hell well lies closest to the well proposed at Drake, but no well log is available for this or the Glidden well. The Gipe and Bean wells, and King Spring are interpreted as producing from the same water-bearing interval near the base of the Martin Formation and could be part of the same interconnected fracture system as the proposed well at Drake.

The proposed quarry is part of a broad ridge delineated by drainages on either side; Limestone Canyon to the south and an unnamed tributary of Hell Canyon to the north. All of the drainages associated with the project area are ephemeral and are part of the Hell Canyon watershed (HUC#15060202B).The Hell Canyon watershed is composed of the Grindstone Wash, MC Canyon, Bear Canyon, Limestone Canyon, and Hell Canyon ephemeral drainages. The Hell Canyon watershed is a Fifth Code watershed without perennial waters (PNF 2001). Hell Canyon eventually empties into the Verde River, which is approximately 9 river miles downstream from the project area.

The proposed road improvements in Limestone Canyon are located in shallow to moderately deep limestone derived soils. Although Limestone Canyon has not been assessed for water quality standards by the ADEQ, it is a tributary of Hell Canyon. Hell Canyon water quality is defined as surface waters assessed as “inconclusive” due to insufficient data to assess any designated use (ADEQ 2004). There is a hydraulic connection to the Verde River, which is in non-attainment status for turbidity.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map panel for the project area, numbered 04025C1000F, was reviewed (FEMA 2006). The area was identified as “Zone D”, areas in which flood hazards were undetermined by FEMA. The Forest Service conducted a site specific study to determine flooding potential of Limestone Canyon. As a result of this study, it was determined that a 100-year discharge would raise the water level at the location of the proposed road crossing by about 11 feet. At this level, approximately 70% of the quarry facilities area would flood under existing conditions.

Water Quality

Water quality of the upper and middle Verde River watersheds is generally considered to be excellent. Data for surface-water and ground-water quality in the upper and middle Verde River watershed are variable. Surface and ground water have exceeded some of the EPA's Primary and Secondary Maximum Contaminant Levels. According to a USGS report produced in conjunction with the ADWR and Yavapai County, groundwater quality is good, although concentrations of antimony, arsenic, fluoride, lead, nitrate, and selenium exceeded the Maximum Contaminant Levels (MCLs) of the primary drinking water standards in some samples. Fluoride and sulfide exceeded standards (4-5 % of all samples) more frequently than any other factor evaluated (USGS 2005).

Regional surface water quality concerns are primarily related to turbidity in the Verde River, fecal coliform and e. coli concentrations, and nitrogen and phosphorus concentrations in the Verde River and Oak Creek. The project area does not contain perennial surface water flows. As such, surface water quality is unknown.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, project facilities would not be constructed and surface water features would be unaffected. Because no water would be required for dust suppression or other uses, there would be no ground water or water quality impacts.

Alternative B – Proposed Action

As described in the PoO, the proposed project activities would use water, primarily for dust suppression at the quarry and along the access roads. Drake Cement has indicated that they intend to pump groundwater from a well located on private land at Drake. Based on the hydrogeologic framework described above, the well from which the water would be drawn is part of the regional carbonate aquifer within the Transition Zone. Water use for mining activities is estimated to be about 8 acre feet per year, and would result in direct impacts to ground water supplies. To put this in perspective, it is estimated that a two common crops in Arizona, cotton and alfalfa, have consumptive water use of 3.43 acre feet per acre and 4.69 acre-feet per acre, respectively (ADWR 1999). Furthermore, a standard residence in the United States uses on average about 107,000 gallons, or 0.328 acre feet of water per year. In other words, estimated annual water use at the quarry is roughly equivalent to that of about 25 residences.

The Gipe, Bean, Hell, and Glidden wells and King Springs may be affected by long-term pumping for the proposed project. Ground water withdrawal at a well site often results in water level changes to the immediate area known as cones of depression. These cones of depression often develop in response to long-term pumping, and their geometry in a karst aquifer is unpredictable. Because the water table varies by less than 10 feet between the Drake area and the upper Verde River, continuous long-term pumping could eventually influence the present ground-water flow patterns (Wirt 2005).

Likewise, impact to base flow of the Verde River as a result of proposed pumping for project implementation would be too small to measure. According to the USGS hydrogeologic review conducted for this project, the proposed ground water withdrawals would be impossible to differentiate from current and larger ground water withdrawals that may reduce base-flow discharge of the upper Verde River in the future (Wirt 2005).

Project facilities would comply with ADEQ, EPA, and ADWR regulations and Forest Service requirements regarding erosion control and storm water management (see Mitigation, Section 2.3.2). The Army Corps of Engineers has previously indicated that there would be no impacts from this project to rivers, permanent and intermittent streams, lakes, wetlands, and natural ponds. The construction and operation of the quarry facility area would occur partially within the 100-year floodplain as determined by the PNF. MSHA requires the quarry facility area to be surrounded by a 36 to 40 inch berm. This berm would be expected to reduce flooding concerns at the quarry facilities area. In addition, PNF staff concluded moving the quarry facilities upslope and east would mitigate potential impacts to the 100-year floodplain. Potential direct effects to Hell Canyon would be minimized because the conveyor would be placed on the existing but abandoned Hell Canyon highway bridge. Dust collection and suppression and other BACTs would minimize the amount of sediment within the canyon.

The proposed project facilities would affect the Limestone Canyon wash with an at-grade crossing for quarry equipment; an above-grade crossing for the conveyor system; and an at-grade crossing paralleling the conveyor alignment. At-grade crossings would require some down-cutting of wash banks, which may result in changes to channel morphology, including minor cutting, pooling, soil erosion, and sedimentation. These crossings would not be expected to affect the overall flow of Limestone Canyon and impacts to the channel would be minor because of the small area affected.

The highest potential for sediment loading to Limestone Canyon would be during construction activities associated with the access roads and the quarry facility operation area. With proper construction and maintenance, sediment loadings should be consistent with natural conditions. As designed, the quarry would be self-contained and would not drain into Limestone Canyon or Hell Canyon, eliminating sediment loading from mining activities.

The area planned for quarry facility operations is previously disturbed and protected from normal storm events within Limestone Canyon. Development of these facilities in this area does not appear likely to impact the flow or water quality in the drainage.

Minimal impacts to water quality are likely to result from quarry operations. Drake Cement plans to leave an approximate 70 to 100 foot buffer between Limestone Canyon and the quarry. The proposed quarry is below the surrounding landscape, so storm water runoff would be contained at the bottom of the quarry and allowed to evaporate. As a result, there is minimal potential of storm water runoff from the mine, other than from the backsides of the vegetated topsoil and overburden stockpiles, reaching Limestone canyon or Hell Canyon. Storm water runoff, including that from topsoil and overburden stockpiles, would be controlled (pursuant to a Storm Water Pollution Prevention Plan) and directed away from the primary drainages in the area.

The potential for water quality impacts from spills at the quarry facility operations area would be minimized by use of a concrete pad. There is low potential for spills of diesel, concentrate, and supplies at the access road crossing of Limestone Canyon. The requirement for immediate spill cleanup (refer to the Spill Prevention, Control and Countermeasures Plan in the PoO) would prevent contaminants from reaching both surface waters and the ground water beneath the mine

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects that could occur to water resources. Based on the review of cumulative actions, the following actions were considered in the analysis of cumulative effects to the water resources:

- Past, present, and future mining activities
- Range management
- Proposed cement plant facility at Drake
- Land exchange/development

All activities identified above have occurred or would occur independent of the Proposed Action.

No water withdrawals are currently approved for other existing mining activities in the area, however future mining claims made in the area could require water withdrawals for operation. These activities could impact water resources in the future but there is no way to determine the degree of those possible impacts. The Gipe, Bean, Hell, and Glidden wells will continue to provide water for livestock and wildlife and therefore will continue to have impacts on groundwater levels.

Drake Cement's proposal to construct a cement manufacturing plant would use approximately 62 acre feet per year of water. The source for the water would be a private well located on private land at Drake. While withdrawing this amount of ground water at this location may result in impacts to several existing wells in the area, 62 acre feet per year is less than 1% of the 50th percentile daily mean flow duration measured near Paulden. As such, minimal or no impacts would be expected to flow levels on the Verde River.

Land development in areas surrounding the PNF would result in impacts to ground water levels. While there is no way of knowing the amount of residential, commercial, or industrial development that may ultimately take place, these developments could result in substantial impacts to regional ground water levels. The majority of these developments would affect both the Big and Little Chino basin-fill aquifers. The Little Chino basin-fill aquifer lies within the state-designated PRAMA, which regulates ground-water withdrawals. In 1999, the ADWR determined that the PRAMA no longer maintained a long-term balance between the amount of water withdrawn and the amount of water naturally and artificially recharged to the system. In order to resolve this imbalance PRAMA has made attempts to augment its water supplies from outside its watershed. Recently, the City of Prescott purchased a ranch in upper Big Chino Valley with the intent of building a pipeline to import 8,717 acre feet per year into the PRAMA (Southwest Groundwater Consultants 2004). These developments may contribute to cumulative effects to the Verde River flow levels.

In sum, human activities such as surface-water diversions and large-scale pumping of ground water may have a direct impact to regional ground water levels and to the base flow of the Verde River. Potential use measurements have not been forecasted or studied where future water use is predictable. Therefore, the cumulative impacts from past, present, and reasonably foreseeable future actions can not be adequately determined. However, it is reasonable to predict that ground water quantities would decline relative to their current state, and water quality may have the potential to be cumulatively impacted from continued and additional human use in this area. The magnitude of this impact, however, is difficult to determine based on current available information.

According to the USGS, the Proposed Action's contribution to water based effects to the Verde River would be immeasurable, and the small withdrawals from this action would be impossible to differentiate from other withdrawals in Big and Little Chino Valley (both ongoing and future) (Wirt 2005).

3.3.10 Air Quality

Affected Environment

The air quality control region in which the limestone quarry, facility operations area, and conveyor system are located is either unclassified or is classified as being in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants: particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur oxides (SO_2), carbon monoxide (CO), lead (Pb) and ozone (O_3). Primary standards are adopted to protect public health and

secondary standards are adopted to protect public welfare. States are required to adopt ambient air quality standards, which are at least as stringent as the federal NAAQS; however, the state standards may be more stringent. Arizona has adopted the federal NAAQS as the state Ambient Air Quality standards (Table 3-4).

Table 3-4 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
CO in parts per million	1 hour	35	–
	8 hours	9	–
NO_2 in parts per million	Annual	0.053	0.053
PM_{10} in micrograms per cubic meter	24 hours	150	150
	Annual	50	50
$PM_{2.5}$ in micrograms per cubic meters	24 hours	65	65
	Annual	15	15
O_3 in parts per million	1 hour	0.12	0.12
	8 hours	0.08	0.08
SO_2 in parts per million	3 hours	–	0.5
	24 hours	0.14	–
	Annual	0.03	–
Pb in micrograms per cubic meters	Calendar quarter	1.5	1.5

Source: http://www.adeq.state.az.us/environ/air/plan/stand.html

The closest air monitoring stations to the project site are located in Clarkdale, approximately 20 miles to the southeast, and in Sycamore Canyon, located about 25 miles to the northeast of the proposed project area.

Amendments to the Clean Air Act establish Class I, II and III areas, where emissions of particulate matter and sulfur dioxide are to be restricted. The restrictions are most severe in Class I areas and are progressively more lenient in Class II and III areas.

The proposed project is located within 50 miles of three Class I areas (Table 3-5), and within 30 miles of five Class II wilderness areas (refer to Figure 3-2).

Table 3-5 Class I Areas near the Drake Cement Limestone Quarry

Class I Area	Federal Land Manager	Nearest Distance to Quarry Area
Sycamore Canyon Wilderness	Forest Service	15 miles
Yavapai-Apache Reservation	Yavapai-Apache Tribe	35 miles
Pine Mountain West Wilderness	Forest Service	50 miles

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, mining activities would not occur and no air quality impacts would be expected. The proposed Drake Cement limestone quarry is located in an area that has been designated as attainment or unclassifiable for all criteria pollutants and this designation would not change by implementing this alternative.

Alternative B – Proposed Action

Air quality is determined primarily by the type and amount of contaminants emitted into the atmosphere, the size and topography of the region, and the pollutant-dispersing properties of local weather patterns. The proposed Drake Cement limestone quarry is located in an area that has been designated as attainment or unclassifiable for all criteria pollutants.

The pertinent requirements for ambient air quality impact analyses and other impact analyses are found in A.A.C. R18-2-406(A)(5) and R18-2-407. Estimated air quality impacts are based upon the analysis performed by Drake Cement as part of their ADEQ Air Quality Permit application (Number 1001770).

Additional analyses required under A.A.C. R18-2-407 include an analysis of the impairment to visibility, soils, and vegetation, and an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the new source or modification.

Proposed activities that could affect air quality include travel along unpaved roads, blasting in the quarry using a mixture of ammonium nitrate and fuel oil as the blasting agent, loading of limestone rubble into quarry trucks using front-end loaders, transporting the rubble to the primary crusher, crushing the material using an integral vibrating screen, and transporting the crushed and screened limestone material to the privately owned property using a series of three overland conveyors.

A standard Class I Prevention of Significant Deterioration (PSD) permit was issued by ADEQ on April 12, 2006, which included activities planned for quarry operations. Emission rate modeling was conducted for the Air Quality Permit application. Table 3-6 presents a summary of the estimated maximum annual emissions from activities associated with the Proposed Action.

Table 3-6 Emissions Summary

Emission Point	Emissions (tons/year)			
	NOx	**SO_2**	**CO**	**PM_{10}**
Quarry face and unpaved roads	0.00	0.00	0.00	8.46
Limestone blasting	2.15	0.25	8.46	0.14
Other quarry operations	0.00	0.00	0.00	0.06
Crusher and conveyor system transfer points	0.00	0.00	0.00	2.22

Quarry Face and Unpaved Roads – Particulate matter emissions would result from vehicle traffic on unpaved roads, including trucks on quarry roads and Caterpillar movement at the working face of the quarry. The working face of the quarry is expected to result in about 0.83 tons/year of uncontrolled PM_{10} emissions. Use of the unpaved quarry access road would result in about 19.08 tons/year of uncontrolled PM_{10} emissions. BACT would involve watering the unpaved quarry road and would result in an estimated reduction of PM_{10} emissions of 60% (8.46 tons/year).

Limestone Blasting – Emissions of gaseous pollutants from limestone blasting occur due to detonation of the ammonium nitrate-fuel oil mixture. These emissions are estimated based on an estimated 48 blasts per year and include potential emissions of 2.15 tons/year of NOx, 8.46 tons/year of CO, and 0.3 tons/year of SO_2. Particulate matter emissions would also result from limestone blasting due to shattering of the rock. The blasting would result in about 0.14 tons/year of uncontrolled PM_{10} emissions.

Other Quarry Operations – Emissions would also result from limestone drilling, loading of limestone into trucks using a front loader, and unloading of limestone from trucks into the hopper of the primary crusher. These activities would result in about 0.26 tons/year of uncontrolled particulate emissions. BACT pursuant to the air quality application would involve spray watering and would result in an estimated reduction of particulate emissions of 75% (0.006 tons/year).

Crusher and Conveyor System Transfer Points – Particulate matter emissions would result from dust collectors serving the primary crusher and the three overland conveyors. Each of the dust controllers is subject to BACT emission limitations. The primary crusher is expected to result in particulate matter emissions of about 1.26 tons/year, while the dust collectors for the three conveyors would cumulatively emit about 0.96 tons/year in particulate emissions.

As a result of BACT measures, the proposed limestone quarry, facility operations area, access roads, and conveyor system would not be expected to result in major air quality impacts. PM_{10} emissions resulting from the unpaved access road; quarry workface; limestone blasting, drilling, and loading; and from the primary crusher and overland conveyors would be minimized to the extent possible through the use of water spray. There are no human receptors in the immediate vicinity of the proposed project, resulting in minimal air quality impacts. None of the activities would result in the potential for an accidental release of air toxic emissions or hazardous materials posing a threat to public health and safety. Similarly, the Proposed Action would not create objectionable odors.

The proposed limestone quarry and associated facilities do not occur on unique habitat or habitat utilized by special status species. Particulate matter emissions and deposition adjacent to the access roads, crusher and conveyance system transfer points would occur, but would not be expected to result in significant impacts to plants or wildlife. Emissions were also compared with the sensitive vegetation thresholds listed in EPA's Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals and all were determined to be below the screening thresholds (ADEQ 2005).

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects that could occur to air quality. The following actions were considered in the analysis of cumulative effects to air quality:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

All activities identified as part of cumulative actions listed above have occurred or would occur independent of the Proposed Action. In addition to existing flagstone and sand and gravel mining that currently exists, other hardrock, mineral, or volcanic mining may occur in the project vicinity. The existing flagstone mines, processing facilities, and transportation of the product along unpaved roads have in the past, and would continue to, generate uncontrolled PM_{10} emissions. Based on limited limestone exploration drilling completed to date, potential raw material reserves of limestone exist within the general area; as a result, it is possible that additional limestone mining will take place in the project vicinity. Potential air quality impacts would likely be similar to the Proposed Action with PM_{10} emissions

resulting from the unpaved roads; quarry workface; limestone blasting, drilling, and loading; and from crushers and conveyors.

Land clearing and land development in the project vicinity would also impact the regions air quality. During land clearing and construction, PM_{10} emissions would be the primary concern, although CO emissions from construction vehicles would also increase. As the area becomes more developed, CO emissions from residents, workers, and visitors vehicles would increase. Development and related population growth expected during the next twenty years could potentially cause air quality degradation.

Drake Cement has proposed constructing a cement manufacturing plant on private land near Drake. As part of their ADEQ Air Quality Permit application (Air Quality Permit Number 1001770), the proposed cement manufacturing facility was determined to be a major source of NOx, CO, PM_{10}, and Volatile Organic Compound (VOC). As part of their permit application, PSD increment consumption analysis was conducted to determine if the cement plant could cause or contribute to the exceedance of the PSD Class I area increments. Only PM_{10} and NO_2 exceeded the modeling significance thresholds, and a full impact analysis for these pollutants was conducted. In developing the 1996 proposal for New Source Review Reform, the EPA determined that, as long as no individual source contribution exceeds 4% of a Class I increment, it is unlikely that the accumulation of source over time will exceed that increment. As such, the 4 % threshold is used as a "significance level" for determining the need for a cumulative source impact analysis to demonstrate compliance with the Class I increments. As a result of these analyses, the maximum model-predicted impacts were all below the PSD Class I significance levels.

ADEQ performed additional analyses for the Sycamore Canyon Wilderness to investigate the potential pollutant and visibility impacts of both the proposed Drake Cement facility and the existing Phoenix Cement Plant in Clarkdale. The results of the study demonstrated that the impacts from these two facilities would not be cumulative because the maximum impacts are expected occur at different locations and under different meteorological conditions.

The Proposed Action would contribute quite minorly to the cumulative effects to air quality generated by these other projects because of mitigations in place to meet air quality standards. Cumulatively, overall air quality would be maintained to State standards.

3.3.11 Noise

Affected Environment

Several factors affect sound as the human ear perceives it. These include the actual level of sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels. These measurements are adjusted or weighted to correspond to the frequencies the human ear can hear. The "A-weighted sound level" or "dBA," is used in view of its widespread recognition and its close correlation with human perception of noise. In the current study, noise levels are reported in dBA. Table 3-7 lists typical noise levels from representative sources.

Table 3-7 Common Noise Levels

Source	dBA
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters (1,640 feet)	100

Table 3-7 Common Noise Levels	
Source	**dBA**
Train horn at 30 meters (100 feet)	90
Freight train at 30 meters (100 feet)	95
Heavy truck at 15 meters (50 feet)	90
Tractor or lawn mower at 15 meters (50 feet)	85
Busy city street, loud shout	80
Busy traffic intersection	80
Highway traffic at 15 meters (50 feet)	70
Predominantly industrial area	60
Background noise in an office	50
Suburban areas with medium density transportation	50
Soft whisper at 5 meters (16 feet)	30
Threshold of hearing	0
Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decreases loudness by about 50%. Source: Egan, M. David 1988. City Environmental Quality Review Technical Manual.	

Very few noises are constant; therefore, it is necessary to describe noise over periods of time. One way to describe the fluctuating noise heard over a specific time period, is as if it had been a steady, unchanging sound. For this condition, a descriptor called the equivalent continuous sound level can be computed from measured data. This descriptor is the time-weighted average sound level that, in a given situation and time period (e.g., 10 hours per day), conveys the equivalent sound energy as the actual time-varying sound.

The proposed project is located in a rural area within the PNF with no residential or commercial development within 3 miles of the proposed facilities. The only human noise receptors in the vicinity of the project area are recreational visitors, Forest Service employees, and laborers at the flagstone processing (industrial) facilities at Drake. The proposed project site is presently National Forest System land, as is the surrounding land. Current noise sources in and adjacent to the project area are primarily associated with vehicle traffic along SR 89 and CR 71, train traffic, flagstone processing activities, as well as firearm practice. The land is generally level, with gentle undulations. At the present time, sound transmission is limited due to ground absorption, as well as shielding by interposing topography. Ambient noise levels in the vicinity of the site are estimated to be near 40 dBA, mostly from distant traffic sources and from natural events including wind and animal sounds.

Yavapai County does not have an official noise ordinance. The PNF does not have a noise element within its Forest Plan.

Environmental Consequences

Alternative A – No Action

Mining activities would not occur as a result of implementation of the No Action Alternative. As a result, the existing ambient noise levels of the project area would not change. Noise sources in and adjacent to the project area would continue to be associated with vehicle traffic along SR 89 and County Road 71, train traffic, flagstone processing activities, as well as firearm practice at the existing quarry.

Alternative B – Proposed Action

The primary noise generators resulting from implementation of the Proposed Action would be blasting, excavating, heavy materials handling equipment, the primary crusher, and the conveyance system. Table 3-8 depicts estimated noise levels for these project elements at the noise source and at distances of 100, 500, and 1,000 meters.

Table 3-8 Noise Specifications for Limestone Quarry

Sound Source	Sound Level (dBA)	Operating Time of Sound Source (hr/day)	Equivalent Continuous Sound Level (dBA)	Sound Level (dBA) at 100m	Sound Level (dBA) at 500m	Sound Level (dBA) at 1000m
Fixed Equipment						
Apron Feeder	85 (-30)	10	51	11	0	0
Vibrating Screen	95 (-30)	10	61	21	7	1
Primary Crusher	95 (-30)	10	61	21	7	1
Compressor for Dust Collectors	95 (-30)	10	61	21	7	1
First Overland Belt Conveyor	75	10	71	31	17	11
Filter Fan	80	10	76	36	22	16
Second Overland Belt Conveyor	75	10	71	31	17	11
Filter Fan	80	10	76	36	22	16
Third Overland Belt Conveyor	75	10	71	31	17	11
Filter Fan	80	10	76	36	22	16
Total Sound Level of Fixed Equipment:			**82**	**42**	**28**	**22**
Mobil Equipment						
Payloader (11 tons)	85	10	81	58	44	38
Haul Truck 1 (55 tons)	85	10	81	58	44	38
Haul Truck 2 (55 tons)	85	10	81	58	44	38
Water Truck (12 tons)	75	3	66	43	29	23
Total Sound Level of Mobil Equipment:			**86**	**63**	**49**	**42**
Drilling						
Drilling	90	5	83	43	29	23
Total Sound Level of Drilling:			**83**	**43**	**29**	**23**
Blasting						
Blasting	110	0.014	78	78	65	58
Total Sound Level of Blasting:			**78**	**78**	**65**	**58**

Notes: (-30) indicates estimated sound reduction as a result of equipment located within an enclosed building.
Source: Cement Engineers Handbook, originated by Otto Labahn, Fourth Edition by B. Kohlhass and 16 other authors, 1983.

As depicted in Table 3-8, noise levels generated by the equipment and facilities would range between 75 dBA and 110 dBA. After factoring the time-weighted average sound level, the Equivalent Continuous Sound Level for these noise sources ranges between 51 dBA and 81 dBA.

Generally, noise levels generated from the proposed activities at the nearest residences or commercial facilities would be indiscernible over ambient noise levels (about 40 dBA). The one exception would likely be blasting activities which may be heard over ambient noise levels, depending upon prevailing winds and topographic factors. As a result, public nuisance and noise are expected to minimal because of the short duration, level of operations planned and distance from nearby communities and rural residences. Visitors to the area may experience annoyance from increased noise levels as a result of mining and conveyance activities. Because of the remote nature of the project site and restrictions to public access for safety reasons, however, most visitors would not come within 0.5 mile of the noise sources. With the exception of the blasting activities, all other noise levels at that distance would be below 45 dBA; blasting noise would be about 58 dBA at that distance.

Wildlife inhabiting the project area may be affected by noise generated by the proposed equipment and facilities and by blasting events. Although no federally-listed threatened or endangered species were identified in the project area, some wildlife such as the pronghorn antelope may initially be affected by the project-generated noise and avoid or move from the area.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to assess potential cumulative noise effects. Because noise levels diminish rapidly as one moves farther from the noise source, the area of analysis considered for cumulative effects from noise was the proposed limestone quarry area and the area around Drake. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis of noise quality:

- Past, present, and future mining related activities
- Road and railroad use and maintenance
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. Flagstone processing and vehicle traffic along SR 89 and CR 71 would continue to be the primary sources of noise in the vicinity of the Proposed Action and contribute to the ambient noise level of 40 dBA. The proposed cement manufacturing plant at Drake would increase noise levels in the project area. Although expected noise levels at the plant are unknown, cement plants are typically characterized by high noise levels due to the breaking of raw materials, the traction systems of the mills, and the fans and blowers for the transport of gasses and materials. Typical cement plants have the potential to generate high noise levels in the range of 87 to 115 dBA, although most of the major noise sources are located within enclosed structures that reduce the noise levels.

These present and future actions would generate noise which would extend beyond their project footprint. Cumulatively, these actions, combined with the Proposed Action would increase noise levels in the project area. Noise generated as a result of the Proposed Action, however, would be primarily located at the limestone quarry, which is about 0.54 miles from the Drake area. Occasional blasting at the quarry would be the only noise that would typically be heard at this distance.

Present and future actions are all located distant from sensitive human receptors and would generally be indistinguishable from ambient noise levels in the communities surrounding the Forest. Recreational visitors to the project area would likely be affected by the increase in noise resulting from cement plant

construction and operation, although most visitors to this portion of the Forest area are traveling through the area to other destinations and do not have the expectation of solitude. Noise in the Drake area would increase as a result of the existing flagstone processing facilities combined with the proposed cement plant, although these noise levels would not be intrusive to area residents or to visitors traveling through the Forest. Noise impacts to wildlife would be expected in the vicinity of the proposed cement plant, although wildlife would be expected to adapt to the facility's noise, or move from the project area.

3.3.12 Hazards

Affected Environment

The project area is uninhabited and there are no residents or sensitive receptors within 3 miles of the project area. Current land uses include livestock grazing and recreational uses primarily in the form of firearm practice, hunting, or sightseeing. Existing human health and safety concerns are primarily related to the unofficial use of the quarry area for firearm shooting and walking around or on the abandoned highway bridge. Although various materials, including appliances, tires, and furniture have been dumped in the area, no hazardous materials were identified.

The project area is near and contains vegetated areas includes juniper, grasses, and other vegetation. Fire hazards exist from lightning strikes, which cannot be prevented, or human and mechanical causes. Indirectly, the project area may be subject to fire hazards in other locations where fire may be started by either natural or human means and then spread. The project area is within a larger region that has not received abundant precipitation in some time. The drought level can be categorized as being between moderate and severe intensity (US Drought Monitor 2006), therefore adding a factor that increases fire hazard potential.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, human health and safety conditions would not change, even if the proposed project was not implemented. Recreational uses of the area for target shooting or hunting would likely continue, as would other dispersed recreational activities. The potential for either natural or man-made fires would remain.

Alternative B – Proposed Action

Project implementation would not result in impacts to police, fire or ambulance services because the majority of construction activities would occur in undeveloped and rural areas and would not hinder or alter emergency service access.

The quarry area would be closed to the general public. These access restrictions would be maintained and would consist of signs, berms, and fencing around the pit area. Unauthorized access to the area may result in an increased risk to public safety, primarily from the pit highwall, although fencing and posting of highwalls during operations and reclamation after mining would minimize the short- and long-term risks.

Potential hazards related to constructing and operating proposed project facilities include the possible existence of sites containing fuels, chemicals, or other toxic or hazardous substances, and the use of, or accidents involving, hazardous materials during mining activities. One above-ground, double-walled diesel fuel tank (approximately 2,500 gallons), oil and other lubricants, and miscellaneous equipment and materials including waste receptacles, waste oil storage containers would be located at the quarry facilities area. As described in the PoO, fuel and other petroleum products used in the operations would be stored in above-ground tanks. Fuel storage and fueling activities and lubricants would be contained on

a concrete pad with spill containment. Drake Cement has developed a Spill Prevention, Containment, and Countermeasures Plan, which addresses safe storage and handling of these materials. None of these materials would be left or disposed of on-site following project implementation. As a result, no potential hazardous material impacts are expected.

Solid waste is another potential environmental problem in cement industries. Because dust emission is a persistent problem, a large amount of dust settles on the surrounding areas over a period of time. However, this can be controlled to a great extent with dust suppression within the quarry and on the access roads and dust collection at the primary crusher and the conveyor transfer points. Because of the proposed mitigation measures, no significant solid waste impacts would be expected as a result of project implementation.

Drilling and blasting would be conducted during normal working hours. Blasting would be conducted approximately once per week or four times per month. No explosives would be stored on the National Forest System lands. The explosives for each shot would be delivered down hole and detonated the same day. All materials needed for the blast on the scheduled day of detonation would be delivered to the site on the day of blasting and all unused explosives would be removed from National Forest System lands after the detonation. Drake Cement and their contractors would follow all federal and state regulations and safety procedures for drilling and blasting to prevent injury to persons and damage to public and private property. Therefore, no significant impact to human health and safety would be expected from these activities.

The Proposed Action slightly increases the likelihood of wildfire due to the direct increase in human and mechanical activity in the project area. Although not foreseen, unplanned fire could result from accidental ignition of vegetation during quarry operation activities. Fires ignited as a result of quarry activities could spread to areas beyond the project site. Because quarry operations would require removal of vegetation, the potential for wildfire ignition in this area would be minimal. Areas where the conveyor system is located that would still contain vegetation pose some level of risk for a fire accidentally igniting. Drake Cement would comply with MSHA standards and safety measures would be employed during project operations to prevent human-caused fire and minimize this hazard. Fire hazard would still remain from unpreventable events, such as lightning and be exaggerated by drought conditions.

Cumulative Effects

Past, present and reasonably foreseeable future actions that may cumulatively result in hazards and human health and safety concerns in the project area include:

- Present and future mining related activities
- Recreational use
- Road and railroad use and maintenance
- Proposed cement manufacturing facility at Drake

Present and future mining activities could result in increased hazards in the general area, although the Forest Service approval process for prospective mine sites considers potential impacts to public safety. Recreational use of the project area would decrease as a result of access restrictions. Fire hazards as a result of firearm shooting and related activities would also be reduced by these access restrictions. Surrounding National Forest System lands may experience increased recreational use, including some of the unofficial uses that currently exist at the quarry site. In addition, population growth in the areas surrounding the PNF would result in increased demand for recreational uses. Road and railroad maintenance activities would continue into the future resulting in human health and safety risk while these activities are ongoing. Fire hazards from the flagstone processing and the use and maintenance of state, county, and forest roads in the area would continue to create a low level of fire concern.

The proposed construction and operation of the cement manufacturing facility would increase the potential for human health and safety concerns, including the potential for accidental release of hazardous materials, increased dust and other air emissions, worker safety, and human caused fires. It is assumed that the proposed plant would comply with all federal, state, and local health and safety guidelines. Traffic generated by cement plant operations would result in increased hazards to travelers on SR 89, primarily at the junction of SR 89 and CR 71, as the cement trucks leave or enter the plant facilities. The Arizona Department of Transportation would determine the need for turn lanes or other forms of traffic control to alleviate safety concerns at this location.

Because of compliance with safety standards and proposed mitigations, the Proposed Action would only contribute minor impacts to human and health safety when added to the other present and reasonably foreseeable future actions.

3.3.13 Land Use

Affected Environment

Land uses in the project area and the vicinity include livestock grazing and dispersed recreation. Developments adjacent to the project area include ranching infrastructure like livestock water improvements, SR 89, CR 71, various Forest Service roads, a natural gas pipeline, electrical transmission lines, the Topeka and Santa Fe Railroad, flagstone-storage and processing facilities located along CR 71. Prime and/or unique farmland currently does not exist within or in the vicinity of the project area.

The project area is located within two grazing allotments: Limestone allotment and the West Bear/Del Rio allotment.

The West Bear/Del Rio allotment is approximately 72,315 total acres and is currently supporting up to 10,200 Animal unit months (AUM) (850 head of cattle and 10 horses). AUMs can be described as the forage necessary to sustain one animal for one month. On both the West Bear/Del Rio and Limestone allotments, one mature cow and her nursing calf are considered one animal. The allotment consists of 21 pastures which are not designated strictly for either winter (dormant season) or summer (growing season) use. The Allotment Management Plan developed for this allotment calls for 37 pastures with 15 pastures utilized by two smaller herds during for dormant season and 25 pastures utilized by a single, combined herd during the growing season use. Grazing activity is managed under a deferred rotational system using a recovery/rest strategy for the pastures.

The Limestone allotment is approximately 57,627 acres in size. Permitted stocking rates have been drastically reduced on the Limestone allotment from a high of 9,710 AUMs in 1988 to 918 AUMs currently. This 91% reduction stemmed from a continued downward trend in range condition, a rating of poor to very poor on nearly all acres, unacceptable soil loss on some acres, and a desire by the PNF to realize the moderate re-vegetation potential on one-half of the allotment. This allotment is currently in a non-use status.

A description of existing recreation occurring within this portion of the PNF is included in Section 3.3.14.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the limestone quarry and conveyor system would not be constructed and existing or planned land uses would be unaffected.

Alternative B – Proposed Action

Under the Proposed Action, impacts to overall land uses are anticipated to be minor. Existing land uses in and adjacent to the project area including SR 89, CR 71, a natural gas pipeline, electrical transmission lines, the Topeka and Santa Fe Railroad, and flagstone-storage and processing facilities located along CR 71 would be unaffected by the Proposed Action. Potential impacts to Forest roads are discussed in Section 3.3.15.

There would be impacts to two grazing allotments, as existing acreage that is currently available for grazing purposes would not longer be available as a result of quarry operations. Approximately 1.35 acres would be removed from the Limestone allotment, and approximately 1.06 acres would be removed from the West Bear/Del Rio allotment. This is approximately 0.00236 % of the Limestone allotment acreage, and approximately 0.00179 % of the West Bear/Del Rio allotment. Therefore, overall impacts to these grazing allotment holders would be minimal. The Limestone allotment is currently in a non-use status, and therefore no impacts to grazing would result.

Quarry activities would not cause direct impacts to cattle, as boundary fences would be constructed to keep them from entering the project area. The current pasture fence that is located on the 160 acre private parcel would be relocated and a new fence would be installed. The project may cause indirect impacts and disrupt cattle when operations at the quarry occur, because noise from operations may startle them or encourage movement to other areas.

Cumulative Effects

Past, present, and reasonably foreseeable future actions in the project vicinity that may result in cumulative land use impacts include:

- Past, present, and future mining related activities
- Range management
- Road and railroad use and maintenance
- Proposed cement manufacturing facility in Drake
- Land exchange/development
- Utilities, including pipelines

All activities identified as part of cumulative actions listed above would impact land management and use and have occurred or would occur independent of the Proposed Action. Existing land management and use of the PNF would continue, including grazing allotments; various state, county, and Forest roads; railroads; and transmission lines and pipelines. Past, present, and future land uses on private land include the existing flagstone processing facilities at Drake, the proposed cement manufacturing facility, the proposed Transwestern Pipeline, and land development in areas surrounding the PNF. None of these actions would result in the physical division of an established residential or mixed-use community or would conflict with applicable PNF or Yavapai County land use plans, policies, goals, or regulations. Therefore, the land use impacts of the Proposed Action would only contribute minor effects when added to the other present and reasonably foreseeable future actions.

3.3.14 Recreation

Affected Environment

The natural to rural settings of much of the project area are conducive to a variety of outdoor recreational activities. Recreational activities in the general area are undeveloped and dispersed in nature and range from target shooting, dispersed camping, hunting, to recreational driving. Field reviews of the area provided evidence that the area associated with the quarry has been adopted as a popular target practice area for local firearm enthusiasts. In addition, evidence of dispersed camping can be found near the existing quarry. The project is located within Arizona Game and Fish Department (AGFD) Game Management Unit 8. Within this portion of the unit there are hunting opportunities for mule deer in the pinion pine and juniper stands and antelope in the flat grasslands located to the east of Drake. In the region surrounding the project area recreational driving opportunities can be found along SR 89, CR 71, CR 70, FR 186 and FR 173.

There are no Forest Service designated or organized recreational areas within the project area or in the region surrounding the project site, including campgrounds or recreational staging areas. The Great Western Trail passes thought the Perkinsville area, approximately 10 miles to the east of the project area. The Great Western Trail is a series of trails and back roads that are proposed as a trail corridor that would connect Mexico to Canada and would pass through Arizona, Utah, Idaho, and Montana. The Verde River is approximately 5 linear miles and 9 river miles from the nearest portion of the project area; portions of this river were designated in 1984 by Congress as a Wild and Scenic River. The Verde River provides opportunities for fishing, boating, whitewater rafting, hiking, biking, and wildlife viewing.

The Forest Service uses the Recreation Opportunity Spectrum (ROS) as their basic framework for planning and managing recreational resources. The ROS system provides a background for defining classes of outdoor recreation environments, activities and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum that is divided into six classes. The PNF has identified the areas associated with the proposed project as Roaded Natural Appearing and Rural. These designations describe the area associated with the project as containing more developed and higher use access routes and with some level of modification to the surrounding vegetative communities.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be approved, and recreational uses within the project area would continue as they do today.

Alternative B – Proposed Action

Under the Proposed Action, recreational uses within the project area would be restricted or entirely eliminated due to changes in access, the limestone quarry, and the conveyor system. Specifically, the project would displace target shooters who use the existing quarry for recreational target shooting and to site-in firearms. These firearm enthusiasts would likely relocate to other areas on the PNF for target shooting or use target ranges in the surrounding communities. The loss of the quarry as a target shooting area may increase pressures for such activities on other areas within PNF. Additionally, the project would restrict AGFD permitted hunters in the area, and prohibit their use of the quarry area for hunting activities. Dispersed recreational use such as sightseeing, would be unaffected by the Proposed Action. However, photographers and others wishing to view the historic railroad and highway bridges would be

unable to access portions of the project area. Public access to Hell Canyon in the project area for recreational purposes would also be eliminated as a result of the Proposed Action. Resulting recreational impacts would be minimal because adjacent portions of Hell Canyon would still be available.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to recreation resources. The following actions were considered in the cumulative effects analysis to recreation resources:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Recreational uses

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. Other actions that have occurred or are occurring in the area have contributed to the recreational use of the parcels. Past mining activities could have added minor incentive to recreational shooters because of the condition of the landscape. The growth and development near the Forest is likely to contribute to additional recreational use of the surrounding National Forest landscape. Drake Cement would build the cement manufacturing plant on private land. Impacts to recreational activities are not anticipated; however, the presence and operation of the cement plant may discourage recreationists due to noise and increases in road traffic. Direct impacts to the recreation use that occurs on private lands is not anticipated. Recreational use of private land should be preceded by appropriate permissions from property owners prior to engaging in these activities, and in general is not considered "public" recreation in the same sense as that which the National Forest System lands contribute. The Proposed Action would contribute minor effects to the cumulative effects of these other activities to the recreation resource.

3.3.15 Infrastructure Improvements

Affected Environment

In general, infrastructure improvements include roads, trails, utility corridors, communication systems and other improvements that exist on the landscape. These systems provide access (motor and foot) uses as well as overall connection to larger improvements and services (such as utility improvements). There is existing infrastructure on and within the vicinity of the project area. Table 3-9 identifies the infrastructure improvements and where applicable the right-of-way authorization associated with it that exist within close proximity of the project area (also refer to Figure 1-2).

Table 3-9 Rights-of-Way

Right-of-Way	PNF Right-of-Way No.	Width (feet)
State Route 89	CHI101219	40
Topeka and Santa Fe Railroad	CHI400104	200
El Paso Gas Pipeline	A3615	30
APS 69kV Transmission Line	CHI401903	80
Forest Road 680	–	12 – 15
Forest Road 680A	–	12 – 15

Table 3-9 Rights-of-Way		
Right-of-Way	**PNF Right-of-Way No.**	**Width (feet)**
Forest Road 0492E	–	12 – 15
Forest Road 9711F	–	12 – 15
Forest Road 9024Y	–	12 – 15
Forest Road 9082G	–	12 – 15
Forest Road 9024A	–	12 – 15
Forest Road 9024B	–	12 – 15
County Road 71	–	25 – 30
Source: Prescott National Forest		

The transportation system within the PNF is managed to provide cost effective, safe transportation for commercial and recreation users. There are approximately 542 miles of arterial and collector roads, 1,286 miles of local roads, and 705 miles of travelways within the PNF. In addition, there are approximately 928 miles of state and Federal highways that run through or are in close proximity to the National Forest. Approximately 80 % of the existing arterial and collector roads are in need of reconstruction to meet current standards and prevent resource damage. Most of the access roads are maintained by both the Forest Service and Yavapai County with current road densities averaging 0.85 miles of road per square mile of Forest (USDA 1986).

Physical access routes are roads and trails that provide points of ingress and egress. Public access routes are roads and trails that are open to public use. Legal access is provided with roads that have valid rights-of-way with the PNF. Currently, all Forest access roads identified in Table 3-9 above are open for travel to the public (refer to Figure 2-6).

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and there would be no impact (modification or improvements) to existing infrastructure.

Alternative B – Proposed Action

Under the Proposed Action, there would be direct impacts to existing transportation infrastructure that is within the vicinity of the project area and provides access to the quarry operation. A Project Level Roads Summary Report (Transcon 2005) was prepared that addressed Drake Cement's proposals to modify the existing access structure of the area. Approximately 10.4 miles of roads were analyzed within the project area. Public travel within the quarry site during operations would pose safety concerns. As a result, Drake Cement would install three gates (refer to Figure 2-6). Two gates would control access to the quarry near the site boundaries, and one would facilitate travel of oversized equipment at the SR 89 and FR 680 junction. The gate at the SR 89 and FR 680 junction would be installed adjacent to the existing cattleguard and opened only when large vehicles need access. Regular public ingress and egress on FR 680 would remain open continuously over the existing cattleguard. The other two gates would prevent public access and remain closed. They are proposed for the junction of County Road 71 and FR 680A, and the intersection of FR 680 A and FR 9711F, respectively. In addition, road improvements would also

occur on approximately 1.4 miles of the existing access roads. A summary of proposed road improvements and closures is identified in Table 3-10.

Table 3-10 Roads Impact Analysis Summary		
Road	**Impact**	**Closure**
FR 680	Currently maintained as level 2; Maintenance would be upgraded to level 4; Widened.	None
FR 680A	Currently maintained as level 2; Maintenance would be upgraded to level 4; Widened.	Closure would occur at the junction with County Road 71 and junction with FR 9711F
FR 9024B	Currently maintained as level 2; Maintenance would be upgraded to level 4; Widened.	Access would be restricted from public use from closure of FR 680A at County Road 71 and FR 9711F junctions
FR 9024Y	No change	None
FR 0492E	No change	None
FR 9711F	No change	None
FR 9082G	No change	None
FR 9024A	No change	None
CR 71	No change	None
Maintenance Levels: 1 = Basic custodial care (closed); 2 = High clearance vehicles; 3 = Suitable for passenger cars; 4 = Moderate degree of user comfort; 5 = High degree of user comfort		

Impacts to existing roads as a result of the proposed project would be minor. This was based on the following criteria:

- The planned road use and proposed improvements would not impact PNF road maintenance activities or budgets. Road maintenance and improvements would be performed by Drake Cement.
- Some road segments that are proposed for improvement would change the level of service rating. The proposed improvement would improve the condition and safety of the roads.
- The public would continue to access the surrounding PNF land from existing roads.
- Existing permittees would continue to access their permitted uses from existing roads.
- Modifications are planned on existing alignments and would create minor increases to the existing road prism by increasing the width and providing drainage.
- The continued use of the existing roads, rather than construction of new roads, would limit impacts to sensitive species. Impacts to sensitive species or ecosystems from road improvements and use are expected to be low.

Additionally, approximately 1.4 miles of existing access roads would be improved and approximately 0.2 miles of new roads would be constructed for this project. This would serve as access between the quarry facility area and the quarry and would not be open for public use. Impacts associated with this new construction relate to minor topographic (i.e. grade) modifications, soils disturbance, water resources used for dust suppression, and vegetation loss that would result from road installation (see appropriate resource sections for further discussion of these impacts).

Operations at the quarry and the conveyor system would not disturb or impair any other infrastructure facilities. Truck traffic along SR 89 would not increase as a result of quarry operations. No hauling of extracted quarry materials and subsequent increase in traffic would result because materials would be transported via the conveyor system to adjacent private land. Daily access to the quarry area by employees would incrementally increase traffic levels in the project area, although total traffic to the project area may decrease as a result of eliminating non-authorized access to the quarry area. Approximately ten round trips per day would be expected as a result of project implementation.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to infrastructure improvements. The area of analysis considered for cumulative effects was the proposed limestone quarry area and the proposed cement manufacturing facility site. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to infrastructure improvements:

- Past, present, and future mining activities
- Recreational uses
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. The previous and current land uses in the project area have contributed to the existing roads infrastructure. The flagstone processing facilities at Drake utilize CR 71 and SR 89 to transport the flagstone product. Recreationists, such as those using the area as a shooting range, use the roads to travel to and from various destinations in the PNF. Land development activities in areas surrounding the PNF could also contribute to additional travels on the existing road infrastructure. As previously stated, Drake Cement would build the cement manufacturing plant on private land. Construction and operation of this facility would require transporting products from the plant to other areas and employees using roads for work travel. Increased heavy truck traffic is anticipated as a result of cement plant operations; up to 95 truck trips per day would occur along CR 71 and SR 89. Drake Cement and the Arizona Department of Transportation would determine the need for road improvements on SR 89 to minimize safety hazards. Transportation impacts expected under the Proposed Action when added to the other present and reasonably foreseeable future actions would be minor because of the small number of miles of road affected.

3.4 Biological Factors

3.4.1 Vegetation

Affected Environment

The project is located within pinyon-juniper woodlands of the Great Basin Conifer Woodland Biome (Brown 1994). The vegetation types that are found within the project area consist of a predominantly early to mid-seral pinyon-juniper community type with a minor intrusion of early to mid-seral chaparral community type. Vast stands of Utah juniper (*Juiperus osteosperma*) are the most conspicuous and dominant species present in the project study area. The juniper woodland consists of open canopies with shrub and grass species present in the understory. Other plant species include pinyon pines (*Pinus edulis*), Stansbury cliffrose (*Cowania mexicana*), barberry (*Berberis* spp.), Apache plume (*Fallugia paradoxa*), scrub live oak (*Quercus turbinella*), banana tree yucca (*Yucca baccata*), bear grass (*Nolina microcarpa*), various cacti (*Opuntia* spp. and *Echinocereus* spp.) and grasses (*Bouteloua* spp. and *Hilaria* spp.).

The vegetation communities present at the project site appear natural in many areas, while others have been modified by past activities, including ground clearing for mining, range and wildlife improvement activities, and roadways. These historic disturbances are evident in that there is absence of mature junipers, presumably the result of previous removal. Native shrubs and grasses have recovered and re-vegetated many of the previously disturbed areas. The proposed conveyor system crosses a mosaic of grassland, scrub oak (*Quercus turbinella*), and juniper woodland.

Regional Forester's Sensitive Species

The PNF Regional Forester's list of sensitive plant and animal species and their potential to occur in the project area includes 12 sensitive plant species for the project area (Appendix B, Table B-1). The Regional Forester's sensitive species list is designed to identify species for which population viability is a concern so that management action may be taken to ensure these species do not become threatened or endangered because of Forest Service actions, and to ensure that viable populations of these species are maintained in habitats distributed through their geographic range on National Forest System lands (FSM 2670). Based on a review of these species, potential habitat exists within the project area for Hualapai milkwort and Mearns sage (also known as Verde Valley sage but hereafter referred to as Mearns sage).

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no impacts to existing vegetation because the activities would not occur.

Alternative B – Proposed Action

Under the Proposed Action, there would be direct impacts to vegetation. Approximately 61 acres of pinyon-juniper woodlands and approximately 2 acres of late seral chapparal community would be impacted from vegetation removal for the quarry operations and the conveyor system. Trees and other vegetation would be removed from the quarry facilities area (0.5 acres), the quarry access road (0.8 acres) and the conveyor corridor (approximately 2-3 acres of the total 7.3 acres of the conveyor corridor) during project construction. Much of the first conveyor is located on existing roads or the bridge, and only requires vegetation removal on approximately 600 feet between Limestone Canyon and old SR 89. Clearing would be limited to only the width necessary to construct the conveyor, conveyor maintenance road and excavation planned for this segment. Vegetation would be removed by clearing and grubbing those areas with tracked dozers or crawlers. Vegetation would be removed in 5 to 20-acre increments in the quarry, in advance of mining operations. Cleared vegetation would be disposed of at the time of clearing, consistent with Forest Service practices (The Mines Group 2004). As part of the project reclamation, there would be reestablishment of approximately 63 acres of early seral grasslands.

Regional Forest Sensitive Species:

Impacts to Hualapai milkwort and Mearns sage could occur. Potentially suitable habitat for the Huapapai milkwork is found within the project site and would likely be affected by this project. Although formal surveys for the species were not conducted, no Hualapai milkwort were identified during habitat field reviews. The project is likely to affect potential habitat for this species and may directly impact this species if it is present on the project site.

Potentially suitable habitat for Mearns sage is found within the project site and would likely be affected by this project. Although formal surveys for the species were not conducted, no Mearns sage were identified during habitat field reviews. The project is likely to affect potential habitat for this species and may directly impact this species if it is present on the project site.

Surveys for these species would be carried out prior to ground clearing activities. If specimens are identified, transplanting or seed collection is recommended. As a result, potential impacts to their species would be minimized.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to vegetation. The area of analysis considered for cumulative effects was the proposed limestone quarry area and the proposed cement manufacturing facility site. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to vegetation:

- Past mining activities
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above would occur independent of the Proposed Action. Previous vegetation disturbance has occurred to the project area where the previous limestone quarry mining took place. The construction of the proposed cement manufacturing plant would cause vegetation disturbance from clearing trees for operation and facilities construction. However, no impacts to threatened, endangered, or Forest Service sensitive species are anticipated. Because of the proposed mitigations and the wide population distribution of the affected plants, the Proposed Action would only contribute minor impacts to the cumulative effects of these other activities. Overall, the cumulative effect on sensitive species would be minor.

3.4.2 Wildlife

Affected Environment

A Biological Assessment and Wildlife Specialist Report were prepared that analyzed impacts to special status, federally protected, and other wildlife species located within or potentially affected by the Proposed Action. The Biological Assessment was used in informal consultation with the US Fish and Wildlife Service (USFWS). This section contains a summary of information from these biological reports.

Threatened and Endangered Species

Federally protected species potentially occurring in the project area were identified using information from federal and state resource agencies. Federally protected species, as identified here, are those listed by the USFWS as threatened, endangered, or are proposed or candidates for such listing. Specifically, a total of 17 federally protected species with the potential to occur within the project study area were identified. Eight of the 17 species were eliminated from further analysis because there are no records of the species occurring on PNF lands. The 8 eliminated species were: brown pelican, Page springsnail, lesser long-nosed bat, Chiricahua leopard frog, desert pupfish, Gila trout, woundfin, and Arizona cliffrose. The remaining 9 federally protected species are evaluated in Appendix B (Table B-2) based on the following criteria:

- The species known geographic ranges
- Whether the project area contains necessary conditions similar to those known to support the species
- Whether the project would remove or adversely affect any habitat of the species

Based on the evaluation criteria, 5 species have potential suitable habitat in the proposed project vicinity (Appendix B, Table B-2). Three of the 6 species are fish associated with the Verde River approximately 9 river miles from the project area.

Regional Forester's Sensitive Species

The Regional Forester, Region 3, has designated 11 sensitive animal species for the PNF. These are identified in Appendix B (Table B-1). The Regional Forester's sensitive species list is designed to identify species for which population viability is a concern so that management action may be taken to ensure these species do not become threatened or endangered because of Forest Service Actions, and to ensure that viable populations of these species are maintained in habitats distributed through their geographic range on National Forest System lands (FSM 2670). Based on the review, the Maricopa tiger beetle has the potential to occur within Hell Canyon.

Wildlife Species of Concern in Arizona

The AGFD describes Wildlife of Special Concern (WSC) in Arizona as species whose occurrence is or may be in jeopardy, or with known or perceived threats or population declines (AGFD in prep). The list is specific to Arizona and is managed by the AGFD. A total of 10 WSC species are listed for Coconino and Yavapai Counties that do not occur on federal threatened and endangered or Region 3 Regional Forester's Sensitive Species lists (AGFD in prep). Species were assessed and are summarized in Appendix B (Table B-3). Based on review of these species in Appendix B (Table B-3), none are expected to be encountered on the project site and would not be affected by the proposed project.

Migratory Birds

On January 10, 2001, President Clinton signed EO 13186 placing emphasis on conservation of migratory birds. To complement the EO, a Memorandum of Understanding (MOU) between the Forest Service and the USFWS was signed January 2001. One of the action items in the MOU includes "Strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent further loss or degradation of remaining habitat on National Forest System lands. This includes: identifying management practices that impact populations of high priority migratory bird species, including nesting, migration, or over-wintering habitats, on National Forest System lands, and developing management objectives or recommendations that avoid or minimize these impacts."

PNF provides nesting habitat for a host of migratory birds each spring and summer. Several Partners in Flight (PIF) priority species also are Management Indicator Species (MIS) or Regional Forester's sensitive species. PNF uses these PIF bird species as indices for migratory birds. Assessing the impacts of a project on these PIF bird species is proposed to meet the intent of the Migratory Bird Treaty Act. The PIF list for the PNF consists of the following 6 species: Mexican spotted owl, Southwestern willow flycatcher, Western yellow billed cuckoo, Northern goshawk, Lucy's warbler, and Plain titmouse.

Management Indicator Species

Vegetation community changes associated with the Forest Service MIS would occur. The proposed project would result in temporary loss of less than 1% of early to mid-seral pinyon juniper and chaparral communities while the quarry is in operation. At the end of quarry operations, the plan to reestablish 63 acres of pinyon-juniper and chaparral communities as grassland would have two results. The first result is conversion of 61 acres from pinyon-juniper and 2 acres of chaparral to grassland. The second result is the impeded progress of early to mid-seral stages to late seral stages among the affected pinyon-juniper and chaparral communities. Population trends for 4 MIS, mule deer, antelope, spotted towhee, and plain titmouse, would be affected from these vegetation changes. Table 3-11 summarizes the impacts to these MIS.

Table 3-11 Population Trends to MIS from Vegetation Community Changes			
Species	**Vegetation Community**	**Population Data**	**Impact to Population Trend**
Mule deer	Early seral pinyon-juniper woodlands; Early seral chaparral	Downward trend on PNF due to drought conditions[1]	Loss of less than 1% of early to mid-seral pinyon-juniper and chaparral communities; no noticeable changes in population trends expected.
Antelope	Early and late seral grassland communities	Appear to be stable, fluctuations have existed[1]	Increase of less than 1% increase in the grassland community; no noticeable changes in population trends expected.
Spotted towhee	Late seral chaparral communities	Stable, can be described as robust[1]	Impact less than 1% of the chaparral community; no noticeable changes in population trends expected.
Plain titmouse	Late seral pinyon-juniper communities	Stable[2]	Impact less than 1% of the pinyon juniper community; no noticeable changes in population trends expected.
Sources: [1] Prescott National Forest 2003; [2] Sauer, et al. 2003			

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented, and there would be no impacts to the wildlife species.

Alternative B – Proposed Action

Threatened and Endangered Species – Direct impacts to federally-listed threatened and endangered species are not anticipated as no threatened or endangered species are present among the proposed quarry and conveyor system sites. Indirect impacts resulting from groundwater pumping associated with quarry operations may affect but are not likely to adversely affect designated critical habitat and threatened and endangered species associated with the species that inhabit Verde River because studies conducted by the USGS (Wirt 2005), which examined the impacts resulting from ground water pumping associated with the project, have indicated that ground water to be pumped by the Proposed Action immeasurable. The 70 acre-feet/year of water proposed for use by Drake Cement is less than 1% of the 50th percentile of the daily mean flow at the USGS streamflow gauging station on the Verde River near Paulden.

Regional Forest Sensitive Species – Although there is potential habitat for the Maricopa tiger beetle in Hell Canyon, neither this species nor its habitat would be impacted, because the project facilities would not affect the bottom of Hell Canyon. It is not anticipated that this project would lead to federal listing as threatened or endangered of any of the Forest Sensitive plant or animal species because it is not likely that any Forest Sensitive plant and animal species would be impacted by the Proposed Action.

Migratory Birds – Five of the 6 species identified in the PIF list have been analyzed and a finding of no impact to the species was determined based on the fact that no suitable habitat is present, the species is not likely to be encountered or the project is not likely to result in “take” of the species. The remaining species, Lucy’s warbler, which is associated with riparian habitat, is not likely to be impacted because the project does not encounter riparian habitat. Thus, no impacts to migratory birds are anticipated to result from the proposed project.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to wildlife. The area of analysis considered for cumulative effects was the proposed limestone quarry area and the proposed cement manufacturing facility site and the Verde River. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to wildlife species:

- Past, present, and future mining activities
- Flagstone processing activities near Drake
- Proposed cement manufacturing facility at Drake
- Proposed Transwestern Pipeline
- Existing use of the quarry and vicinity as an unauthorized shooting range

All activities identified as part of cumulative actions identified above have occurred or would occur independent of the Proposed Action. Past mining activities caused disturbance to wildlife and also wildlife habitat from operations and surface disturbing activities. Flagstone processing activities near Drake could also cause disturbance to wildlife and potential habitat that could exist in the area. The proposed Transwestern Pipeline follows the alignment of the existing El Paso Pipeline approximately 1 mile east of Hell Canyon. During construction of the proposed pipeline, there would be increased disturbance to wildlife species and their habitat. Once construction is complete, there would be minimal further cumulative impacts. The existing use of the quarry and vicinity as a shooting range is likely to disturb wildlife and cause them to move to other locations. The proposed construction of a cement manufacturing plant on private land could cause disturbance to wildlife and also wildlife habitat, as a result of surface disturbing activities, noise, and ongoing operations at the plant. Wildlife species are likely to avoid the area and not inhabit it during plant operation. Wildlife species displaced will be able to move to other areas despite the cumulative activities, because of the abundance of existing habitat, the relatively small areas of disturbance, and the planned restoration of habitat. Population trends of the MIS, including the pronghorn antelope, are not expected to change. However, the antelope are expected to avoid the mining area in the future in favor of areas less disturbed than the SR 89 corridor and having a source of water. The Proposed Action is not expected to contribute to adverse cumulative effects to threatened and endangered species or their habitat. This determination is based on the fact that species and habitat are either completely avoided or potential impacts were determined to be immeasurable. There are no impacts to Regional Forest Service Sensitive Species, Wildlife Species of Concern in Arizona, or Migratory birds. In summary, cumulative effects to wildlife are mostly temporary and minor. Because special status species and their habitat are not affected or immeasurably affected by the Proposed Action, minor cumulative impacts are expected.

3.4.3 Fish

Affected Environment

There are no fish species that occur in the project area. Potential impacts to aquatic species occupying the Verde River, and critical habitat for aquatic species in the Verde River, were analyzed due to the project's association with Hell Canyon watershed and connection to the groundwater recharge supply of the Verde River. Within the Verde River watershed there are 31 fish species that exist. Eight native fish species occur in the Verde and its tributaries, and 23 introduced fish species have been recorded (NPS 2006). Threatened and endangered aquatic species known to occupy the Verde River include the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and spikedace (*Meda fulgida*). Segments of the Verde River are designated as critical habitat for the razorback sucker.

The Colorado pikeminnow was listed as endangered under the ESA on March 11, 1967. Critical habitat was designated on March 21, 1994. There is no critical habitat for Colorado pikeminnow designated in the Verde River. Populations of Colorado pikeminnow within the Verde River are considered "experimental non-essential" (USFWS 1985). As such, the pikeminnow is treated as a threatened species, except in regards to Section 7 of the ESA, where they are treated as a proposed species. The Verde River is currently the focus of pikeminnow reintroductions in Arizona by the AGFD. Since 1994, almost all reintroductions have occurred in the Verde River below Beasley Flat, which is located near Camp Verde, over 35 river miles downstream from the project area. A small population has established itself, but no signs of reproduction have been identified.

The razorback sucker was designated as endangered under the ESA on October 23, 1991. Critical habitat was designated on March 21, 1994. Critical habitat for the razorback sucker includes the Verde River and its 100-year floodplain, from the PNF boundary to Horseshoe Dam, including Horseshoe Lake. Critical habitat is located approximately 14 river miles (down Hell Canyon and a section of the Verde River) from the project location. Since 1994, nearly all reintroductions have occurred in the Verde River downstream of Beasley Flat. As with the pikeminnow, a small population has established itself, but no signs of reproduction have been observed.

The spikedace was designated as threatened under the ESA on July 1, 1986. Critical habitat for the spikedace is proposed on the Verde River from the confluence of Fossil Creek, upstream to Sullivan Dam. Spikedace are present in the upper Verde River from the headwaters downstream to the confluence with Sycamore Creek, within the PNF (RMRS 2002).

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no effect to fish species because the proposed project activities would not be implemented.

Alternative B – Proposed Action

The project may result in indirect impacts to the Colorado pikeminnow, razorback sucker, and spikedace as a result of groundwater pumping associated with the quarry and conveyor. Drake Cement plans to pump approximately 8 acre-feet/year as part of quarry operations. The water would be pumped from a well located on private land, which has been determined to be part of a larger regional aquifer. The regional flow of the aquifer is southeast or east toward the Verde River. Impacts resulting from groundwater pumping on base level flows within the Verde River would be immeasurable as evidenced in the USGS hydrogeologic report reviewing groundwater pumping associated with the Drake Cement project (Wirt 2005). The report concluded that based upon the amount of water being extracted, any impact to flow of the Verde River would be too small to measure. Impacts too small to measure would not likely result in a significant loss in the quantity or quality of habitat for these fish species.

No direct impacts are likely to result as part of the proposed project. The project location is approximately 9 river miles up the ephemeral Hell Canyon from the Verde River. The project would not directly impact any segment of occupied or critical habitat of the fish species.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to fish species in the Verde River. The area of analysis considered for cumulative

effects was the proposed limestone quarry area, the proposed cement manufacturing facility site, and the Verde River. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to fish species:

- Land exchange/development
- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake

All activities identified as part of cumulative actions identified above would occur independent of the Proposed Action. As previously described, Drake Cement proposes to build a cement manufacturing plant on private land. The pumping currently proposed for the plant is approximately 62 acre-feet per year. This is less than 1 % of the 50th percentile daily mean flow duration of 25 cubic feet per second at the USGS streamflow gauging station near Paulden. Such an impact on the Verde River would be impossible to discern based on the accuracy of discharge measurements at the USGS streamflow gauging station on the Verde River near Paulden. The proposed cement plant ground water withdrawals would be impossible to differentiate from larger ground-water withdrawals (both current and proposed) that may reduce base-flow discharge of the upper Verde River in the future (Wirt 2005).

Potential use measurements have not been forecasted or studied for the remaining cumulative actions where water use is predictable. However, it is reasonable to predict that surface and ground water quantities would decline, relative to their current state, and water quality may have the potential to be cumulatively impacted from human use. However, because there are no measurable effects to fish from the Proposed Action, this action would not contribute to cumulative effects.

3.4.4 Exotic and/or Noxious Organisms

Affected Environment

PNF ranks invasive plants according to three different classes. Class A plants are given the highest priority and emphasis is placed on complete eradication. Class B plants are second in priority and management emphasizes controlling spreading, decreasing population size, and eventually eliminating the species. Class C species are lowest in priority and management emphasis is placed on controlling spreading to maintain the current population size or decreasing the population size (Phillips, et al. 1998). No invasive plants surveys were conducted as part of the EA analysis. However, exotic and/or noxious organisms impacts may result if activities introduce new or increase the spread of existing invasive plants or noxious weeds to National Forest System lands.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and there would be no impact to noxious weeds, either beneficial or detrimental.

Alternative B – Proposed Action

Under the Proposed Action spreading of noxious weeds may increase as a result of soil disturbing activities including, but not limited to, road widening and improvements, quarry excavation, and construction and installation of the conveyor system. A noxious weeds survey would be conducted prior to the commencement of project activities. PNF would be notified of the results of the survey and would provide guidance on managing noxious weeds. The location for all Category A and B noxious plants

would be mapped on a 1:24,000 scale map for entry into the Southwest Exotic Plant Mapping Program database. In general the following measures would be implemented:

- Road areas where soil disturbing activities are planned should be coordinated with the PNF weeds specialist. If weeds are present the ground disturbing activities should be scheduled when seeds or propagules are least likely to be viable and spread. If the roadside is weed infested then it is best to blade from areas of the lowest number of weeds to an area of highest weed infestation.
- Following ground disturbing activities associated with road improvements, conveyor installation and upon reclamation of the quarry the disturbed areas should be planted with a native seed mix approved by PNF.
- All earth moving equipment brought onto the project area would be cleaned prior to entering PNF. A high pressure hose should be used to clear the undercarriage, tire treads, grill, radiator, and any other areas where mud and dirt may accumulate.
- Any fill material brought in from an off-site location should be free of invasive weed species.

Implementation of these measures would minimize potential exotic or noxious plant impacts.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects that could occur from exotic and/or noxious organisms. The area of analysis considered for cumulative effects was the proposed limestone quarry area and the proposed cement plant site. Based on the review of cumulative actions, the only actions considered were the proposed cement manufacturing facility and the use of access roads.

The construction of the cement plant on private land may contribute to the introduction of exotic and/or noxious organisms to the project site, and also other areas outside of the private land parcel. This could occur from hauling materials, employees driving to and from the work site, and other activities. It is anticipated that with the proposed mitigation measures, that this Proposed Action would not contribute noticeably to the cumulative effects from exotic and/or noxious organisms that could be introduced to the general area.

3.5 Economic and Social Factors

The economic factors described in this section come primarily from the neighboring towns and communities that are near the project area. The proposed project facilities are located within the PNF, and no other businesses, development, homes, or other community-type resources exist within the area on Forest Service lands. This section primarily focuses on 6 towns that are within a 30 mile radius of the project area, where it is reasonable to expect some level of interaction will occur with the quarry operations. These are Ash Fork, Chino Valley, Clarkdale, Cottonwood, Prescott, and Prescott Valley (data for Paulden was not available). Where feasible for comparison purposes, data relating to Yavapai County and Arizona have also been included.

3.5.1 Population Dynamics

Affected Environment

No humans currently reside within or adjacent to the proposed project facilities. Table 3-12 shows the populations of the Yavapai County communities within a 30-mile radius of the project. All areas reflect a growth in the population since 2000.

Table 3-12 Population Dynamics		
Location	**2004 Population**	**Percent Growth Since 2000**
Ash Fork	457*	–
Chino Valley	9,530	18 %
Clarkdale	3,675	7 %
Cottondale	10,655	14 %
Prescott	40,225	16 %
Prescott Valley	30,590	23 %
Yavapai County	196,720	15 %
Arizona	5,833,685	12 %
* 2000 population. Source: Arizona Department of Commerce 2005		

Environmental Consequences

Alternative A – No Action

Under the No Action Alternatives, the proposed facilities would not occur and there would be no impact to population dynamics of the surrounding areas associated with the project.

Alternative B – Proposed Action

The Proposed Action would cause a minor worker-related population increase in the surrounding communities during the 10-year operation of the mine. Approximately 8 full-time personnel would be employed at the quarry. Although it is not known if these employees currently reside in the project vicinity, or they would be moving into the surrounding communities, only minimal population change would be expected. People would be located at the project area during operation of the quarry, with numbers varying depending on scheduling of work and other factors. The Proposed Action may cause a very slight increase in the population of the neighboring communities, depending on whether non-resident employees are hired and move to the areas with their families.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to the population dynamics. The area of analysis considered for cumulative effects is an area approximately 30 miles around the proposed project site. Based on the description of cumulative actions, the following actions were considered in the cumulative effects analysis to population dynamics:

- Past, present, and future mining activities
- Land exchange/development
- Proposed cement manufacturing facility at Drake

These activities would occur independent of the Proposed Action. By the nature of the actions described, those involving the land exchange and growth in the surrounding communities would contribute to an increase in the population. Population growth from mining activities is induced by strong economic growth in the region, but is expected to represent a small increase in population growth. The proposed cement plant is expected to employee 60 to 80 personnel, some of which would be expected to currently reside in the neighboring communities. These communities would experience some population growth,

although the population dynamics and composition would remain consistent with those presented from the 2000 US Census. Population growth in the region is expected to continue, and may substantially increase as a result of development associated with the Yavapai land exchange. The incremental population increase resulting from the Proposed Action would be very minor when added to the other present and reasonably foreseeable future actions.

3.5.2 Economic Base

Affected Environment

An economic base study considers both the structure and composition of an economy. (Arizona Department of Commerce 2004) The economic base of the project area can be described as being both local and non-local. The project area for the proposed facilities at the quarry is considered as being within the local economic base. Currently, within the project area, there is not an economic base. There are no jobs, employment, goods and services transactions, and no economic contributors to the area.

Within the non-local area, or surrounding towns that are within a 30 mile radius of the project area, the economic base is varied, as are the principal economic activities. Table 3-13 summarizes the economic bases and the principal economic activities associated of these surrounding nearby towns.

Table 3-13 Economic Base and Principal Economic Activities of Nearby Towns

Town/City	Economic Base	Principal Economic Activity
Ash Fork	Ash Fork's primary economic base is from tourism, service to transportation, and mining. It has a small employment base	Tourism, mining, and cattle ranching. The trade and services sectors are strong because of tourism and the truck volume on Interstate 40. There are five stone (flagstone) yards and a sawmill.
Chino Valley	Chino Valley has a small employment base. Two wholesale trade industries and one mining industry help drive the Chino Valley economy. The town is partially dependent on the economy of the broader Prescott area. Government provides the most employment of any sector in Chino Valley.	Mix of retail, commercial and government activities. Significant growth in the Chino Valley has been created in construction, services and supplies. Retirement is popular. Agriculture is also a viable business.
Clarkdale	Manufacturing, wholesale trade, and mining are the largest forces driving the Clarkdale economy. Clarkdale is partially dependent on the economy of the broader Verde Valley area. Government provides the most employment of any sector in Clarkdale.	Developed as a service center for the mining area around it. The growing population spurs the housing, construction and construction-related industries and makes for active retail and service sectors. Peck's Lake is the site of the Verde Valley Ranch, a 977-acre mixed-use, master-planned community currently being developed by Phelps Dodge.
Cottonwood	Certain manufacturing operations help drive the Cottonwood economy. In-migrating retirees also contribute. Cottonwood is partially dependant on the economy of the broader Verde Valley. Retail trade provides the most employment of any sector.	Serves as the trading center for the Verde Valley, with a wide variety of retail establishments, professional services and manufacturing concerns. Verde Valley Medical Center offers diagnostic and treatment care. Travel and tourism industry are also important to the economy. Nearby National Forests, State Parks, National Monuments, and wilderness areas attract hundreds of thousands of tourists each year.

Table 3-13 Economic Base and Principal Economic Activities of Nearby Towns		
Town/City	**Economic Base**	**Principal Economic Activity**
Prescott	Prescott has a large economic base. A combination of activities, particularly tourism and certain types of manufacturing, drive the city's economy. Educational services, seasonal residents, and in-migrating retirees also contribute. Government provides the most employment of any sector in Prescott.	Prescott is the center for trade in the region, with abundant retail establishments, professional services and manufacturing plants. Yavapai Regional Medical Center and Veterans Administration Hospital provide diagnostic and emergency treatment care. Travel and tourism, cultural institutions and government offices are important to the economy. PNF, area lakes, and established trail and park systems provide outdoor activities for residents and visitors.
Prescott Valley	Certain manufacturing and wholesale trade industries help drive the Prescott Valley economy. However, it is partially dependant on the economy of the broader Prescott area. Government provides the most employment of any sector of Prescott Valley.	The area's economy is comprised of industry, manufacturing, retail, and service businesses. These businesses are growing. A planned new downtown regional shopping center and cross-town highway will offer new opportunities.
Source: Arizona Department of Commerce 2004, 2005		

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and there would be no impact to the economic base to the local or non-local areas associated with the project. This alternative would limit the opportunity to realize economic benefits, such as jobs and associated salaries, local expenditures, royalty and tax payments.

Alternative B – Proposed Action

Under the Proposed Action, there would be a positive (although small) impact to the economic base of the communities in the vicinity of the PNF. There would be a temporary impact, during construction activities, and long-term impact during the 10-year operating period of the quarry. Project implementation, would result in approximately 8 people employed in the area. This employment would be expected to contribute to neighboring town economies for services such as hotel and lodging for visiting workers, restaurants, and supplies. Because of the limited number of employment opportunities, project implementation would not be expected to result in any substantial change to the current economic base of the region.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to the economic base. The area of analysis considered for cumulative effects is an area approximately 30 miles surrounding these areas. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to the economic base:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

The project area has been a location of mining and mineral processing since the late 1880s. Mining activities served as a critical economic base for the Cedar Glen/Drake communities at various points until the 1950s. Since that time, mining activities associated with the project site have also contributed to the economies of the surrounding communities. The only existing economic activity in the immediate vicinity of the proposed project is the flagstone mining and processing facilities. These activities are expected to continue into the foreseeable future and contribute to the economic base of Yavapai County and the communities surrounding the PNF. Other future actions expected to result in changes to the economic base of the area include cement plant construction and operation, and land development and growth in areas near the PNF. These actions would contribute to the economic base of the area from employment opportunities, business transactions, and goods and services distribution. These development combined have a considerably larger impact on the regional economic base than the Proposed Action would. Therefore, the Proposed Action would only contribute a minor increase to the economic base, when added to these other actions.

3.5.3 Employment/Unemployment

Affected Environment

Employment and unemployment data is closely related to that of the economic base. In the project area, the only current employment is associated with the flagstone processing facilities at Drake. Approximately 20 personnel work at these facilities. Table 3-14 shows the primary employers and unemployment data for surrounding towns, Yavapai County, and Arizona.

Table 3-14 Employment and Unemployment Information of Nearby Towns, County, and State

Location	Major Employers (Private and Public)	Unemployment Rate (2004)
Ash Fork	American Sandstone, Dunbar's Store, Zettler's Market, Ash Fork Clinic, Ash Fork Public Library, Ash Fork Public School, US Postal Service	15.7 %*
Chino Valley	American Sandstone, Safeway Incorporated, Chino Valley Unified School District, US Postal Service	4.2 %
Clarkdale	Yavapai College Verde Campus, Verde Canyon Railroad, Phoenix Cement Company, CTI Trucking	3.9 %
Cottonwood	Griffith Enterprises, Phelps & Sons Inc., Verde Valley Medical Center, Wal-Mart, Arizona Public Service, City of Cottonwood, Cottonwood/Oak Creek School District, Mingus Union High School.	3.7 %
Prescott	Embry-Riddle Aeronautical University, Phelps-Dodge Bagdad Copper, Sturm Ruger & Company, Wal-Mart, Yavapai Regional Medical Center, City of Prescott, Prescott Unified School District, State of Arizona, Veterans Administration Medical Center, Yavapai County.	3.2 %
Prescott Valley	AAE, Arizona Public Service, Prescott newspapers, Ace Retail Support Center, Arizona Department of Transportation, Town of Prescott Valley, Humboldt Unified School District.	2.5 %
Yavapai County	Government, Trade, Transportation and Utilities, Education and Health Services, Leisure and Hospitality	2.7 %
Arizona	Various	3.4 %

* 2000 population. Source: Arizona Department of Commerce 2005; US Census 2000

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, project implementation would not occur and economic benefits, such as jobs and associated salaries would not be realized.

Alternative B – Proposed Action

Under the Proposed Action, Drake Cement would add 8 new jobs associated with quarry operations to the immediate project area. Employment of 8 individuals would be a minor positive impact, and would not affect existing employment in the area. Employment levels and opportunities in the surrounding communities would be unaffected by the proposed mining activities.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to employment. The area of analysis considered for cumulative effects is an area approximately 30 miles surrounding the project area. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to regional and local employment:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

The project area has been a location of intermittent mining and mineral processing since the late 1880s and served as a primary local employer. Mining activities and railroad use and maintenance employed people in the Cedar Glen/Drake community until the 1950s. Since that time, mining activities associated with the project site have also contributed to the economies of the surrounding communities. The only existing economic activity in the immediate vicinity of the proposed project is the flagstone mining and processing facilities. The flagstone processing facilities at Drake employ approximately 20 people full-time. Other future actions expected to result in employment changes in the project area include cement plant construction and operation, and land development and growth in areas near the PNF. The proposed cement plant would employ about 60 to 80 people. Construction associated with land development in the area surrounding the PNF would also result in employment opportunities.

These past, present, and future actions, combined with the incremental employment impacts of the Proposed Action would result in increased employment opportunities. The Proposed Action, however, would be a minor contributor to these effects because of the small number of employees.

3.5.4 Housing

Affected Environment

There is no housing in the immediate project vicinity. The closest residential area is Paulden which is approximately 5 miles away, and other neighboring communities within a 30 mile radius. Table 3-15 describes the housing occupancy of these areas.

Table 3-15 Housing Occupancy				
City	**Total Housing Units**	**Owner Occupied Units**	**Renter Occupied Units**	**Vacant Units**
Ash Fork	189	105	44	40
Chino Valley	3,256	2,337	693	226
Clarkdale	1,546	1,166	267	113
Cottonwood	4,427	2,139	1,844	444
Paulden	1,334	994	150	190
Prescott	17,144	9,848	5,250	2,046
Prescott Valley	9,484	6,335	2,629	520
Source: US Census 2000				

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed quarry and associated facilities would not be constructed and there would be no impact to the housing occupancy or structure of the project area or to the surrounding areas.

Alternative B – Proposed Action

The Proposed Action would not cause a change to the housing occupancy or structure in the immediate project vicinity. Most of the land surrounding the proposed project facilities is federal land administered by the Forest Service and no permanent or temporary housing would occur. No housing has been proposed on private inholdings within 2 miles of the project area.

The Proposed Action would, however, cause a minor increase in employees that are expected to the area, and therefore may cause minor changes to the housing structure of the area, depending on whether or not these employees are residents of the area. If most employees (both temporary and full-time) of the proposed quarry are already local residents, then the impacts would be even less, and the housing occupancy and structure change of the area would be virtually unnoticeable. Workers who are staying temporarily would be anticipated to use existing rental infrastructure. Other employees may move to the area for the full-time jobs and plan to stay in the area, which may cause an increase in the number of owner occupied units, the number of renter occupied units, or a mixture of both. Because of the limited number of employees expected at the quarry, however, all impacts to the number and need for owner-occupied and renter-occupied units would be quite minor.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects to housing. The area of analysis considered for cumulative effects is an area approximately 30 miles surrounding the project area. Based on the review of cumulative actions, the following actions were considered in the cumulative effects analysis to housing:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

The existing flagstone processing facilities at Drake employ approximately 20 people full-time, many of whom own or rent housing units in the communities surrounding the PNF. Future actions expected to result in changes to existing housing stock in these communities include cement plant construction and operation and land development and growth in areas near the PNF. The proposed cement plant would employ about 60 to 80 people, many of which would require owner or rental housing units in the area. Depending on how many employees already reside in the area, this could result in additional housing demand and may require construction of additional housing units. Expected land development activities in the areas surrounding the PNF would result in both demands for housing in the short-term for construction workers and additional housing stock in the long term. These current and future actions combined with the Proposed Action would result in increased housing requirements, although the communities surrounding the project area have the capacity to accept increased population growth and housing demand. The contribution of the Proposed Action to these effects would be quite small, however, because of the small number of employees.

3.5.5 Community Service Requirements

Affected Environment

There are currently no community services in the immediate project area. The surrounding areas and towns provide medical services, fire departments, law enforcement services, and schools. In addition, these surrounding areas provide business retail, industrial, commercial, banking, and professional level services that the project area currently does not contain. Utilities such as electricity, telephone, water, and cable are also provided in the surrounding areas.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the project would not be implemented and there would be no impact to community service requirements to the project area or to the surrounding areas associated with the project.

Alternative B – Proposed Action

Under the Proposed Action, the construction and operation of the limestone quarry and associated facilities would indirectly require services from the communities surrounding the project area. These services would include emergency services, where necessary, as well as other business needs. Impacts to community services would be expected to be minor and become part of the existing community infrastructure. Depending on whether new employees with families move into the surrounding towns from other areas, the local schools may experience a very small growth in their student populations. There may also be an incremental growth in demand for other services (medical, utility, etc.) for any new employees and their families.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions identified potential cumulative effects to community services. The following actions were considered in this assessment:

- Proposed cement manufacturing facility in Drake
- Land exchange/development

All actions in the project vicinity that house and employ or are expected to house and employ people increase the demand for community services. All actions occurring presently, and their associated population and housing demand, are assumed to currently be getting adequate community services. The proposed cement plant at Drake would cause population growth and increased demand for community services in the nearby areas. Given the relatively modest employment and population growth that may result from the construction and operation of the plant, however, this demand is not expected to be substantial and would be expected to be spread over several communities. The potential for large-scale development projects in the areas west of the PNF could drastically affect community services of the area. However, this growth is expected to be managed by applicable regulatory agencies, assuring that appropriate levels of community services are provided. These current and future actions combined with the Proposed Action would result in increased community services requirements, although the communities surrounding the project area have the capacity to accept increased population growth and community service demands, or would require appropriate police, fire, or other community service coverage as part of their development approval process. The contribution of the Proposed Action to these effects would be minimal because of the small number of employees.

3.5.6 Revenue Base

Affected Environment

The proposed project facilities are located on public lands administered by the PNF. As a result, there is currently not a revenue base that exists for the project area. Sources that contribute to managing the project area come from appropriated funds that Congress allocates to the Forest Service to manage Forest Lands. The local communities near the site would provide the revenue base through taxes and other support mechanisms that provide revenue to local government institutions. Table 3-16 identifies revenue base information for communities near the project area.

Table 3-16 Property and Sales Tax Information for Adjacent Communities

Town/City	Property Tax Rate[1]	Sales Tax Rate
Ash Fork	$ 14.56*	0.00 %
Chino Valley	$ 9.76*	3.00 %
Clarkdale	$ 8.86*	2.25 %
Cottonwood	$ 8.57*	2.20 %
Prescott	$ 8.77*	2.00 %
Prescott Valley	$ 9.59*	2.33 %
Yavapai County	$ 4.42	0.75 %
Arizona	n/a	5.60%

[1] Tax rate is per $100 assessed valuation.

* Includes County tax rate of 4.42. Source: Arizona Department of Commerce 2005; US Census 2000

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed facilities would not exist, and there would be no impact to the revenue base to the project area or to the surrounding areas. The federal government would not receive rents and royalties associated with mining the limestone.

Alternative B – Proposed Action

Implementation of the Proposed Action would allow the Forest Service to receive rents and royalties from the extraction of limestone. Allocations of appropriated funds would continue to be distributed by Congress for the Forest Service to manage the land in and around the project area. Communities adjacent to the PNF would be positively impacted by the contribution of business dollars, and therefore associated sales taxes, into the revenue base. Specific dollar amounts that are associated with this increase are unknown at this time. There would be no revenue base generated from property taxes, as the project would be located on Federal land that is not taxable.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions identified potential cumulative effects to the revenue base. The following actions were considered in this assessment:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

The current flagstone mining activities at Drake is the only economic activity in the nearby area. Revenue generated by these facilities is expected to be relatively minor. The proposed cement plant at Drake would be located on private land within Yavapai County and would contribute to the revenue base of Yavapai County through both property taxes that are paid on the private land parcel, and also sales taxes that are paid on items that are needed by the cement plant for operations. Indirectly, the project would result in additional revenue for the communities adjacent to the PNF through increases in employment, employee expenditures, and housing. The potential for large-scale development projects in the areas west of the PNF could drastically affect the tax revenue structure of the area, primarily as a result of increased property taxes, business fees, and sales taxes. The incremental impact of the Proposed Action when added to these other past, present, and reasonable foreseeable future actions.

3.5.7 Income

Affected Environment

As previously described, there is currently no economic infrastructure at the project area and no income source. Median household incomes in 1999 are shown in Table 3-17 for the towns that are near the project area, for Yavapai County, and Arizona.

Table 3-17 Median Household Incomes

Location	Median Income (1999)
Ash Fork	$ 30,893
Chino Valley	$ 32,289
Clarkdale	$ 34,911
Cottonwood	$ 27,444
Paulden	$ 32,532
Prescott	$ 35,446
Prescott Valley	$ 34,341
Yavapai County	$ 34,901
Arizona	$ 40,558

Source: US Census 2000

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be constructed, and there would be no impact to local or regional income.

Alternative B – Proposed Action

Under the Proposed Action, an income source would be generated on National Forest System lands. The quarry and associated facilities would provide income to employees that work there and reside in the neighboring communities. This income is expected to be less than $50,000 per year, per employee, depending on the specialty of the worker that is required for operations. The median income of neighboring communities is not expected to change as a result of the proposed project because of the small number of people who would be employed by it.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions identified potential cumulative effects to local and regional income. The following actions were considered in this assessment:

- Past, present, and future mining activities
- Proposed cement manufacturing facility at Drake
- Land exchange/development

The current flagstone mining activities at Drake is the only economic activity in the nearby area. Approximately 20 people are employed, and are expected to continue to be employed, at these facilities. Average income of these employees is unknown, but assumed to be less than $25,000 per year. The proposed cement plant at Drake is expected to generate 60 to 80 jobs. Average employee income would be less than $50,000 per year. Land development activities in areas west of PNF would also add employees and income, but the timing and magnitude of these development activities is unknown. Each of these actions would contribute to an increase in median household income levels in the region. The Proposed Action would add a minor contribution to these cumulative effects because of the small number of people employed at the quarry

3.5.8 Environmental Justice

Affected Environment

On February 11, 1994, Executive Order 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations", was published in the Federal Register (59 F.R. 7629). The order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The project area is currently not populated. Table 3-18 identifies the general demographic profile of the nearby towns, Yavapai County, and Arizona.

Table 3-18 General Demographic Profile							
Location/ Total Population	Ethnic Composition (%)						Individuals Below Poverty (%)
	White	African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other/ Two or More	
Ash Fork/ 457	96.3	–	1.3	–	–	2.4	20.4
Chino Valley/ 7,835	94.1	0.2	0.9	0.2	0.1	4.5	15.5
Clarkdale/ 3,422	84.5	0.3	6.8	0.4	0.1	8.0	10.3
Cottonwood/ 9,179	85.2	0.5	1.6	0.4	–	12.3	13.5
Paulden/ 3,420	92.0	0.5	2.4	0.2	0.1	4.8	17.3
Prescott/ 33,938	92.9	0.5	1.3	0.8	0.1	4.4	13.1
Prescott Valley/ 23,535	91.1	0.5	1.0	0.5	0.1	6.8	10.9
Yavapai County/ 167,517	91.9	0.4	1.6	0.5	0.1	5.5	11.9
Arizona/ 5,130,632	75.5	3.1	5.0	1.8	0.1	14.5	13.9
Source: US Census 2000							

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the proposed project would not be implemented and there would be no disproportionate or adverse effects to low-income or minority populations.

Alternative B – Proposed Action

The Proposed Action would not adversely or disproportionately impact minority or low-income populations. As shown in Table 3-17 and Table 3-18 the ethnic compositions and income, respectively, are not significantly disproportionate relative to Yavapai County data, or relative to the entire State of Arizona. The project would be sited in an area on Forest Service land that has been located for its locatable mineral value, and potential to extract mineral resources. Impacts to these communities as a result of the Proposed Action is likely to be positive in terms of economic and social benefit due to employment and business needs that are likely to filter to the surrounding communities.

Cumulative Effects

A review of past, present and reasonably foreseeable future actions was conducted to consider potential cumulative effects that could occur that relate to environmental justice, and impacts to low income and/or minority populations. The area of analysis considered for cumulative effects is an area approximately 2 miles from the proposed project facilities. Because there are no residences or other sensitive land use in the vicinity of the proposed project, disproportionate impacts to minority and low-income populations are not possible. As a result, there are no actions associated with the area considered that would contribute to adverse environmental justice impacts, and therefore there would be no cumulative effects from either Alternative A or Alternative B. With no direct or indirect effect to environmental justice, the Proposed Action would not contribute to cumulative effects for this social factor.

CHAPTER 4 – PREPARERS AND CONSULTATION WITH OTHERS

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Town of Chino Valley
Town of Clarkdale
Town of Cottonwood
Town of Jerome
Town of Prescott
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4.5 Others Consulted

Santa Fe-Pacific Railroad Company

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APPENDIX A

Plan of Operations Maps

APPENDIX B

Biological Evaluation Tables

Table B-1 Summary of the PNF Regional Forester's Sensitive Plant and Animal Species and Their Potential to Occur in the Project Area and Their Potential Effects to the Proposed Action			
Species	**Status**	**Habitat Needs and known Distribution**	**Likelihood of Occurrence in the Project Area**
Arizona phlox *Phlox amabilis*	S	This species inhabits chaparral and desert grassland at elevations about 3,000 to 3,500 feet and is found in southern Coconino County and in Yavapai County.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Eastwood alum root *Heuchera eastwoodiae*	S	Occurs on moist slopes and creek banks in ponderosa pine forests and canyons at elevations from 5,000 to 8,000 feet. Found at Crown King and Senator Mines in the Prescott region as well as various locations on the Tonto and Coconino National Forests.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Flagstaff pennyroyal *Hedeoma diffusum*	S	Associated with rock pavement, cliff, limestone and sandstone break habitats in ponderosa pine vegetation type at elevations between 4,000 to 7,000 feet. Found within Coconino and Yavapai counties, Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Heathleaf wild buckwheat *Eriogonum ericifolium var. ericifolium*	S	Occurs within dry gravelly or rocky limestone and gypsum soils described as white or chalky gray and powdery, which is derived from Tertiary lakebed deposits. Associated with creosotebush and desert scrub to pinyon -juniper woodlands. Found in Chevelon Butte in Coconino County and Verde Valley in Yavapai County.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Hualapai milkwort *Polygala rusbyi*	S	This species is found in desert grasslands and juniper wood-lands and is usually associated with white limestone of Tertiary lake beds, but has been found on sandy soils at elevations from 3,500 to 5,000 feet in Mohave and Yavapai counties. Records document this species near Drake, Arizona.	Possible. This species has been observed within the project vicinity (Baker and Wright 1995) and could potentially occur within the project area.
Broadleaf lupine *Lupinus latifoliu* spp. *leucanthus*	S	This species occurs on stream terraces in sandy to gravelly substrates and appears to be associated with running water at elevations from 5,000 to 7,000 feet. Surveys have not been done to determine the full extent of the species habitat distribution, but it has been identified in Apache Creek, Juniper Mesa, Sycamore Canyon and Woodchute Wilderness Areas on the Prescott National Forest.	Neither the species nor its habitat occur within the project area or would be impacted by this project.

Table B-1 Summary of the PNF Regional Forester's Sensitive Plant and Animal Species and Their Potential to Occur in the Project Area and Their Potential Effects to the Proposed Action			
Species	**Status**	**Habitat Needs and known Distribution**	**Likelihood of Occurrence in the Project Area**
Mearns sage (aka Verde Valley sage) *Salvia dorrii* spp. *mearnsii*	S	Occurs in open creosotebush-shrub communities on gypseous limestone substrate at elevations 3,250 to 3,800 feet. Found in central Arizona in Verde Valley, Yavapai County, and near Sedona, Coconino County.	Possible. The subspecies is restricted to open creosotebush-shrub communities on areas of whitish, powdery, gypsumeous limestone of tertiary lakebed deposits at elevations from 3,120 to 5,120 feet and in the Supai/Haulapai Formation in pinyon-juniper communities.
Mt. Dellenbaugh sandwort *Arenaria aberrans*	S	Found in meadows or edges of meadows within oak and pine forest at elevation of 5,500 to 9,000 feet in Coconino, Mohave, Yavapai and Gila counties.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Ripley wild buckwheat *Eriogonum ripleyi*	S	This species is found in creosote communities and pinyon-juniper woodlands on sandy-clay to gravelly, rocky, medium textured soils on sandstone bedrock as well as on white calcareous soil of tertiary lakebed deposits at elevations from 2,000 to 6,000 feet. Populations known in Maricopa, Coconino, Mohave and Yavapai counties.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Rock dwelling fleabane *Erigeron saxatalis*	S	Sheer canyon walls with moist north-facing slopes and steep bedrock outcrops in canyons above the Mogollon Rim at elevations of 4,400 to 7,000 feet. This species is associated with Rocky Mountain riparian deciduous forests. This species is known in Coconino and Yavapai counties.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Tonto Basin agave *Agave delamateri*	S	Found in well-drained soils atop benches and edges of slopes, and on gentle slopes overlooking major drainages and perennial streams. Usually associated with archaeological features. Populations are limited to a small geographic area in Central Arizona including the Verde Valley area of Yavapai County.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Tusayan rabbitbrush *Chrysothamnus molestus*	S	Found in open areas on slopes and flats at an elevation of 6,000 to 7,000 feet within Coconino, Apache, and Navajo counties.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
American peregrine falcon *Falco peregrinus*	S	Associated with large high cliffs such as the Mogollon Rim, Grand Canyon, and the Colorado Plateau, where sufficient prey and water are available. Found throughout Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.

Table B-1 Summary of the PNF Regional Forester's Sensitive Plant and Animal Species and Their Potential to Occur in the Project Area and Their Potential Effects to the Proposed Action			
Species	**Status**	**Habitat Needs and known Distribution**	**Likelihood of Occurrence in the Project Area**
Arizona toad *Bufo microscaphus microscaphus*	S	Associated with rocky streams and rivers, and temporary woodland pools within closed chaparral, mixed broadleaf riparian, cottonwood-willow riparian, and mesquite bosque (floodplain woodland) habitat types. Found in these habitats in Arizona and New Mexico.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Common black-hawk *Buteogallus anthracinus*	S	This species is an obligate riparian nester found along permanent flowing waters. Species is found in central Arizona in relationship to the Mogollon Rim.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Gila chub *Gila intermedia*	S	Generally occurs in slow waters and pool habitats of small streams, springs, or artificial impoundments. Historically, the Gila chub was found in most headwater streams of the Gila River drainage in Arizona and New Mexico, and within the Santa Cruz and San Pedro river systems of Arizona and Sonora, Mexico. The largest remaining U.S. populations are in south-eastern Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Lowland leopard frog *Rana yavapaiensis*	S	Found in small to medium-sized streams and occasionally ponds at elevations below 5,000 feet. This species is generally restricted to perennial waters. This species is found in central Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Maricopa tiger beetle *Cicindela oregona maricopa*	S	Common on sandy banks of streams, seeps, and reservoirs. Found along banks of semi-permanent streams throughout the Arizona central highlands below the Mogollon Rim.	Possible. It is possible that this species might be found along the banks the drainage in Hell Canyon, however, the conveyor system, which crosses Hell Canyon, will be installed along the existing Hell Canyon Bridge high above the canyon bottom where the species would be located.
Mexican garter snake *Thamnophis eques megalops*	S	Occurs primarily in permanent marshes, livestock tanks and streams with dense riparian vegetation at middle elevations. Throughout central, south central, and southeastern Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Narrow-headed garter snake *Thamnophis rufipunctatus*	S	Highly aquatic snake that typically inhabits clear, cool, rocky streams. Primarily known from permanent streams draining the Mogollon Rim including the Verde River.	Neither the species nor its habitat occur within the project area or would be impacted by this project.

Table B-1 Summary of the PNF Regional Forester's Sensitive Plant and Animal Species and Their Potential to Occur in the Project Area and Their Potential Effects to the Proposed Action			
Species	**Status**	**Habitat Needs and known Distribution**	**Likelihood of Occurrence in the Project Area**
Northern goshawk *Accipiter gentilis*	S	Found in coniferous and deciduous forests associated with mountains and plateaus of north central Arizona. In addition to this species status a sensitive it is the Management Indicator Species for late seral stage ponderosa pine vegetation type on the Prescott National Forest.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Roundtail chub *Gila robusta*	S	Occurs in cool to warm waters in mid-elevation streams and has been documented in the Verde River and its mainstream tributaries.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Verde Rim springsnail *Pyrgulopsis glandulosa*	S	Found in sandy conditions associated with perennial water. This species range is restricted to two springs that form the headwaters for Sycamore creek, Yavapai County in central Arizona.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Prescott National Forest Category: **(S)–Region 3 Regional Forester's Sensitive**			

Table B-2 Summary of Species with ESA Protection and Their Potential to Occur in the Project Area			
Species	**Status**	**Species Information**	**Likelihood of Occurrence in the Project Area**
Bald eagle *Haliaeetus leucocephalus*	T	Inhabits areas with large trees or cliffs near water (reservoirs, rivers and streams) with an abundant prey at various elevations. This species occurs throughout Arizona primarily as a winter resident or migrant.	Neither the species nor its habitat occur within the project area or would be impacted by this project. Suitable habitat for this species is found at the Verde River, which is located approximately five linear miles away from nearest point of the project area.
Mexican spotted owl *Strix occidentalis lucida*	T	Found in dense multi-storied closed canopy forests with many snags and downed logs as well as canyons at elevations from 4,100 to 9,000 feet. This species is patchily distributed in forested subalpine and montane coniferous forest statewide.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Southwestern willow flycatcher *Empidonax traillii extimus*	E	This species breeds at lower elevations in dense cottonwood, willow, and tamarisk communities along rivers and streams. Critical Habitat for this species occurs along the Verde River.	Neither the species nor its habitat occur within the project area or would be impacted by this project. Critical Habitat for this species is found along the Verde River and is located approximately 22 linear miles southeast of the project area.
Colorado pikeminnow (squawfish) *Ptychocheilus lucius*	E	This species is found in warm turbid rivers with a high silt content. This species is considered extirpated from Arizona. Two experimental non-essential populations were reintroduced in the Salt River and Verde River drainages.	Neither the species nor its habitat occur within the project area or would be impacted by this project. Suitable habitat for this species occurs in the Verde River, which is located approximately 9 river miles downstream from the project area.
Gila topminnow *Poeciliopsis occidentalis occidentalis*	E	Occurs in small to moderate sized streams, springs, cienegas and margins of larger bodies of water generally in shallows. This species is usually associated with emergent or aquatic vegetation at elevations below 4,500 feet. Found in various counties including Yavapai County.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Loach minnow *Tiaroga cobitis*	T	Occurs in small to large perennial streams with swift shallow water over cobble and gravel substrates. This species is believed to be extirpated from the Verde River.	Neither the species nor its habitat occur within the project area or would be impacted by this project.

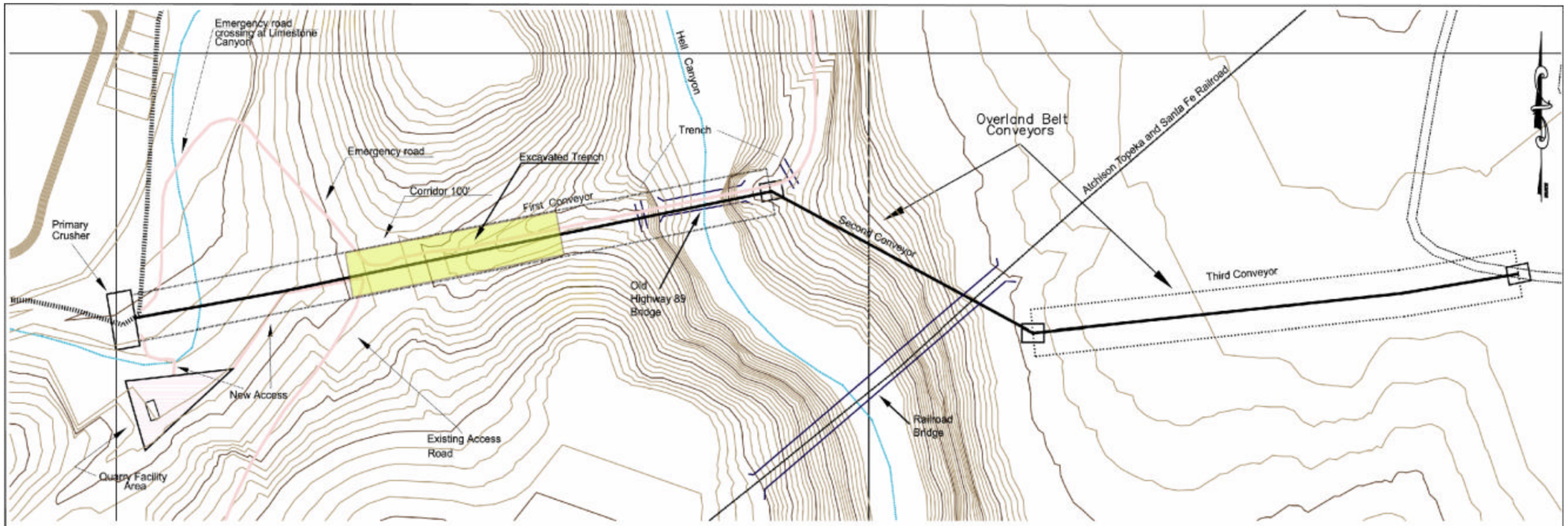
Table B-2 Summary of Species with ESA Protection and Their Potential to Occur in the Project Area			
Species	**Status**	**Species Information**	**Likelihood of Occurrence in the Project Area**
Razorback sucker *Xyrauchen texanus*	E	Found in backwaters, flooded bottomlands, side channels, and reservoirs. In the Lower Colorado River Basin populations are isolated to Lakes Mohave, Mead and the Colorado river below Lake Havasu. Experimental nonessential populations have been reintroduced into the Verde River. Critical habitat has also been designated along the Verde River.	Neither the species nor its habitat occur within the project area or would be impacted by this project. Suitable habitat for this species occurs in the Verde River, which is located approximately 9 river miles downstream from the project site. Designated critical habitat for this species is located along the Verde River and terminates near Perkinsville, which is approximately 16 river miles downstream from the project area.
Spikedace *Meda fulgida*	T	Occurs in moderate to large perennial streams with gravel cobble substrates and moderate to swift velocities. This species has been documented in the Verde River.	Neither the species nor its habitat occur within the project area or would be impacted by this project. Suitable habitat for this species occurs in the Verde River, which is located about 9 river miles downstream from the project site.
Western yellow-billed cuckoo *Coccyzus Americanus occidentalis*	C	Found among large blocks of riparian woodlands consisting of cottonwoods, willow or tamarisk galleries.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
USFWS categories: **Endangered (E)—**Taxa in danger of extinction throughout all or a significant portion of its range; **Threatened (T)/Proposed Threatened (PT)—**Taxa likely to become endangered within the foreseeable future throughout all or a significant portion of its range; **Candidate (C)—**Species for which the USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened. Candidate species, however, are not protected legally because proposed rules have not been issued. [Source: USFWS database (http.//ifw2es.fws.gov/EndangeredSpecies/lists/)]			

Table B-3 Summary of Wildlife Species of Concern in Arizona and Their Potential to Occur in the Project Area		
Species	**Species Information**	**Likelihood of Occurrence in the Project Area**
Ferruginous hawk *Buteo regalis*	Ferruginous hawks occupy and breed in grasslands and other open habitats, primarily from 2,800 – 7,500 feet elevation.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Spotted bat *Euderma maculatum*	Habitat is varied. In Arizona mostly collected in dry, rough desertscrub with a few captured or heard in ponderosa pine forests. This bat has been found from low desert areas in southwestern Arizona to high desert and riparian habitats in northwestern Arizona and Utah, and conifer forests in northern Arizona and other western States. Considered by some biologists to be an elevational migrant. Roost site localities and characteristics are poorly understood, but limited observations suggest they prefer to roost singly in crevices and cracks in cliffs. Cliffs and water sources are characteristic of localities where it occurs. Specimens known from a wide range of biotic communities, from desertscrub of all four North American Deserts through riparian and pinyon-juniper to montane coniferous forests of Rocky Mountains, Sierra Nevadas and scattered ranges between (AGFD 2005).	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Belted kingfisher *Ceryle alcyon*	Belted kingfishers are restricted to habitats with permanent, fish-inhabited waters, primarily the Verde River drainage in central Arizona and possibly the Black River in eastern Arizona and the Grand Canyon segment of the Colorado River (AGFD, 1996). (BISON) Nests are horizontal burrows in vertical banks. Belted kingfishers are commonly observed along the Verde River during the breeding season (Sillas, personal communication).	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Western red bat *Lasiurus blossevii*	This species is associated with broad-leaf deciduous riparian forests and woodlands. Roosts by day in trees. Suitable habitat may occur along the Verde River. Red bats feed on moths. (AGFD 2005)	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Osprey *Pandion haliaetus*	Breeds primarily in White Mountains, and along Mogollon Rim. Known to nest at Lynx Lake near Prescott and commonly seen along the Verde River year-round. Nests in conifers alongside or near rivers and lakes. (AGFD 2005)	Neither the species nor its habitat occur within the project area or would be impacted by this project.

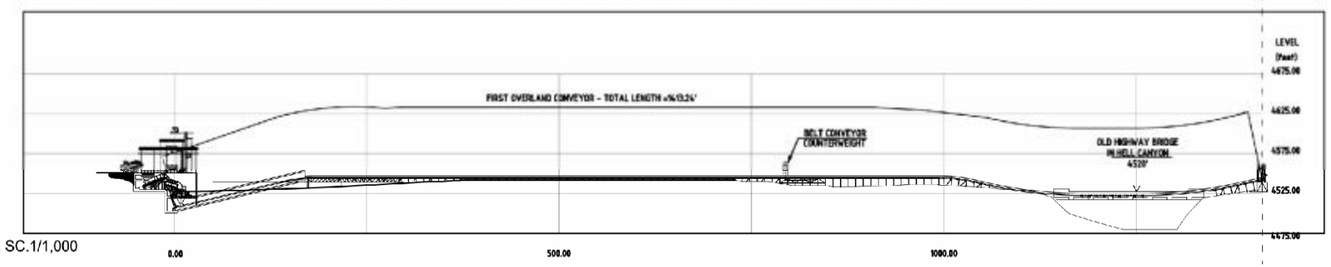
Table B-3 Summary of Wildlife Species of Concern in Arizona and Their Potential to Occur in the Project Area		
Species	**Species Information**	**Likelihood of Occurrence in the Project Area**
Sonoran desert tortoise *Gopherus agassizi* (Sonoran population)	The Sonoran population of the desert tortoise occurs primarily on rocky slopes and bajadas of Mojave and Sonoran desertscrub. Caliche caves in incised, cut banks of washes (arroyos) are also used for shelter sites. Shelter sites are rarely found in shallow soils. (AGFD 2005)	Neither the species nor its habitat occur within the project area or would be impacted by this project.
California leaf-nosed bat *Macrotus californicus*	Mostly found in Sonoran desertscrub. Primarily roosts in mines, caves, and rock shelters.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
American redstart *Setophaga ruticilla*	The American redstart breeds irregularly, mainly along the upper Little Colorado River, near Greer. Breeding habitat includes riparian hardwoods. This species breeds in northern North America and winters in Central and South America. Arizona is on the periphery of the wintering range.	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Pine grosbeak *Pinicola enucleator*	The species occupies open coniferous forests, woodland, second growth and shrubbery. In Arizona, known from the White Mountains, North Kaibab Plateau, and Oak Creek Canyon (AGFD 2005).	Neither the species nor its habitat occur within the project area or would be impacted by this project.
Plains leopard frog *Rana blairi*	Range within Arizona: Isolated population in southeastern Arizona, western side of Chiricahua Mountains (Turkey Creek, etc.) and adjoining Sulphur Springs Valley. Found mainly around streams, ponds, creek pools, reservoirs, marshes, or irrigation ditches in prairie and desert grasslands, but can also be found in oak and pine-oak woodland and farmland. Can range into terrestrial habitat near water during wet weather. Often bask on vegetation mats at water's edge. (AGFD 2005)	Neither the species nor its habitat occur within the project area or would be impacted by this project.

APPENDIX C

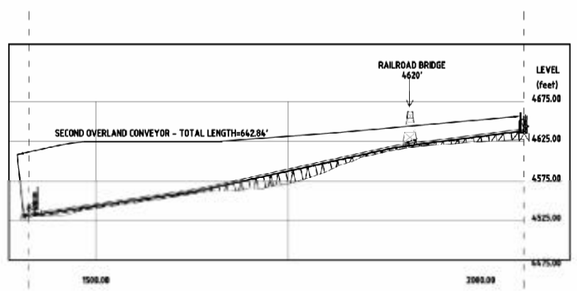
Proposed Forest Plan Amendment Pages



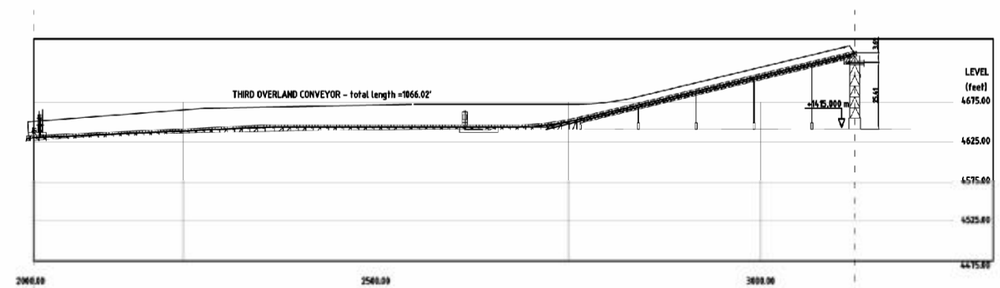
PLANT. SC. 1/1,250



SECTION A1-A2. SC.1/1,000



SECTION B1-B2. SC.1/1,000



SECTION C1-C2. SC.1/1,000

PROPOSED LIMESTONE QUARRY

QUARRY FACILITY AREA

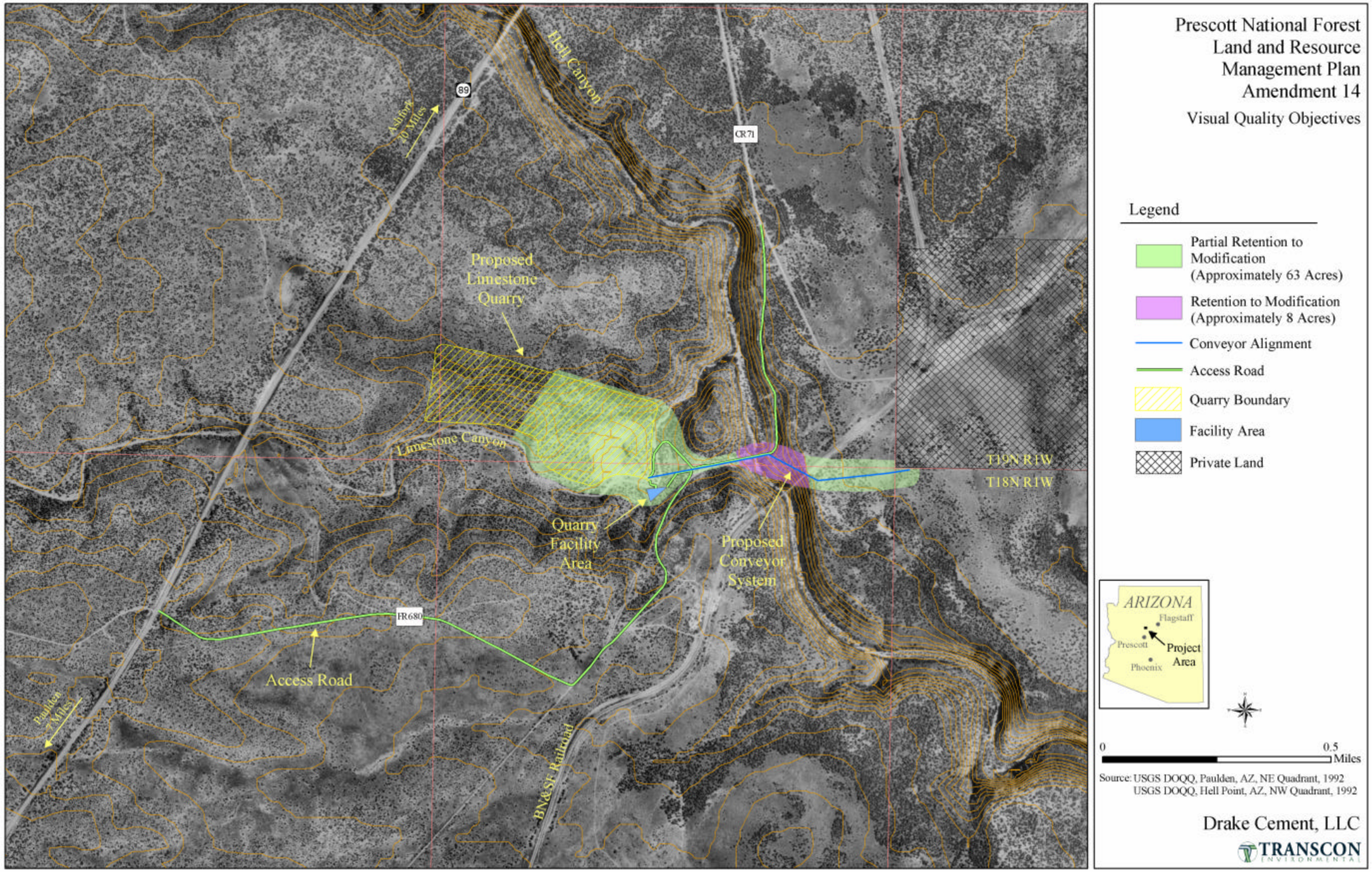
ACCESS ROADS

This drawing is only a conceptual layout developed to illustrate longitudinal sections for the proposed conveyor and the estimated cut for the first conveyor corridor. It is based upon USGS 5- foot contour data. Use of this data is not suitable for final desing and construction.

This map is based on USGS digital topo data and NOT from survey data. All data shown is approximate.

COORDINATES SHOWN ARE UTM
(NORTH AMERICAN DATUM Nad 27)

Prepared For: DRAKE CEMENT LLC	THE MINES GROUP INC. 1325 Airmotive Way, Reno, NV 89502
Title: PLAN OF OPERATIONS LONGITUDINAL SECTIONS A1 THROUGH C2	Scale: AS SHOWN; Date: 22/07/09; Rev. 3
	Drawing No. DC04-09; Drafted By: BRGEN


Prescott National Forest
Land and Resource
Management Plan
Amendment 14
Visual Quality Objectives
Legend
Partial Retention to Modification (Approximately 63 Acres)
Retention to Modification (Approximately 8 Acres)
Conveyor Alignment
Access Road
Quarry Boundary
Facility Area
Private Land
ARIZONA
Flagstaff
Prescott
Phoenix
Project Area
0
0.5
Miles
Source: USGS DOQQ, Paulden, AZ, NE Quadrant, 1992
USGS DOQQ, Hell Point, AZ, NW Quadrant, 1992
Drake Cement, LLC
TRANSCON
Hell Canyon
Ashfork 20 Miles
89
CR71
Proposed Limestone Quarry
Limestone Canyon
T19N R1W
T18N R1W
Quarry Facility Area
Proposed Conveyor System
FR680
Access Road
Paulden 7 Miles
BN&SF Railroad

Prescott National Forest Plan

Amendment 14

To the 2004 republished version (V1.1) of the 1986 Forest Plan, as amended

Visual Quality Objectives
Drake Cement Limestone Quarry Project

May 26, 2006

Visual Quality

Visual quality levels as inventoried and mapped serve as the visual quality objectives (VQOs) for the forest.

Table 7. Visual quality objectives

VQO	Current Acres	Amended Acres
Preservation	132,401	n/a
Retention	52,466	52,458
Partial Retention	210,069	210,006
Modification	637,961	638,032
Maximum Modification	229,902	n/a

Analyze each project in the field to determine if the elements and levels that comprise the existing VQOs are accurate and reflect current conditions and uses. Raise VQOs to the next higher scenic level if appropriate, and determine if this new VQO level reflects increased or anticipated public use and/or future management intentions for the area. Changes to inventoried VQOs require project-level NEPA analysis and a decision by the forest supervisor. The changes will be mapped and tracked for trend assessment during the first decade of Forest Plan implementation **(see attached Map)**.

In ponderosa pine foregrounds, manage for diversity varying from openings to multistoried stands, with some overmature yellow-bark ponderosa pine trees in open, park-like stands. Group selection within the front 200 feet of the foreground should not exceed 1 acre and the shapes should be designed to achieve the characteristics of natural openings.

In retention and partial retention VQO middle ground and background distance zones, create or maintain a diversified texture of the forested landscape in relation to the existing landscape character type. All improvements, permanent structures, vegetation manipulation, ground disturbing activities and/or construction will be compatible with the visual quality objective for the area.

By the end of the second decade (1996-2005), develop viewshed corridor implementation plans for all high-use areas, water bodies, primary travel routes and all secondary routes where three-quarters of the users have major concern for scenic qualities.

Conduct vegetation management planning for visual quality to enhance and assist in long-term survival of aspen stands and other interesting vegetation features. Implementation would occur after analysis of applicable environmental factors is performed.

Complete visual absorption capability and existing visual condition mapping for the forest by the end of the first decade (1986-1995).

By the end of the fist decade (1986-1995), inventory and list in priority order all areas not meeting VQOs that need rehabilitation.

Manage developed recreation site perimeters (within 330 feet) for the visual quality objective of retention.

Design and construct improvements and permanent structures in foreground areas with natural appearing materials. Improvement, permanent structures, vegetation manipulation and ground disturbing activities will be compatible with the natural landscape.

Place timber markings on the side opposite the viewer along all roads and travel ways were practical.

In mixed conifer foregrounds, maintain a variety of species, age classes and size classes through the use of various silvicultural prescriptions and stand marking guides.

Dispose of all activity slash in the first 200 feet of Sensitivity Level 1 foregrounds.

In pinyon/juniper foregrounds, retain or create diversity in pinyon/juniper stands by emphasizing open stands of mature trees (12 inches DBH or more) with a variety of other size classes. A minimum of 40 percent of the existing canopy should be retained. Openings and cutting practices should be compatible with visual quality other objectives identified in the project environmental analysis.

Retain a mix of noncommercial species (oak, locust, etc.) in foreground areas, whenever these species are present.

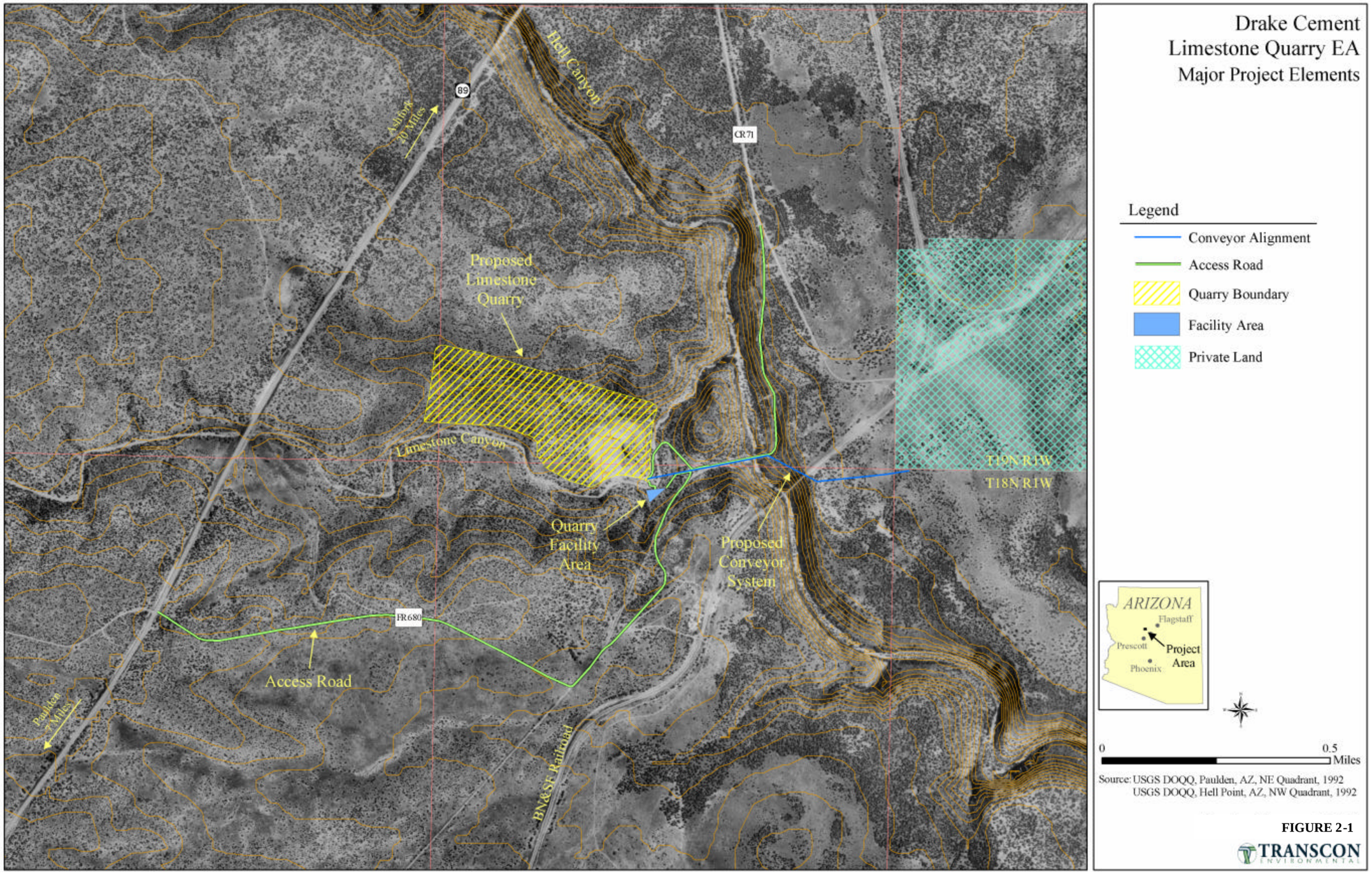

Drake Cement
Limestone Quarry EA
Major Project Elements
Legend
Conveyor Alignment
Access Road
Quarry Boundary
Facility Area
Private Land
Hell Canyon
Ashfork
20 Miles
89
CR71
Proposed
Limestone
Quarry
Limestone Canyon
T19N R1W
T18N R1W
Quarry
Facility
Area
Proposed
Conveyor
System
FR680
Access Road
Paulden
7 Miles
BN&SF Railroad
ARIZONA
Flagstaff
Prescott
Phoenix
Project
Area
0
0.5
Miles
Source: USGS DOQQ, Paulden, AZ, NE Quadrant, 1992
USGS DOQQ, Hell Point, AZ, NW Quadrant, 1992
TRANSCON
ENVIRONMENTAL

FIGURE 2-1

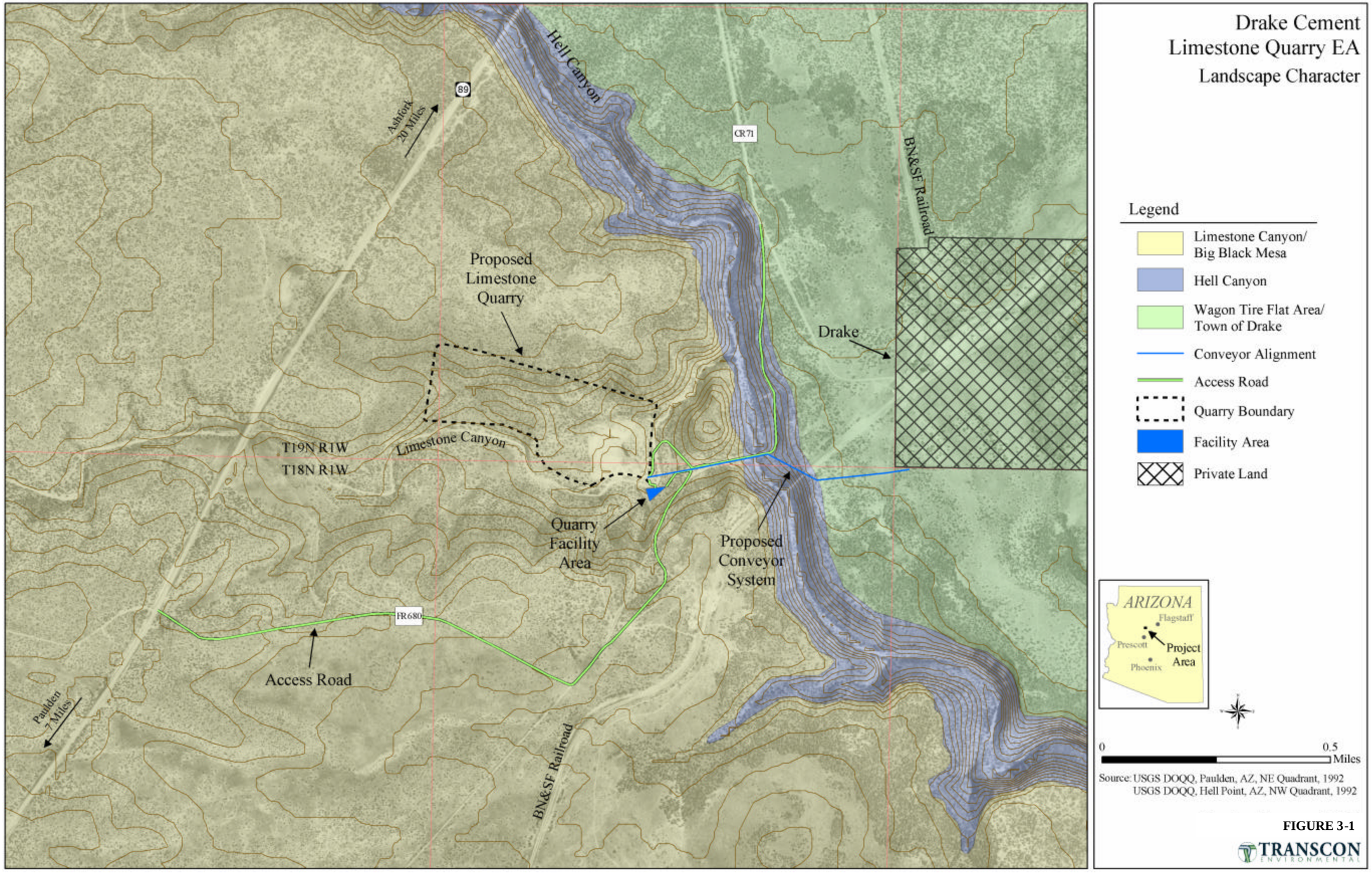

Drake Cement
Limestone Quarry EA
Landscape Character
Hell Canyon
89
Ashfork
20 Miles
CR 71
BN&SF Railroad
Proposed
Limestone
Quarry
Drake
T19N R1W
T18N R1W
Limestone Canyon
Quarry
Facility
Area
Proposed
Conveyor
System
FR 680
Access Road
Paulden
7 Miles
BN&SF Railroad
Legend
Limestone Canyon/
Big Black Mesa
Hell Canyon
Wagon Tire Flat Area/
Town of Drake
Conveyor Alignment
Access Road
Quarry Boundary
Facility Area
Private Land
ARIZONA
Flagstaff
Prescott
Phoenix
Project
Area
0
0.5
Miles
Source: USGS DOQQ, Paulden, AZ, NE Quadrant, 1992
USGS DOQQ, Hell Point, AZ, NW Quadrant, 1992
TRANSCON
ENVIRONMENTAL

FIGURE 3-1