

### Introduction

This chapter describes existing conditions, including resources and values that potentially could be affected by the alternatives presented in this document. The impacts of alternatives on each of these resources and values are described in Chapter 4, Environmental Consequences. Detailed information on resources in Arches National Park may be found in the park's *General Management Plan (GMP), 1989*, *Visitor Experience and Resource Protection Implementation Plan, 1995*, and other park plans and studies. A summary of the resources associated with this follows.

### Description of Affected Environment

#### Soils and Biological Soils Crusts

##### Soils

A large percentage of Arches National Park's land surface is exposed bedrock or shallow soil over bedrock with sparse land cover. The arid climate of the area, with only eight inches of annual precipitation, results in sparse vegetation and poorly developed soils. Large areas of slickrock cover approximately 11 percent of the park and are largely devoid of soil and plant life.

Soils in the park are derived from local sandstones and are classified as well- drained, fine- grained sandy loams of eolian, residual, and alluvial origin with little organic material. The soils are a yellow- red color and soil depth varies greatly. Approximately 90 percent of the soils in the park are in the Rizno- Begay Complex. These soils are fine sandy loams characterized by 2 to 10 percent slopes and are closely intermingled. Rizno soils are found on ridges and close to rock outcrops. Beday soils are found in open areas and are deeper. Rizno soils are 4 to 20 inches in depth, while Begay soils are as deep as 60 inches. Both soils are well drained and contain less than one percent organic matter. These soils in the park are generally very susceptible to damage by trampling

from unplanned foot traffic at areas of concentrated visitor use, such as parking areas, scenic overlooks, campgrounds, and trails.

Salt Valley is covered mostly with sandy deposits transported by wind and water. The northern portions of the valley and lower slopes have surface exposures of shale and clay. This material forms soil that expands when moisture is added, resulting in a high shrink to swell ratio that can cause heaving of road surfaces. Portions of the park Main Road in Salt Wash and Delicate Arch Road cross these unstable soils.

##### Biological Soil Crust

Biological soil crusts cover much of Arches National Park. Soil crusts are common on sandy soils in the pinyon/juniper areas and in shrublands. These dark brown crusts may represent 70 to 80 percent of the living ground cover in the cold deserts of the Colorado Plateau regions. The soil crusts consist of a variety of organisms, including cyanobacteria, lichens, algae, mosses and fungi, which form an intricate web of filaments that increase soil stability, increase rainfall infiltration, fix nitrogen in the soil, and protect the soil surface from wind and water erosion. These functions contribute to the park's ecosystems by increasing nitrogen and other nutrients for plant growth and enhancing germination and establishment of some vascular plants.

The nitrogen- fixing role is particularly important in desert ecosystems where nitrogen levels are low and often limit the ecosystem's productivity.

Construction activities, motor vehicles, foot traffic, and livestock easily damage soil crusts. When crusts are dry, they are very brittle and easily crushed. Breaking the fiber connections destabilizes the underlying soil making it more susceptible to both wind and water erosion, which may affect soil fertility and moisture retention, adversely affecting the establishment and survival of vascular plant seedlings. Crushed soil crusts also contribute less nitrogen and organic matter to the ecosystem.



The natural recovery of soil crusts can take many years. Under the best of circumstances, a thin veneer, consisting of one or two cyanobacterial species, may return in five to seven years. Full recovery of all of the crust components may take more than 250 years depending on the type and extent of disturbance, availability of nearby inoculation material, and temperature and moisture regimes.

## Visual Resources

Visual resources are the visible physical features of a landscape that impart scenic value.

Southeastern Utah is known worldwide for its unique scenic qualities and unusual landscape features. It is a land of deep canyons, rock arches, towering rock formations, badlands, and expansive panoramas. Many of the more spectacular features are preserved in national and state parks or monuments including Arches National Park (US Department of Energy 2004).

The primary scenic attractions at the park are the arches. Water and ice, extreme temperatures, and underground salt movement are responsible for the sculptured rock arches of Arches National Park. Other geologic features and panoramic views also contribute to the scenic richness of the park. The park has pronounced angular topography and contains several horizontal layers of sedimentary rocks with steep escarpments and cliffs (USDI National Park Service 2002). The roads, designated trails, and viewpoints in the park provide panoramic and dramatic views of these unique scenic features for park visitors. Some of the most prominent visual features include Park Avenue, Courthouse Towers, Petrified Dunes, Salt Valley, Delicate Arch, Fiery Furnace, Devils Garden, and the distant La Sal Mountains.

## Visitor Use, Visitor Experience, and Recreational Resources

Arches National Park is a popular year- round destination for people from around the world. The park offers a variety of recreational experiences including sightseeing, viewpoints/photo stops, hiking, interpretation

(Visitor Center and other locations in the park), picnicking, special tours (Fiery Furnace and others), camping, rock climbing, bicycling (on established park roads), and access to the backcountry. Visitors are able to enjoy many of the park's arches and features while driving along park roadways, but are encouraged to get out of their cars and walk to "*grasp the aura of time and silence and experience the scale so special here*" (Arches National Park brochure). Arches National Park is a great family park, with several trails and trail loops that offer moderate and easy dayhiking experiences.

A new visitor center opened in September 2005. It includes an expanded area of interpretive exhibits. Also, a new visitor entrance station was completed in 2004, which vastly improved the efficiency of entering the park and reduced the congestion of cars on the park's entry road.

Visitors are cautioned about summer daytime temperatures, which can reach 110 degrees F and encouraged to carry water on trips to the park. Drinking water is available at the Visitor Center, campground, and the Devils Garden Trailhead.

The park is surrounded by public lands managed by the Bureau of Land Management (BLM) where additional hiking, mountain biking, camping, rockclimbing, "jeeping"/four- wheel- driving, and sightseeing opportunities can be enjoyed by visitors. The Moab region is known as one of the premier destinations for mountain biking and "jeeping"/ four- wheel- driving in the country, if not the world. Millions of visitors come to the area each year to enjoy these and other activities.

There is regional interest in increasing visitation to the region overall, as well as interest in spreading visitation out throughout the year (beyond peak periods and into seasons that are off- peak periods). Arches National Park works closely with tourism interests including the Grand County Travel Council and Utah Tourism Council to develop strategies for marketing and promoting regional tourism experiences. Arches National Park has been working with these interests to encourage travel to the area during off- peak periods.



The park manages visitor experience through the provisions of the GMP and the Visitor Experience and Resource Protection (VERP) Implementation Plan. The VERP program provides support for informed, defensible decisions about visitor use and provides a framework for cost-effectively coordinating planning, research, monitoring, and management actions. Under the VERP plan, various indicators have been monitored throughout the park to determine if visitor experience and resource protection goals are being met. The park has monitored these standards and indicators for the past several years; however future annual funding for ongoing VERP monitoring is not guaranteed. Refer to Chapter 2 for a summary of monitoring results from past years.

### Trends in Park Visitation and Visitation Forecasts

An analysis of past trends in park visitation was conducted to anticipate potential future visitation levels that the transportation plan and park management will need to respond to. The results of this analysis and forecasting are summarized below.

Since the 1960s, visitation at Arches National Park has increased in a series of peaks (periods of high visitation) and valleys (periods of low visitation). After a period of rapid growth, park visitation tended to drop and stabilize for a few years then experience another accelerated growth cycle. This cycle continued up through the mid- 1990s when growth in visitation began to level off. From 1993 through 2005, annual visitation rates have stayed relatively constant.

In 1982, Arches National Park experienced a visitation of 339,415 people. In 1993 the visitation level was 773,678. Average annual growth within that eleven year span was 11.6 percent. From 1993 to 2005, the average annual growth was .09 percent.

Between 1982 and 1999, the park experienced a 9.2 percent average annual growth rate, but overall between 1982 and 2005, the average annual growth rate was 5.7 percent. Since 1991, visitation has fluctuated within a range of between 700,000 and 870,000 visitors per year, with the peak visitation occurring in 1999.

1999 was one of the busiest years on record with 869,980 visitors. Park staff reported many problems and challenges associated with managing parking, traffic congestion, and visitor experience in that year. These problems included crowding at key features, congestion on park roads and in parking areas, and damages to soils and vegetation from social pull off and parking activity at roadsides. These types of problems continue annually at the park during peak visitation periods in spring, summer, and on holiday weekends. Easter weekend is known as one of the busiest weekends in the park, along with the traditional holiday weekends of Memorial Day and Labor Day.

Visitation in 2005 was 781,672, up by 6.6 percent above the 2004 visitation of 733,131 and up by 3.2 percent above the 2003 visitation of 757,781.

Figures 3.1, 3.2 and 3.3 illustrate visitation trends since the 1960s.



Figure 3.1 — Arches National Park Visitation from 1967 - 2005

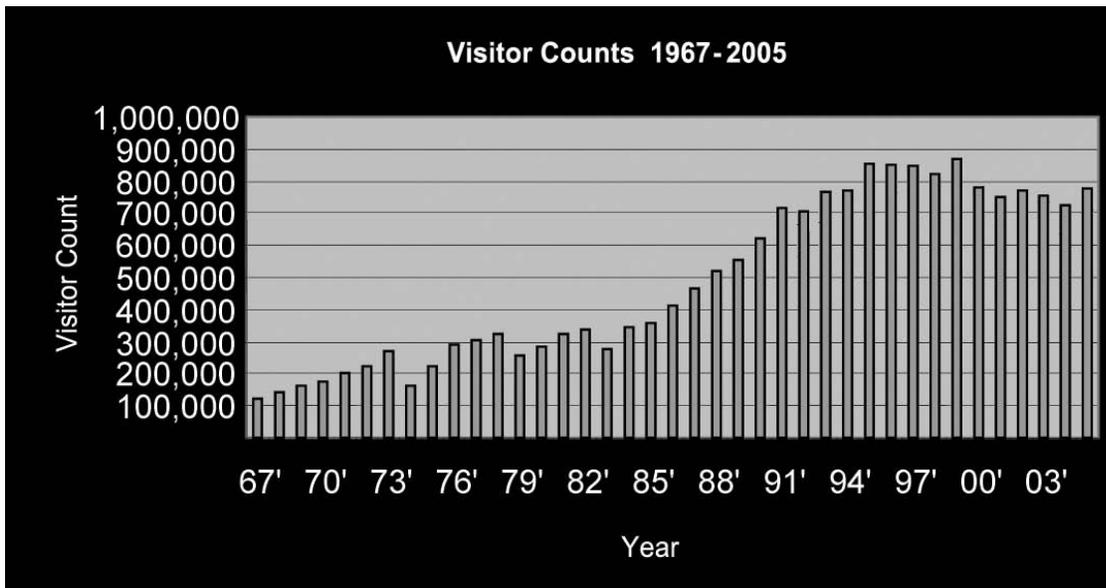


Figure 3.2 — Arches National Park Visitation Growth from 1982 - 2005

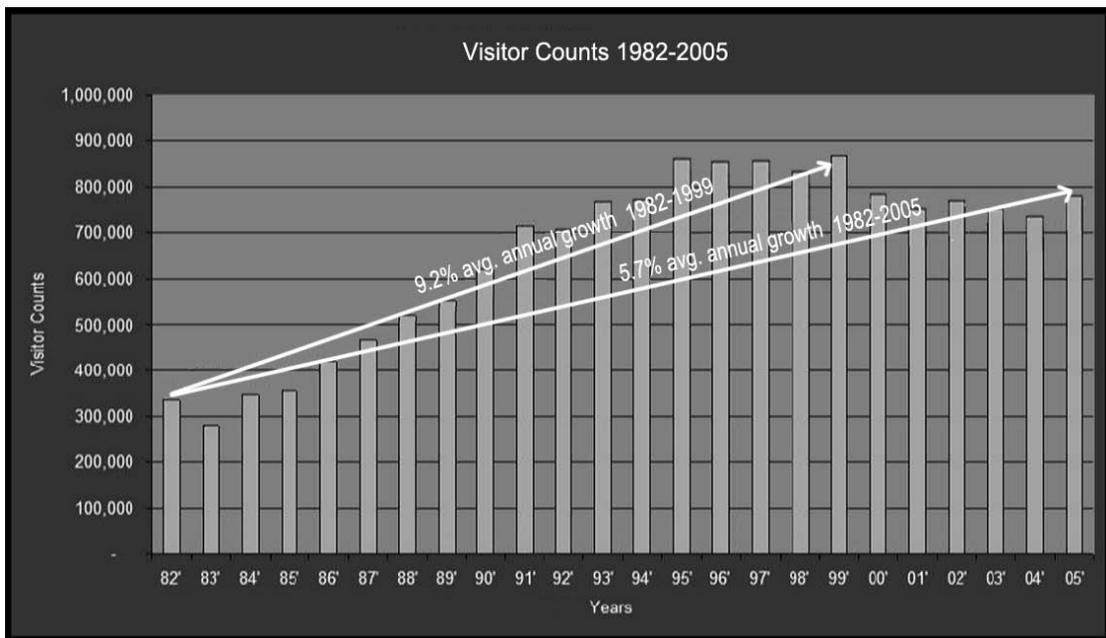
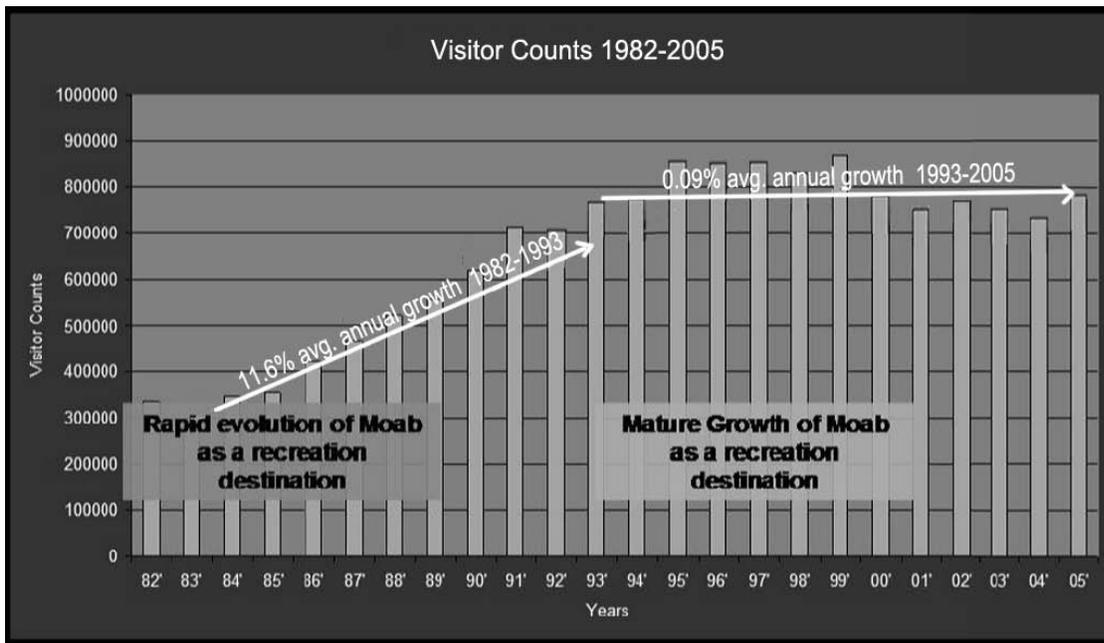


Figure 3.3 — Arches National Park Visitation Growth Analysis from 1987- 2005



Breaking down the annual growth of the last ten years into months, as shown in Figure 3.4 on the next page, illustrates that park attendance has increased in the off- peak season. Summer increases were not experienced over the last ten years.

An evaluation of the data prior to the recent down- turn of the economy, as shown in Figure 3.5 (depicting visitation through 1999), illustrates similar gains during the off- peak season; however, there still was growth in attendance during the peak summer months.

Anticipating growth in visitation over the next twenty years for Arches National Park is a difficult task. Many factors influence park attendance. The analysis of trends above has provided a frame of reference for possible growth patterns that may occur in the future, but the actual levels that visitation may increase, decrease, or remain constant are unknown.

Because of the challenges associated with predicting a specific growth rate for the park, three potential growth scenarios (low, medium and high) were evaluated for Arches National Park and are depicted in Table 3.1. The low growth scenario anticipates annual monthly growth in attendance to reflect that which has been experienced over the last ten years. Medium and high growth assumption increased each month by one half and one percentage point, respectively. It is anticipated that the actual growth rate of visitation at the park will fall somewhere within these scenarios.

This analysis of potential growth scenarios helps the park anticipate possible future visitation in order to help inform planning for the appropriate types of management strategies and actions. For example, the transportation implementation plan includes some proposed actions that may not need to be implemented if growth levels remain flat or low, but others that may be needed if growth levels are higher.



Figure 3.4 — Park Attendance Analysis 1992- 2001

(Showing Percentage Increases in Visitation per Month for the Period)

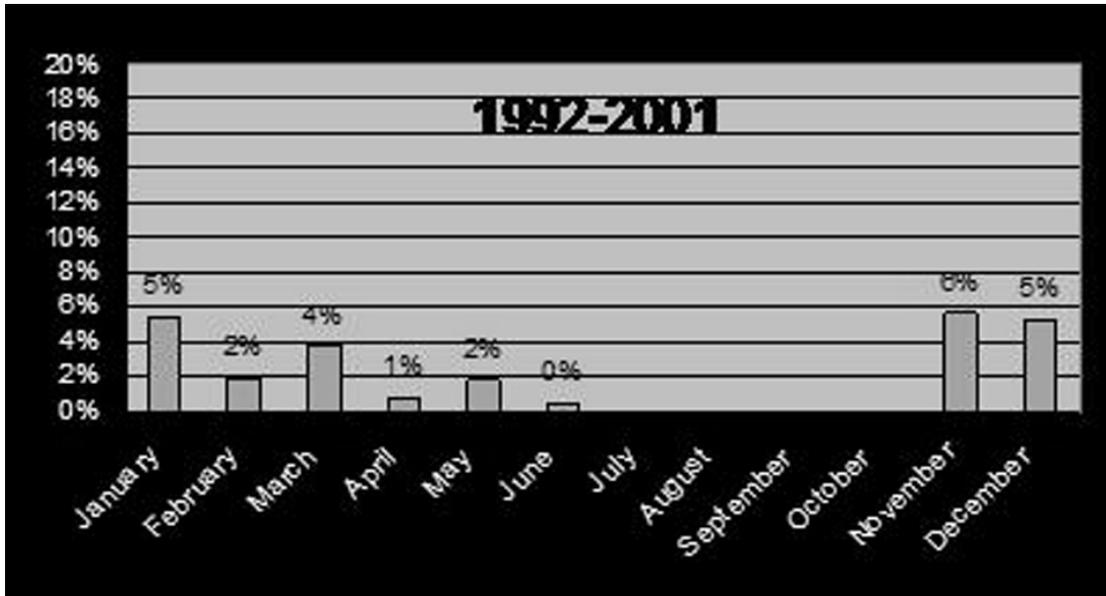
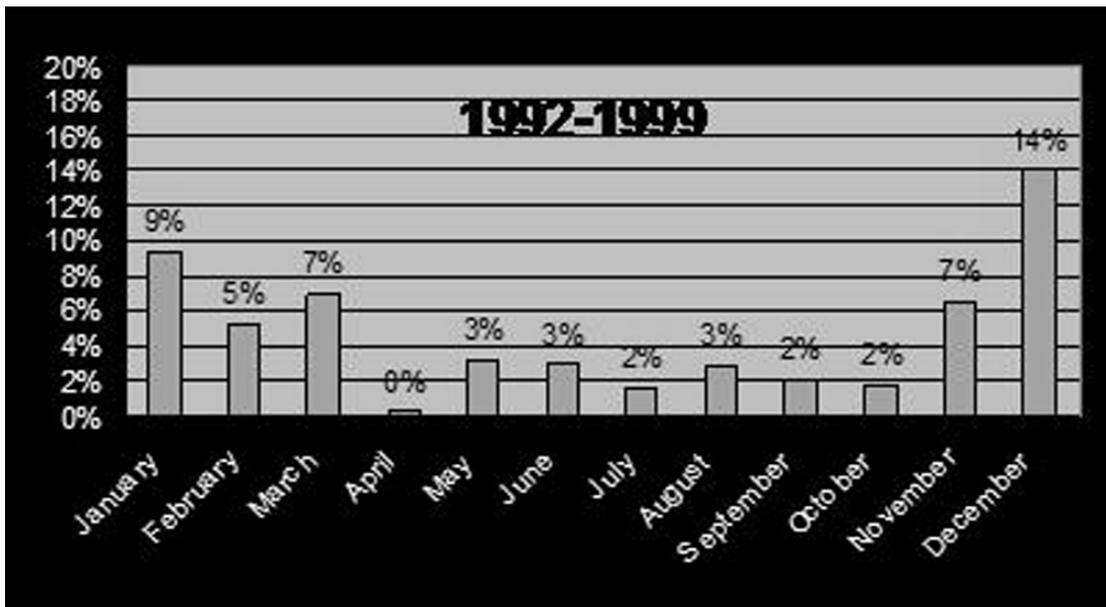


Figure 3.5 — Park Attendance Analysis 1992- 1999

(Showing Percentage Increases in Visitation per Month for the Period)



**Table 3.1 — Potential Growth Scenarios for Arches National Park**

	Low	Medium	High
January	6.50%	7.00%	7.50%
February	3.50%	4.00%	4.50%
March	4.50%	5.00%	5.50%
April	0.50%	1.00%	1.50%
May	1.50%	2.00%	2.50%
June	1.50%	2.00%	2.50%
July	0.50%	1.00%	1.50%
August	0.50%	1.00%	1.50%
September	0.50%	1.00%	1.50%
October	0.50%	1.00%	1.50%
November	5.50%	6.00%	6.50%
December	9.50%	10.00%	10.05%
<b>Annual Growth Rate</b>	<b>1.86%</b>	<b>2.50%</b>	<b>3.11%</b>

**Visitor Characteristics**

Gaining an understanding of Arches National Park visitor characteristics helped to inform the development of strategies and actions proposed in the transportation implementation plan.

**Results of the 2003 Visitor and Travel Surveys**

In April and August of 2003, visitor surveys were conducted at Arches National Park specifically to provide background data and information to support development of the transportation implementation plan. The primary purpose of the surveys was to understand park visitor characteristics, experiences, preferences, and perceptions.

The survey asked where they go when they come to the park, as well as specific questions about their experience, and whether or not they would ride a shuttle at the park. Surveys were conducted using an “exit” methodology. Visitors in vehicles and on bicycles were stopped at the Park Avenue parking area before they left the park and asked to voluntarily participate in the survey. Surveys were also conducted at the campground covering many of the same questions in the general visitor survey. An employee survey was also conducted during the same timeframe as the visitor surveys. An analysis of the results of these surveys is available from Arches National Park as a

separate report. Survey findings are summarized below.

*General Findings*

- The 2003 survey findings indicated that April visitors tended to travel with fewer people per vehicle (average of two people per vehicle), compared to an average of three people per vehicle during August.
- The average age of visitors was 46 years in April and 37 years in August. 42 percent of visitors were 55 and over in April and 21 percent were 55 and over in August. This reflects the affect of the seasonal school calendar on visitation, with summer being a popular time for family travel due to summer break.
- Primary visitor activities recorded were photography, hiking and picnicking, regardless of season.
- Most visitors surveyed were first- time visitors to the park (57 percent in April and 69 percent in August). The 43 percent of repeat visitors in April reported an average of 7 visits to the park. August repeat visitors reported an average of 5 visits to the park.
- Most park visitors were from outside of Utah. Out- of- state visitors ranged from 85 percent in April to 91 percent in August.
- Foreign visitors (outside the USA) were more prevalent during August (21 percent of the total visitors). Most foreign visitors indicated England, Switzerland, and France as their home countries. (The park reports that many visitors come from Germany as well.)
- 42 percent of visitors indicated they were staying in private and public campgrounds in April, while 43 percent indicated they were staying in motels. In August, more visitors were staying in motels (62 percent of the total).
- 35 percent of respondents in April indicated they would be staying at the park for less than one day, and 31 percent indicated they would be staying for one full day. In August, park the duration of park visits got shorter – 47 percent



indicated they would be staying less than one day and 29 percent indicated they would be at the park for one full day.

- Most people in April and August indicated they would visit the park in the morning rather than other times of the day.
- The duration of stays in the Moab area were three days on average in April and two days on average in August.

#### *Popular Park Attractions and Visitor Perceptions about Attractions*

- The most popular attractions at the Arches National Park were similarly listed by April and August respondents. The attractions mentioned as places respondents visited in the park (in order of most mentioned to least mentioned) were:
  - The Windows
  - Balanced Rock
  - Devils Garden
  - Delicate Arch Viewpoint; Park Visitor Center (tied)
  - Wolfe Ranch/Delicate Arch Trailhead
  - Courthouse Towers; Park Avenue Trailhead (tied)
  - La Sal Mountain Viewpoint
- Regional attractions (in decreasing level of visitor interest) were:
  - Downtown Moab
  - Canyonlands National Park
  - Dead Horse Point State Park
  - BLM recreation sites along Highway 128
  - Various other BLM recreation sites

Refer to Figures 1.1 and 1.2 in Chapter 1 for the locations of these sites within proximity to Arches National Park.

- Most visitors did *not* report that parking areas at the Visitor Center, Windows, Wolfe

Ranch/Delicate Arch Trailhead, or Devils Garden seemed full when they first arrived at them in either April or August, and most visitors indicated that they got to see all the sites they wanted to while at the park.

- Most visitors had a positive experience at the main attractions, responding that problems related to crowding, parking, behavior, and resource damage did not detract from their visit. However, 10 to 15 percent of visitors reported parking and crowding problems at Devils Garden and Windows in April and August.
- When asked about how their willingness to use advance information about crowding at park attractions, the majority of respondents indicated that they would likely use such information to schedule their trips to Arches on a different day or during a different time of the day.
- Most visitors were not willing to use a reservation system to reserve a specific time to visit the park to avoid crowds (65 percent said no in April and 66 percent said no in August). 21 percent of April respondents said they would use a reservation system and 14 percent said they were not sure. 23 percent of August respondents said they would use a reservation system and 11 percent said they were not sure.
- 85 percent of visitors in April said they would visit Arches National Park again. 75 percent of visitors in August said they would visit the park again.
- While the existing levels of congestion at park sites were not listed as a detracting factor to respondents' visits, reduced congestion was listed by 37 percent of April visitors and 34 percent of August visitors as an important factor in their decision to visit the park again.

#### *Transportation Topics*

- Of the visitors surveyed (not including visitors on tour buses), most Arches National Park visitors (90 percent) arrived at the park by car, truck or sport utility vehicle. About 8 percent arrived by recreational vehicle (RV), and 2 percent by bicycle or other means.



- Six percent of April visitors used bicycles in the park, while only one percent of August visitors mentioned their use of bicycles. The national average of people who bicycle is one percent, so the April usage of six percent represents a fairly high level of bicycle use comparatively.
- About 81 percent of the April visitors and 44 percent of the August visitors encountered bicyclists while driving through the park. Most visitors (about 80 percent) said it was not difficult to share the road with bicyclists.
- When asked about the use of bicycles if bike lanes or paved trails were provided, 39 percent of visitors in April and 38 percent in August indicated they would bicycle to park sites if facilities were available.
- 29 percent of the visitors in April and 30 percent in August indicated that they would bicycle between Moab and the park if a safe route were available (i.e. separated bridge over the Colorado River, and pathway along Highway 191, etc.)
- 54 percent of April visitors and 50 percent of August visitors indicated they would use a shuttle system at Arches National Park and the surrounding area.
- The majority of survey respondents stated that the following elements would encourage their use of a shuttle system:
  - Frequent service (67 to 69 percent)
  - Reliable/on- time service (67 to 72 percent)
  - Guides and information on shuttles (61 to 71 percent)
  - Shelter/shade at shuttle stops (56 to 69 percent)
  - Benches/seating at shuttle stops (58 to 66 percent)
  - Safe places to leave vehicles (67 percent)
- The majority of respondents stated that the desired frequency between shuttle pick- up

and drop- off at popular park attractions was 15 minutes.

- 29 percent of respondents were interested in a shuttle service that would provide access throughout the entire park compared to 27 percent who were interested in shuttle service to the most popular attractions. 29 percent wanted a shuttle connection to Moab.
- 47 percent of April respondents and 54 percent of August respondents said they would be willing to pay a modest fee (less than \$5.00) to ride the shuttle (in addition to paying the park entrance fee).
- Even though there was a relatively strong interest in shuttle service, the majority of survey respondents (63 percent in April and 64 percent in August) stated that the ability to use their car in the park would be an important factor in their future visits.

### Summer 2003 Visitor Study

The National Park Service conducted a separate visitor study during the summer of 2003 as part of the Visitor Services Project. The full results of this survey are available online at: <http://www.psu.uidaho.edu>

Findings of interest from the 2003 summer visitor study included the following.

- 76 percent responded that visiting Arches National Park was their primary reason for visiting the Moab area.
- 94 percent indicated that taking a scenic drive/sightseeing would be the most common activity they would participate in during their visit to Arches, followed by walking/hiking (86 percent), and then photography/painting/drawing (66 percent).
- 50 percent of visitors spent between \$1.00 and \$200.00 during their visit (within a one hour drive from the park); 32 percent spent \$301.00 or more. The largest portion of the expenditures were for hotel/motels (34 percent), followed by restaurants/bars (19 percent).



- The average visitor group expenditure was \$372 per visit.
- 75 percent of visitors indicated they spent between two and six hours in the park, while 21 percent stayed seven hours or more.
- 94 percent rated visitor services as “very good” or “good” on this trip. Less than 1 percent of visitor groups rated services as “poor” or “very poor.”
- Various comments were received, one comment that was highlighted in the summary report stated a need for *“more emphasis on non-motorized enjoyment of the park. Increase length of trails between parking areas and features by moving parking lots.”*

## Transportation and Traffic Conditions

### Regional Transportation System

Most visitors travel by personal vehicles to get to the park via US Highway 191, which connects to Interstate 70, about 27 miles north of the park and Moab, about five miles southeast of the park. Highway 191 continues south of Moab, toward Monticello and beyond and is a frequent route for travelers of the Grand Circle for access to other national and state parks and recreation sites (such as Canyon Rims, Hovenweep, Mesa Verde and others).

Other nearby highway routes include Highway 128, which joins Highway 191 approximately two miles southeast of the park entrance and heads toward the northeast. Travelers frequently use Highway 128 as a principal route between Moab and Grand Junction, Colorado. Visitors in the Moab area use Highway 128 for access to the BLM recreation sites, such as Negro Bill Canyon, a few miles northeast of the Highway 191 junction.

The Potash Road (Route 279) joins with Highway 191 less than one mile south of the park and heads toward the southwest, providing access to various other BLM recreation sites.

Visitors drive to the park from other places throughout the country or from cities in Utah and Colorado where they have arrived by commercial air, bus, or train. An

international airport is located in Salt Lake City, Utah, four hours driving distance from the park. Another airport with frequent commercial flights is located in Grand Junction, Colorado, about two hours driving distance from the park. A smaller airport, located in the vicinity of and serving Canyonlands and Arches National Park, serves private charter flights, flight tour companies, and other flight operations.

Visitors can also travel to the area via commercial bus and van service. Greyhound offers service along I-70, making stops in Grand Junction, Colorado and Green River, Utah, and commercial van services operate between Salt Lake City and Moab. Commercial passenger train service is available via Amtrak, which also stops in Green River, Utah and Grand Junction, Colorado. Rental vehicles can be obtained in Grand Junction, Colorado for access to Moab and the park. There currently is no public transportation service to and from the park.

The Moab region is a major focal area for mountain biking and road bicycling and bicycle use in the area continues to growth with the implementation of several regional improvements. A pedestrian/bicycle path was recently constructed along Highway 191 between the park and the junction with the Potash Road. A pedestrian/bicycle bridge over the Colorado River to Lions Park (on the east side of the river) will be constructed in the near term. The county plans to improve Lions Park as well, and the uranium mine tailings reclamation site across Highway 191 from Lions Park is also planned for redevelopment in the long term future. An additional bicycle/pedestrian path will be developed along Highway 128 to the Negro Bill Canyon site, and eventually a shared use path will be constructed from the new bridge over the river into Moab along Highway 191 to the southeast. This will create a continuous, separated route of access for pedestrians and bicyclists for the full five-mile distance between the town and the park. With the full construction of the regional pathway system, including the link from Moab to the park, it is anticipated that more visitors will come to the park on bicycle, as well as some on foot.

Currently for access to, from, and within the park, the primary mode (for sightseeing and access to park features and recreation sites) is travel by private vehicle, but some visitors do travel through the park via bicycles and also between features in the park on foot.



### Roadway Conditions in the Park

As visitors enter the park off of Highway 191, they travel through a new entrance station, completed in 2004. Construction of the new entrance has vastly improved the efficiency of entering the park and has reduced traffic congestion on the park's entry road. A previous problem related to queuing vehicles stacking up and extending out onto the highway at the entrance has been resolved.

Additional park access for four- wheel- drive vehicles is available at a single point along the west boundary of the park via the Willow Flats road – an unpaved route. Some recreationists enter the backcountry by traveling through the park and taking unpaved roads such as the Salt Valley Road to lands beyond. Some visitors also enter and leave the park via this location.

There are 11 roadways (including paved and unpaved routes), 24 parking areas, and 2 main intersections in the park. From the Visitor Center area to the top of the grade, the main park road (also known as Route 10) ascends the steep grade in a switch- back pattern. Because the road cuts through various rock features, there are minimal shoulders and few areas for pulling off within this stretch to the two- lane, two- way road.

Upon reaching the top of the grade, roadway lanes vary from approximately 9.5 to 11 feet in width with paved shoulders that vary in width from approximately 12 to 18 inches throughout the park. In some cases there is minimal shoulder width adjacent to the travel lanes.

Bicycling is allowed on park roads, however, no signing or striping exists related to bicycle usage and lane widths are typically less than the 14 feet required by the American Association of Highway and Transportation Officials (AASHTO) recommend for shared vehicle and bicycle use. AASHTO and NPS standards require minimum four- foot paved shoulders when a route is intended for bicycling.

The main park road is approximately 17.54 miles in length. The speed limit varies from 15 mph to 20 mph in the first two miles, and then ranges

from between 30- 45 mph for the remainder of the main park road.

The Windows road is 35 mph in both directions up until the point that the road enters the parking loop area, where the posted speed limit becomes 15 mph.

The eastern portion of Delicate Arch road was constructed more recently than other roads in the park, and its cross section was designed and constructed in accordance with Federal Highway Administration (FHWA) standards with lane widths from 11 to 12 feet in width and paved shoulders at least two feet wide on either side of the roadway. The Delicate Arch road speed limit ranges from 15 to 35 mph.

The posted speed limit for the Devils Garden parking/loop road at the end of the main park road is 15 mph.

Park rangers report that visitors often exceed posted speed limits on roads throughout the park, particularly on downhill segments of the main park road and along the more recently constructed portion of the Delicate Arch road.

Roadside pull off areas are provided on all park roads. Many of these roadside areas are paved pull offs where sightseeing visitors stop for a brief period of time to enjoy the scenery and take photographs. Over the years, many “social” roadside pull offs have been created by visitors. These are unimproved areas where people have pulled their vehicles off the main road and shoulder. Studies identifying and assessing these locations have been completed and are described in more detail Chapter 2.

A two- part study of park roads completed by RS Engineering in 2002 (*Arches National Park Draft Engineering Study for Roads and Arches National Park Draft Traffic Engineering Safety Study*) was prepared for Arches National Park under the direction of the US Department of Transportation. The study efforts analyzed the safety and function of park roads and made recommendations for change. Recommended roadway improvements included shoulder widening to a consistent width (18 inches is the desirable width) and



resolving sight distance and roadside drop-off problems in a few locations. The total estimated cost for needed short-term improvements cited in the study was \$33,950,000 (in 2001 dollars). Arches National Park has prepared a project funding request to implement some of the improvements recommended by the study efforts and anticipates completing this work within the next five to six years.

### Traffic Volumes

Table 3.2 shows seasonally adjusted average daily traffic (SAADT) volumes. Approximately five to eight times per year, during holiday weekends and special events, these numbers can be tripled. Even when tripled, average daily volumes are well within the standard traffic volumes that can be adequately accommodated by the roadway built to its current standard. There is no need to increase traffic capacity through the addition of travel lanes, passing areas, turning lanes, or other facilities. However, it should be noted that the analysis of park roads in 2002 recommended shoulder widening and various minor improvements to the roadway that would considerably improve its function and safety.

**Table 3.2 — Seasonally Adjusted Average Daily Traffic**

Roadway	SAADT	
	2002	2022
Main park road	1870	2850
Windows Road	1500	2280
Delicate Arch Road	1500	2280
Devils Garden Loop	1500	2280

### Transportation System Capacity Analysis

A comparative analysis between visitation forecasts and the park's transportation system capacity was completed during the development of this transportation implementation plan. The transportation system capacity for Arches National Park was calculated by multiplying the total

number of parking spaces available at park features and trailheads by the average vehicle occupancy (currently 2.4 persons per car) and a turnover rate of 3 times per day – a methodology originally outlined in the park's GMP.

Although average parking turnover rates at the parking areas of some of the more popular features in the park are greater than 3 times per day, particularly during peak visitation periods, the turnover rate of 3 times per day was used to calculate overall system capacity because it is more representative as an average daily figure across all parking areas in the park throughout all seasons.

Table 3.3 provides an updated count of the prescribed parking area capacities within the park based on the capacities proposed by the park's GMP, VERP, and field evaluation of existing conditions. Table 3.3 depicts the prescribed level parking for each parking area assuming that the areas eventually would be formally striped, enforced, and reconfigured to contain parking at the capacities shown (as recommended in the GMP and VERP planning documents).

Existing parking levels at Devils Garden, Fiery Furnace, Window/Double Arch, and other areas in the park sometimes exceed the prescribed levels shown in Table 3.3 below because visitors park informally along the roadside and in overflow areas. Several of the parking lots currently are not fully striped. In some cases, parallel parking areas are wider than they need to be and as such, visitors park perpendicularly in those areas on busy days, increasing the effective capacity of that area. Because of the informal nature of parking during congested times at the park, the effective existing parking capacities can not be quantified.

Consistent with the provisions of the GMP and VERP, the park intends to continue to work towards managing parking capabilities in accordance with the levels shown in Table 3.3.

In Table 3.3, oversized vehicle (or RV) spaces count as two standard size spaces. Parking spaces at roadside pull offs (both formal and social) were not included since these are not typically true destinations within the park, but rather "photo moments" for visitors. Parking capacity in the campground area also was not



included since the campground is not open to general visitor parking. In analyzing existing traffic volumes on park roadways, the VERP social indicator for the motorized sightseeing zone was referenced. The VERP indicator provides that traffic on the roadway will be monitored and will be considered out of standard if congestion is rated at a level of service of “C” or worse at any time. The Traffic Congestion Index set forth by the Transportation Research Board’s *Highway Capacity Manual* includes levels of service A through F, with A being the least congested condition and F being the most congested condition. Level of service C allows for a relatively stable flow and maneuverability closely controlled by higher volumes. Most drivers are restricted in their freedom to select their own speed, change lanes, or pass (VERP Implementation Plan 2005). Park roads typically do not exceed this standard and traffic volumes have been well within accepted operating standards prescribed by the federal government for rural roadways. As such, parking capacity was determined to be the best factor to determine the park’s transportation system capacity.

A theoretical parking capacity of 4,817 daily visitors total resulted from this analysis as depicted in the table.

The park’s GMP identified a possible short-coming of this analysis by stating “...the people who cannot find parking at the most popular destinations generally are not dispersing to sites with excess capacity. Thus, the theoretical maximum capacities are exaggerated...”

However even with this possible short-coming, the theoretical capacity is a reasonable basis and point of reference for understanding the transportation system/parking capacity of the park. The capacity analysis provides a basis for the proposed actions in the transportation implementation plan and for ongoing management of parking areas and features to maintain visitor experience and resource protection standards.

A typical “rule of thumb” in transportation planning states that parking areas and transportation facilities operate best on a continual basis when use levels stay within approximately 85 percent of the facility’s capacity (the 85<sup>th</sup> percentile rule). Referencing the theoretical parking capacity of 4,817 total daily visitors, it can be assumed that 4,094 visitors (85 percent of the total daily visitors) theoretically can be adequately accommodated by existing parking facilities within the park on a continual basis.

Applying the forecasted annual growth rates (shown in Table 3.1) as frame of reference, visitation levels likely will not exceed the 85<sup>th</sup> percentile theoretical capacity at peak periods annually within the six- year planning horizon of this transportation implementation plan (2006-2012) if growth rates stay within the forecasted range on average. Even a constant average annual growth rate of 5 percent in visitation would not reach the 85<sup>th</sup> percentile capacity level until 2024.

However, another point of reference cited by staff was the level of visitation experienced in 1999. Park staff noted challenges in managing the visitation levels during the peak periods of that year. Visitation counts indicate that an average of about 3,480 visitors per day visited Arches from April 1 through October 31 that year. As such, if this visitation level is reached on a more consistent basis in the future, it could be viewed as another threshold upon which more intensive transportation management strategies may be needed. If visitation increased by 3.11 percent on average annually, it would reach this level in 15 years.

This analysis has helped to determine appropriate strategies and actions for the near term transportation implementation plan horizon of six years. Park growth rates may vary from forecasted rates. Also, because some sites/features in the park are more popular, these areas likely will reach their individual capacity levels sooner and more frequently and consistently than the park overall.



Table 3.3 - Parking Capacity at Arches National Park Parking Areas

Arches National Park – Parking Capacity Table (Sites from South to North)							
Parking Area	Spaces			Total Spaces	Vehicle Occupancy	Turnover Rate	Capacity
	Standard	Oversized*	Accessible				
Visitor Center Parking Lot	104	15 x 2	4	138	2.4	3	994
Park Avenue Viewpoint	18	3 x 2	2	26	2.4	3	187
La Sal Mountains Viewpoint Parking Area	10			10	2.4	3	72
Courthouse Towers Viewpoint Parking Area	18	2 x 2		22	2.4	3	158
Tower of Babel Parking Area	2			2	2.4	3	43
Unsigned Courthouse Wash Parking Area	6			6	2.4	3	43
Petrified Dunes Viewpoint Parking Area	4			4	2.4	3	29
Balanced Rock Parking Area	13	3 x 2	1	20	2.4	3	144
Garden of Eden Parking Area	20			20	2.4	3	144
Double Arch Parking area	16	4 x 2	2	24	2.4	3	173
Windows Parking Area	27	4 x 2		35	2.4	3	252
Panorama Point Parking Area	20			20	2.4	3	144
Wolfe Ranch/Delicate Arch Trailhead parking Area	53	11 x 2	2	77	2.4	3	554
Delicate Arch Viewpoint Parking Area	26	17 x 2	3	63	2.4	3	454
Salt Valley Overlook Parking Area	8			8	2.4	3	58
Fiery Furnace Viewpoint Parking Area	17			17	2.4	3	122
Sand Dune Arch/Broken Arch Parking Area	13	3 x 2	1	20	2.4	3	144
Skyline Arch Trailhead Parking Area	7			7	2.4	3	50
Devils garden Picnic Parking Area	14		1	15	2.4	3	108
Devils Garden Parking Area	101	15 x 2	4	135	2.4	3	972
<b>Totals</b>	<b>497</b>	<b>77 x 2</b>	<b>18</b>	<b>669</b>	<b>2.4</b>	<b>3</b>	<b>4817</b>

\*Note: Oversize spaces account for one RV or 2 vehicles. Lots are sized with the assumption that the RV spaces will be occupied by two vehicles.

overall, particularly during peak visitation periods (a likely scenario given the short-coming of the capacity analysis stated earlier). If this happens, some additional congestion management strategies, such as additional key feature management through permits systems or guided tours during peak periods (similar to the Fiery Furnace program), are proposed in the transportation implementation plan.

### Visitor Travel Patterns and Parking Area Conditions

A more detailed analysis of travel patterns was completed related to the most popular attractions at Arches National Park, the Windows section, Balanced Rock, Devils Garden, Delicate Arch Viewpoint, the Visitor Center, and Wolfe Ranch/Delicate Arch Trailhead. 70 percent of all visitors go to the Windows, while 60 percent go to the Visitor Center, Balanced Rock, Delicate Arch viewpoint, and Devils Garden.

Over half of all visitors stay in the park for less than one day. The average length of stay at the park is about four to five hours. Of those visitors that do stay longer than one day, the majority spend no more than two days at the park. Average vehicle occupancy rates for visitor vehicles exiting the park were calculated in 2003 based on a statistically valid travel survey. The calculated average was 2.4 to 2.5 people per vehicle. Parking area capacities (shown in Table 3.3) were calculated based on the 2.4 average and an overall average turn-over rate of 3 times per day.

A study was conducted of the distribution of entering vehicles in 2003. Table 3.4 depicts the number of days that correlated to various quantities of entering vehicles. Based on a comparison of these numbers to parking turn-over rates and conditions at park feature parking areas, it appears that when the total number of vehicles entering the park in a day exceeds about 900 vehicles, congestion and crowding typically occur at three parking areas: Devils Garden, Windows/Double Arch, and Wolfe



Ranch/Delicate Arch Trailhead, at least during some hours of the day. There were 97 days in 2003 when more than 900 vehicles entered the park. Most of these 97 days occurred between mid- April and mid- October.

When visitation is higher (for example, when there are 1,100 or more vehicles entering the park), parking congestion and management problems become considerably more severe according to park staff. The general conclusion is that there is parking congestion in the three parking areas for about 100 days per year at the levels of visitation that existed in 2003. Any

future growth in visitation would exacerbate the parking congestion.

Although this analysis focused on parking conditions associated with three of the major park feature areas (because parking occupancy data was available for those areas), park staff report that additional parking areas experience congestion during peak visitation periods, and although analysis has not documented specific conditions at these areas, it will be important for transportation implementation plan strategies and actions to address the potential for congestion in all parking areas throughout the park.

**Table 3.4 — Distribution of Entering Vehicles in 2003**

<b>Highest day - - 1394 entering vehicles</b>	
Number of days with 1300 or more entering vehicles	2
Number of days with 1200 or more entering vehicles	5
Number of days with 1100 or more entering vehicles	18
Number of days with 1000 or more entering vehicles	44
Number of days with 900 or more entering vehicles	97
Number of days with 800 or more entering vehicles	137
Number of days with 700 or more entering vehicles	177
Number of days with 600 or more entering vehicles	197
Number of days with 500 or more entering vehicles	217
Number of days with 400 or more entering vehicles	226
Number of days with 300 or more entering vehicles	244
Number of days with 200 or more entering vehicles	273
Number of days with 100 or more entering vehicles	316



### Summary of Existing Tour Services

Although there is no general sightseeing tour experience offered at Arches National Park presently, a few specialized tour services are currently available to visitors as described below. These tour services are tailored to specific clientele interested in a fully catered experience. The majority of current tours that include a visit to Arches National Park are focused on accessing and guiding visitors to remote areas of the park. Most private tours in the region focus on providing access to Canyonlands National Park and river rafting on the Colorado River.

The existing types of tour services offered are typically marketed in association with another type of activity, such as hiking, four- wheeling, and/or river rafting. Existing tours tend to be tailored and marketed more toward “adventure seekers” and less toward the general population. Currently, a general motorized interpretive/sightseeing tour of features within Arches National Park, provided at a more affordable price for a broader spectrum of the public, is not available.

The following tour providers are authorized through concession contracts issued by the National Park Service to guide tours into Arches National Park

#### Tag- A- Long Expeditions ([www.tagalong.com](http://www.tagalong.com))

Located in Moab, Utah, Tag- A- Long Expeditions offers river expeditions, land safaris, half- day, full- day, self guided, and custom trips down the Colorado River and into Canyonlands and Arches national parks. In 2001, Canyonlands National Park dedicated the Visitor Service Award to Tag- A- Long Expeditions for superior service to park visitors. A guided tour of Arches National Park is an option as part of a customized tour. Customized tours are typically priced at \$60.00 per person for half day and \$80.00 per person for full day.

#### O.A.R.S. ([www.oars.com](http://www.oars.com))

OARS is the largest river company in the west, running rivers in Idaho, Utah, California, Oregon, Wyoming, and the Grand Canyon. In Utah, OARS offers adventures in Cataract Canyon, the San Juan River, and the Canyonlands Backcountry including the Needles, the Maze and White Rim. In addition to white water rafting, OARS offers multi- sport trips and 4x4 tours. One- day 4x4 trips to both Canyonlands and Arches National Park are offered through OARS through the “multi- sport tour.” The typical price per person is \$19.95.

#### NAVTEC ([www.navtec.com](http://www.navtec.com))

Based out of Moab, Utah, NAVTEC offers river trips, combination river and land trips, and 4x4 land trips. Trips range from one day to multi- day and explore Utah’s Canyonlands. NAVTEC offers one- day 4x4 land trips to areas in the Moab region, including Canyonlands National Park and provides backcountry guides as part of the experience. Trips involving Arches National Park are not currently offered by NAVTEC according to the information available on the website.

#### National Park Service Guided Tours of the Fiery Furnace

Arches National Park provides guided interpretive tours (on- foot; tour guides meet visitors at Fiery Furnace parking lot). Visitors are required to obtain reservations in advance for these tours. After heavy use threatened to impact the sensitive environment surrounding the Fiery Furnace, the park decided to manage access through guided tours by park staff and a limited number of daily permits.

Park staff report that the Fiery Furnace tour is very popular. Tours often book full two days or more in advance. The park leads two tours per day, one in the morning and one in the afternoon. Group size for the tours is limited to 25 people, and the park charges a nominal fee of \$10.00 per adults and \$5.00 per child.



### Other Arches National Park Interpretive Tours

Arches National Park staff and volunteers provide one- hour interpretive walks each day at different locations throughout the park. The schedule for the walks varies. Visitors are encouraged to check with the Visitor Center or refer to the one of many park bulletin boards for the walk schedule. These interpretive walks are provided free of charge. The interpretive guide meets the visitors at the designated location for the walk (so visitors use their own vehicles to travel to the tour location.)

### Existing Intelligent Transportation System (ITS) Applications at the Park

There are several ITS applications already in use or planned to be installed at Arches National Park. While some of these applications require enhancement to maximize their effectiveness, others are being used quite effectively already. The following is a summary of existing ITS applications that Arches National Park already uses:

- Self- guided audio tours,
- Informational, interactive kiosks in the new Visitor Center with stored information to assist regional trip planning,
- Visitor Center staff can assist visitors in obtaining weather and other related travel information,
- Digital Closed Circuit Television (CCTV) recording the entrance station,
- Campground reservations via the Internet and toll- free telephone,
- Arches National Park website,
- Automated fare collection system, used when the fee booths are closed, and
- Highway Advisory Radio (HAR) system updated five or six times a year.

### Park Operations

Park staff members are assigned to the following divisions and areas: fee collection, interpretation, law enforcement and emergency assistance, facility management, resource protection, special park uses, management, and administration. The total number of permanent and seasonal staff fluctuates each year. In 2003, 40 staff members at Arches National Park completed employee surveys as part of this transportation plan project. Park staff members report that a considerable amount of time is spent each year on efforts related to managing traffic congestion in parking areas and at park attractions, assisting in visitor orientation, monitoring resource impacts as a result of social pull offs and social trail use, and patrolling traffic conditions along park roads.

The park operates with the assistance of many volunteers each year, who help with interpretive activities, resource management activities and campground host duties. The park's total volunteer commitment in FY 2004 was 10, 124 hours.

Staff continued to monitor VERP in FY 2004, conducting 2,100 VERP monitoring surveys, 700 each at the Windows, Delicate Arch and Devils Garden (pedestrian section). A total of 340 surveys were conducted in the motorized rural zone (Salt Valley Road) and 63 were conducted in the semi- primitive motorized zone (four- wheel drive road).

Arches National Park total ONPS Green Book funding for fiscal year (FY) 2004 was \$1,140,000 prior to IMR assessment and \$1,121,200 after assessments.

The Division of Interpretation conducted the following services and programs in 2004:

- Fiery Furnace walks
- Visitor Center programs
- Evening programs
- Guided walks
- Visitor contact on roving interpretation



- “Porch talks” outside the Visitor Center

In 2003, the Visitor Services Project conducted a survey of visitors. Most visitor groups (94 percent) rated the overall quality of visitor services at Arches National Park as “very good” or “good.” Visitor groups were asked, “If you were a manager planning for the future of Arches National Park, what would you propose?” Following were the most often stated responses:

#### Related to Personnel:

- More roving rangers to prevent damage
- More ranger guided tours

#### Related to Interpretive Services:

- Mark all trails with mileage and difficulty level
- More interpretive signs along the trails
- Advertise more about the park
- Park brochure and map in different languages
- An educational center further inside the park

#### Related to Facilities/Maintenance:

- Add drinking fountains
- More hiking trails
- Improve quality of maintenance
- Add food service/snack bar
- Better access for people with mobility problems
- More shaded areas
- More restrooms
- Keep it clean
- Better directional signs
- More trash cans
- More parking
- Add a primitive campground with water
- More paved roads/more roads
- More pullout overlook spaces

Ninety- eight percent of the respondents expressed an interest in learning new subjects. Preferred methods of learning mentioned included “hiking in the park” (65 percent), “reading illustrated brochures” (56 percent), and “driving through the park” (47 percent). “Taking a guided tour with ranger” was mentioned by 22 percent of the survey respondents. For additional survey results, refer to <http://www.psu.uidaho.edu>

These survey results could help to guide future planning and implementation activities and ongoing park management and operations (including those areas with a relationship to transportation facilities). There are several proposed elements of the transportation implementation plan, that if implemented would help to address the interests stated by visitors. Park staff members have been actively involved in the development of this plan.

### Socioeconomics

Arches National Park is an international attraction that provides benefits to the regional economy.

Grand County (where Arches National Park is located) had a population of 8,826 in 2005. Population growth in the county has been variable over the last two and a half decades. According to the 2000 US Census information, population in the county grew 28.2 percent between 1990 and 2000 after a previous period of decline in the 1980s. Population growth between 2000 and 2005 slowed to less than one percent annually on average. In 2005, Moab’s population was 4,825, equaling 54.7 percent of the County’s total population.

In the 2005 civilian labor force there were 3,950 employed workers in Grand County out of the total labor force of 4,332, leaving 382 unemployed, equaling 8.8 percent unemployment, higher than the Utah state average of 4.2 percent and national average of 5.0 percent in 2005.

Tourism and recreation now form the basis of economic activity and growth in the regional



economy. Tourism/recreation related employment has grown by approximately 20 percent since 1995, accounting for more than 45 percent of Grand County's total employment in 2002. The City of Moab is the tourism/recreation activity hub of the region, acting as a gateway to Arches and Canyonlands national parks, as well as Dead Horse State Park and Bureau of Land Management recreational lands (Grand County General Plan Update, 2003). Due to the strong correlation between employment and the regional tourism/recreation industry, the county experiences seasonal fluctuations, and unemployment levels are typically higher during off-peak tourism periods (primarily during the winter).

Government, retail trade, and accommodation and food services are the primary economic sectors for the region. The accommodation and restaurant sectors each paid out around \$10 million in wages and salaries (personal income) in 2002.

Largest non-agricultural employers in the county in 2005 included Allen Memorial Hospital, Grand County, Grand County School District, National Park Service, Quinstar, the Bureau of Land Management, City Market, Inc., Moab Brewery, City of Moab, State of Utah, and Zax Wood Fired Pizza.

The average per capita income in Grand County in 2002 was \$20,678, below both the Utah state per capita income of \$24,306 and the national per capita income of \$30,906. Total personal income in Grand County in 2002 was \$180 million.

The Utah Department of Community and Economic Development reported total visitor spending in Grand County in 2002 at \$111.4 million, supporting 2,042 jobs and \$2.3 million in taxes, ranking Grand County 8<sup>th</sup> among all counties in the state. Total gross taxable room sales in the county were \$27.9 million in 2002.

Based on the results of the 2003 study entitled *Impacts of Visitor Spending on the Local Economy: Arches National Park*, Arches National Park hosted 757,781 recreation visits in 2003.

There were 205,600 trips made by parties to the area. The two largest visitor segments in terms of trips to the region were overnight visitors staying in hotels, motels, or B & Bs in the area (59 percent) and visitors on day trips (19 percent).

Arches National Park visitors spent an average of \$310 per party per trip in the local area, with trip expenditures ranging from \$445 per party per trip for the hotel segment at the high end to \$67 per party for day trips at the low end.

Total spending from park visitors in 2003 was \$63.7 million. Sectors that received the greatest direct benefit from park visitors were hotels (\$22.4 million), restaurants (\$12.8 million) and amusements (\$7.7 million). Arches National Park visitors spent \$63.7 million within a fifty-mile radius of the park in 2003. Arches National Park contributed 57 percent of all tourist spending in Grand County, including 80 percent of hotel room sales and 73 percent of tourism related employment in 2003.

Currently, various types of touring programs and services that access Arches National Park are offered to visitors. However, there are no general motorized interpretive tours being offered at Arches or in the vicinity.

2000 census data show significant increases in the number of housing units and the number of households in the region. In Grand County, the number of housing units increased by more than 35 percent above 1990 levels, and the number of households increased by 38 percent above 1990 levels. Temporary housing and accommodations in Moab are available for the large influx of tourist and recreational visitors in various forms, including motels and hotels (1,583 rooms); bed and breakfasts; apartment units; condominiums; and guest houses (278 rooms) and numerous campsites (Grand County General Plan Update 2003).

Construction workers in the area typically seek a variety of temporary housing types including motels and hotels, RV parks, trailer parks, and rental properties in the region. Vacancy rates for temporary housing in Moab tend to follow the



patterns of seasonal tourism. The availability of temporary units is greatest between November and mid- February typically.

## Land Use

### Arches National Park

#### Existing Land Use

There are a total of 76,359 acres within the legislative boundaries of Arches National Park. Of this total, 133 acres are managed by Grand County, Utah under a recreational use patent (USDI National Park Service 1996). Park land uses include pedestrian trails that lead to many of the park's natural features, extensive backcountry areas recommended for wilderness designation, developed areas consisting of paved roads and pullouts, overlooks, picnic areas, parking areas, and other facilities that support visitor touring at major park destinations (e.g., Windows, Delicate Arch, Sand Dune Arch, and Devils Garden), and major visitor and administrative facilities such as the park Visitor Center, headquarters, and Devils Garden campground and picnic area. The park is comprised of one of the greatest density of natural arches in the world.

#### Land Use Plans

The *Arches National Park General Management Plan* (GMP) (USDI National Park Service 1989) serves as a guide for management of land use development in the park. It identifies development and management actions that satisfy public need for recreation, while simultaneously protecting the park's natural and cultural resources. The plan established management objectives consistent with National Park Service policies and appropriate for the park's setting (excerpted from the *Arches National Park Statement for Management*, USDI NPS 1988b). While all the management objectives listed are important to consider as part of parkwide planning efforts, the following objectives in particular are relevant to the proposed transportation implementation plan:

- Minimize threats to the health and safety of visitors;

- Provide for visitor education and enjoyment through the interpretation of park resources, values, and primary themes; and
- Retain the lowest possible level of development to satisfy the needs of a wide diversity of interest.

For National Park Service management purposes, the GMP divides Arches National Park into four zones: natural, cultural, development, and special use. The "development zone" provides the necessary space for visitor and management facilities (71 acres) and roads (179.4 acres). According to the GMP, parking pullouts along the main park road would be redesigned as necessary for safety, requiring some widening and lengthening of existing pullouts and possibly eliminating others. Proposed parking areas and trails are identified on individual site development plans, and include plans to construct a new parking area at the Sand Dune Arch Trailhead.

The *Arches National Park Resource Management Plan* (USDI National Park Service 1996) is a strategic planning document focused on effective management and preservation of the park's natural and cultural resources. Specific management objectives include managing developed areas for intensive visitor use while providing for the maximum protection of the natural environment and restoring wherever possible the natural condition of parklands and plant communities altered by human activities.

The *Arches National Park Visitor Experience and Resource Protection (VERP) Implementation Plan* (USDI National Park Service 1995a) was developed with intent of safeguarding both the quality of visitor experiences and the resources at the park. The VERP program established park-wide management zones. Actions proposed in the transportation implementation plan would occur in the park's "motorized sightseeing zone." This zone is a substantially developed area consisting of paved roads, pullouts, overlooks, and associated short trails and small picnic areas, parking areas, and other facilities that support visitor touring. Intensive management is provided in the motorized



sightseeing zone to ensure resource protection and public safety. Proposed management actions to address increasing visitor use in the motorized sightseeing zone include closing off and reclaiming unapproved social pull offs along main roads and using barriers or road construction techniques to discourage social parking. Other management actions include prohibiting parking along main roads except at designated sites.

## Bureau of Land Management

### Existing Land Use

The BLM administers over 5 million acres near and/or contiguous to Arches National Park and provides the public numerous recreation opportunities. Those include camping, boating, picnicking, swimming, and hiking on BLM-administered land directly adjacent to Arches' southeast boundary along the Colorado River. To accommodate these uses, BLM maintains several developed recreation and picnic sites and campgrounds (USDI National Park Service 1995a).

### Land Use Plans

The BLM is currently updating its Resource Management Plan, however the plan will not be publicly released until March 2006. The existing Resource Management Plan (RMP) is still being used to manage land in the Grand Resource Area. This RMP was created in 1985.

## Grand County

### Existing Land Use

Arches National Park is located in Grand County, Utah. Of the approximately 2.4 million acres in the County, 72 percent is managed by the federal government (66 percent by the BLM), 16 percent is managed by the state, 4 percent is owned by tribal governments, and 4 percent is privately owned (Grand County 2004). As of the 2000 US Census, the total population for Grand County was 8,485. Most of the county's private land, current development, and future projected growth is in Spanish Valley (which includes the City of Moab). Grand

County's land use and zoning authority does not directly apply to lands within the park (Grand County 1999). The park and surrounding BLM lands are identified in the Grand County General Plan Update as Public Land (Grand County 2004).

The unincorporated area between the park Visitor Center and the City of Moab is known as the *North Corridor Gateway*, and was the focus of a joint planning effort by Grand County and the City of Moab in 2001 (see Land Use Plans, below). In that area, the setting is predominantly rural with the exception of the Atlas tailings and mill site. The area south of the river is characterized by developing tourist uses and accommodations including motels and RV parks.

### Land Use Plans

The *North Corridor Gateway Plan* was the result of a joint planning effort by Grand County and the City of Moab in 2001. The North Corridor Gateway is the area along US Highway 191 between the Arches National Park Visitor Center and Moab city limits that includes a) parcels or portions of parcels with highway frontage, b) lands within 500 feet of the highway, and c) the Atlas properties. The plan proposes two new land use categories for future development in the corridor: a) a Tourist Commercial (TC) category that would allow a variety of tourist-oriented commercial uses and b) a Specially Planned Area (SPA) to accommodate a variety of interim uses on the Atlas Mill and tailings sites over the next 15- 20 years as DOE remediation and reclamation of the sites proceeds.

## City of Moab

### Existing Land Use

The City of Moab is located approximately five miles south of Arches National Park and is the center of visitor services for the park. The City supports numerous tourism- and recreation-related businesses that dominate the city's central downtown.



These include motels and hotels, restaurants, campgrounds, interagency Moab Information Center, rental and shuttle services, mountain bike shops, river float companies, and air tour operators (USDI National Park Service 1995a). The 2000 US Census population of Moab was 4,479.

#### Land Use Plans

The *City of Moab General Plan* (City of Moab 2001) and Moab Zoning Code (Title 17 Moab City Code 2004) guide land use development in the city. The General Plan contains a number of goals and policies intended to protect the small town character of the city while promoting growth and economic development, including tourism.

Zoning for commercial uses is predominant along the entire US 191 corridor through the City of Moab. In particular, the Central Commercial (C3) and General Commercial (C4) zones allow a variety of commercial, business, and light industrial uses. The C3 zone focuses on the downtown and promotes it as the dominant shopping and financial center of the city. The C4 zone allows a variety of business and light industrial uses, and also has the stated goal to “facilitate the development of attractive entrances to the city.” The zone allows a full range of tourist-related uses, but also allows auto services and some other light manufacturing uses.



### Introduction

This chapter describes the environmental consequences associated with the alternatives. The chapter is organized by impact topics, which distill the issues and concerns into distinct topics for analysis. These topics focus on the presentation of environmental consequences and allow a standardized comparison between alternatives based on the most relevant topics.

NEPA requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the action be implemented. This chapter analyzes the environmental impacts of the alternatives identified in Chapter 2 on the relevant impact topics defined in Chapter 1.

In accordance with National Park Service (NPS) and National Environmental Policy Act (NEPA) requirements, some environmental topics have been eliminated from detailed analysis because the expected adverse impacts would be negligible to minor with implementation of mitigation. Only topics selected to be carried forward through more detailed analysis are addressed in this chapter.

### Methodology

NEPA requires examination of several factors in the analysis of potential environmental consequences of alternatives. The type, context, intensity and duration of impacts must be addressed for each element of the environment being analyzed, along with direct, indirect, and cumulative effects. NPS policy also requires that “impairment” of resources be evaluated in all environmental documents. For each impact topic, the discussion includes analysis of impacts of each alternative followed by an assessment of cumulative impacts, and a conclusion.

### General Definitions

For each impact topic, impacts are defined in terms of type, context, intensity, and duration. Cumulative effects are also discussed. Definitions of intensity levels vary by impact topic. However, for all impact topics the following definitions are applied.

#### Types of Impacts

The effects that an alternative would have on an impact topic would be either adverse or beneficial. In some cases, an action would result in both adverse and beneficial effects for the same impact topic. For example, Alternative B would have an adverse effect by disturbing biological soil crusts at the new Sand Dune Arch Trailhead parking area, and a beneficial effect by discouraging further social pull off activity and protecting soil crusts from further disturbance.

#### Context

Context is the setting within which impacts are analyzed. Examples include the affected region, the society as a whole, affected interests, and/or a locality. In this plan, context is defined as local (within the footprints of construction areas or within a specific area of the park), park-wide (throughout the entire park), or regional (Moab, Arches National Park, and surrounding areas in Grand County, Utah).

#### Intensity

Impact intensity is the degree to which a resource would be beneficially or adversely affected (negligible, minor, moderate, and major). The criteria used to rate the intensity of the impacts for each resource topic are presented later in this chapter under each topic heading.

#### Duration

Duration is the time period for which impacts are evident (e.g., short-term and long-term). Impact



duration varies by resource topic and is analyzed for individual resources in this chapter. In general, a short- term effect is one that occurs within a short period of time (for the purposes of this document, not more than six years) and would no longer be detectable as the resource is returned to its pre- disturbance condition or appearance. A long- term effect is generally defined as a change in a resource or its condition that does not return to pre- disturbance condition or appearance and for all practical purposes is considered permanent.

### Direct and Indirect Effects

Direct effects are impacts resulting from alternatives and occurring at the same time and place. Indirect effects are impacts resulting from the alternatives but occurring later in time or further removed in distance, but still reasonably foreseeable. For example, the creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours would result in direct, short- term adverse impacts on visual quality during construction caused by use of large equipment working in construction areas; dust and fumes created by earth- moving activities; and temporary parking of contractor and staff vehicles. However, the proposed motorized interpretive tours likely would decrease the overall number of motor vehicles in the park, particularly during periods of peak visitation. Over the long term, this would reduce one of the most prevalent visual impacts currently affecting the park – vehicles that circulate in parking areas and park in undesignated areas – resulting in indirect beneficial effects on visual quality.

### Cumulative Effects

The Council on Environmental Quality (CEQ) regulations and Director’s Order- 12, which implement National Environmental Policy Act (NEPA), require assessment of cumulative effects in the decision- making process. Cumulative effects are defined as “the impact on the environment, which results from the incremental impact of the action when added to other past, present, or future foreseeable actions regardless of

what agency (federal or non- federal) or person undertakes such other actions” (40 CFR 1508.7).

### Geographic Area for Cumulative Impacts

The geographic area for the cumulative impact analysis of alternatives includes Arches National Park, adjacent BLM lands, and adjacent lands in Grand County. In addition, City of Moab and Grand County plans and policies that have the potential to impact resources affected by alternatives are also considered.

### Past, Present, and Future Actions

Cumulative impacts are determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions within Arches National Park and, if applicable, the surrounding region. These actions are summarized below.

#### Arches National Park

Specific past, ongoing, and reasonably foreseeable future projects at Arches National Park considered in this environmental analysis include the following:

- **Delicate Arch Road Corridor Project:** The three- mile spur road from the main park road to the Wolfe Ranch/Delicate Arch Trailhead and Delicate Arch Viewpoint was redesigned and paved in 1993. At the same time, the parking lots at the Delicate Arch Trailhead and Delicate Arch Viewpoint were expanded and paved.
- **Visitor Center and Park Entry Road Realignment Project:** This project involved construction of a new 14,855- square- foot Visitor Center adjacent to the previous 4,618 square foot Visitor Center, which was remodeled to hold administrative offices and storage. A new 74,596 square- foot parking lot with a capacity for over 140 vehicles (including 15 recreational vehicle stalls) was constructed adjacent to the new building. As part of the new Visitor Center project, approximately one- half



mile of the park entry road was realigned to increase safety for vehicles entering and exiting the park and to provide adequate queuing room for vehicles at the fee collection booth. The new Visitor Center was dedicated in September 2005.

In addition to these past and planned construction projects, Arches National Park has a number of smaller projects planned or underway that involve either minor physical disturbance or implementation of programs and activities. These actions include the following:

#### Actions Proceeding

- **Chip Seal Surfacing of Park Roads:** This action involves resurfacing and restriping the following existing roads: The main park road from the Delicate Arch road to Devils Garden, the Salt Valley Overlook road, and the Fiery Furnace road. If funding allows, the main road from Panorama Point to the Delicate Arch road and the Panorama Point road would be added. The work period would be 50 days or less. Traffic would be restricted to one lane for up to two miles at a time, with traffic delays limited to 15 minutes or less.
- **Rehabilitate/Upgrade Devils Garden Photovoltaic System:** This action involves installing a series of independent photovoltaic power systems for various existing power uses in the Devils Garden area: three comfort stations, the campground amphitheater, one campground host campsite, the generator building, and water well pump and supply system. The existing Devils Garden ranger office/residence would be remodeled for use as a campground host residence. Solar panels, freestanding or mounted on existing buildings, would be located at or near most of these sites. Comfort stations would be modified to safely provide for battery storage. Some trenches for underground water or power lines would be excavated, some of which would be within existing roadways or disturbed areas.
- **Trail Rehabilitation:** This action involves repair/reconstruction of sections of the following existing trails: Tunnel Arch, Devils

Garden Amphitheater and Trails, Delicate Arch Viewpoint, Double Arch, Balanced Rock, Fiery Furnace Viewpoint, Sand Dune Arch, and Turret Arch, totaling approximately 29,200 linear feet of trail rehabilitation.

- **Replace Fences at Trailheads and Parking Lots:** This action involves replacing existing fences at Balanced Rock, Windows, Delicate Arch Trailhead and Delicate Arch Viewpoint, Fiery Furnace, Sand Dune Arch/Broken Arch, Skyline Arch, and Devils Garden parking lots.
- **Fire and Fuels Management Plan:** NPS has developed a fire and fuels management plan for the four parks located within the Southeast Utah Group, including Arches National Park. The plan implements fire management policies and contributes toward resource management and fire management goals. The plan includes a variety of techniques to minimize the impacts of fire suppression. These include confinement strategies employing existing fuel breaks when available, restrictions on the use of heavy equipment and retardant, involvement of archaeologists in locating fire lines to avoid cultural resources, and protection of native riparian and grassland vegetation.
- **Commercial Use Authorization, Commercial Canyoneering Guided Tours:** The requested Incidental Business Permit (IBP) would permit a commercial tour company to continue to offer guided canyoneering trips in the Fiery Furnace, Lost Spring Canyon, Petrified Dunes, and the Rough and Rocky Mesa/Park Avenue areas of the park. These areas are not accessible by developed trails. Visitors would need to step carefully to avoid disturbing cryptobiotic soil crust and sensitive plants. The number of trips permitted per year would not be limited under this IBP. In recent years this tour company has conducted 50- 110 trips per year in the park, with group sizes averaging less than 5 people per group.

#### Actions Being Formulated or Under Environmental Review

- **Vegetation Management Plan, Southeast Utah Group:** This plan is under development, and



would focus on removal of exotic vegetation park- wide, but may also address active or passive restoration of native plant communities. Riparian areas, where tamarisk and other exotics have invaded, would be an area of emphasis. Large shrubs would be cut down, herbicide would be applied to stumps, young seedlings and sprouts, and slash would be piled and burned, broadcast, or removed from treatment sites.

### Adjacent Bureau of Land Management Lands

The Bureau of Land Management (BLM) is currently updating its Resource Management Plan. However the plan will not be publicly released until March 2006.

The existing Resource Management Plan (RMP) for the Grand Resource Area (now known as the Moab Field Office) was created in 1985. The Grand Resource Area includes approximately 1,819,885 acres of land in Grand County and the northern third of San Juan County. During the process of developing this Transportation Implementation Plan and Environmental Assessment, the BLM provided up- to- date information related to resource management objectives in the area. The following are the existing resource management actions that apply to land surrounding Arches National Park.

- **Critical Watersheds:** install in- stream drop structures in eight streams (about 3,500 acres, eight allotments) to decrease sedimentation and improve water quality.
- **Livestock Requirements:** Livestock grazing is permitted over much of the Moab Field Office area. Areas around Arches National Park are reserved forage for wildlife.
- Some BLM land surrounding Arches National Park is open to off- road vehicle use. Vehicle use is limited to existing roads and trails in a few areas, including the Colorado and Green river corridors, Deadhorse Point State Park, and Canyon Rims Recreation Area.
- The BLM has designated 16,000 acres of land for utility corridors. A portion of a utility

corridor is located near the southwest boundary of Arches National Park.

- Much of the Moab Field Office area is open for mining claims. Mining and exploration is allowed in the Potash region of BLM land, adjacent to the northern and southwestern boundaries of Arches National Park. There are three sand and gravel areas near the boundary of Arches National Park. The majority of land surrounding the park is open for mineral leasing. Eleven Wilderness Study Areas (WSAs), totaling about 350,000 acres, are withdrawn from new mining claims and mineral leasing, while the Green, Colorado and Dolores River canyons are withdrawn from new mining claims.
- Lands surrounding Arches National Park are being used and managed for recreation, including off- road vehicles, mountain biking, hiking and camping.
- The Moab Field Office area includes eleven Wilderness Study Areas, totaling about 350,000 acres. Four of these WSAs are near Arches: Lost Spring, Negro Bill Canyon, Mill Creek, and Behind the Rocks. The WSAs are generally closed to vehicle use.

No immediate improvements on BLM lands are proposed except at the Negro Bill Canyon parking lot (see State of Utah Projects below). The BLM has confirmed their interest in working in partnership with the National Park Service to manage regional visitation patterns.

### Other Federal Actions

#### Atlas Mine Tailings Site

The US Department of Energy (DOE) is proposing to clean up surface contamination and to develop and implement a groundwater compliance strategy to address contamination that resulted from historical uranium- ore processing at the Atlas Mill and tailings site. The tailings site is located in Grand County on the southeast side of the junction of highways 191 and 279, less than one mile from the Arches National Park entrance and Visitor Center. Contaminated material will be relocated to a disposal site to be constructed at



Crescent Junction, away from the park and the town of Moab. The DOE analyzed the potential environmental impacts of both on- site and off- site remediation and disposal alternatives involving both surface and groundwater contamination in an environmental impact statement (DOE/EIS- 0355, Final EIS published in 2005 and record of decision signed in September 2005). The contaminated materials will be transported to Crescent Junction via an existing railroad line.

### State of Utah Projects

Specific nearby projects undertaken by the State of Utah and considered in this environmental analysis include the following:

#### Highway 191 Improvements

The Utah Department of Transportation (UDOT) completed widening of a five- mile stretch of US Highway 191 to four lanes between Potash Road and County Road 313 in the spring of 2005 (UDOT 2005). Long- term plans involve widening the entire 34- mile section of US 191 from Moab to Interstate 70. Recently completed highway improvements also included the addition of a paved shared use path (for bicycle and pedestrian use) adjacent to US 191 from the Courthouse Wash Bridge on 191 to a location approximately one mile beyond the park.

#### Colorado River Bridge Study

UDOT recently conducted an analysis of the US 191 crossing of the Colorado River, immediately south of the park. Although the bridge is structurally reliable, the purpose of the study was to help UDOT determine if it needs to be widened, replaced, or rehabilitated. The study proposes a four- lane replacement bridge. Preliminary design and an environmental assessment began in the spring of 2005 (UDOT 2005).

#### Pedestrian/Bicycle Bridge over the Colorado River

This project involving design and construction of a bicycle/pedestrian bridge over the Colorado River at Lions Park, north of the City of Moab, is

currently underway. Design began in spring 2005, and construction is anticipated to begin in 2006. Another section of shared use path eventually would be constructed from the Colorado Bridge to Moab along US 191, creating a pathway for bicyclists and pedestrians that extends all the way from Moab to Arches National Park.

#### Pedestrian/Bicycle Path near State Route 128

UDOT plans to construct a bicycle/pedestrian path from Lions Park to Negro Bill Canyon in the State Route 128 corridor. The project was in the design phase as of spring 2005 and construction is anticipated to begin in 2006.

#### State Route 128 at Negro Bill Canyon

UDOT plans to lower a hill on State Route 128 to improve sight distance at the Negro Bill Canyon turn- off. This project also includes excavating and paving a parking lot at the Negro Bill Canyon entrance. Project construction is anticipated to be completed in 2006.

#### Moab Main Street

UDOT is also preparing plans to rebuild and improve US 191, the main street through Downtown Moab, by replacing aging pavement with new, low- maintenance pavement and improving the road grade. All work would be conducted within the existing roadway. Construction is planned to start in winter 2005/2006.

### County/City Actions

#### North Corridor Gateway Plan

The North Corridor Gateway is the area along US Highway 191 between the Arches National Park Visitor Center and Moab city limits that includes parcels or portions of parcels with highway frontage, on lands within 500 feet of the highway, and the Atlas Mill and tailings properties. The North Corridor Gateway was the focus of a joint planning effort by Grand County and the City of Moab in 2001. The plan proposes two new land use categories for future development in the corridor: 1) a Tourist Commercial (TC) category that would allow a variety of tourist- oriented commercial uses, and 2) a Specially Planned Area



(SPA) to accommodate a variety of interim uses on the Atlas Mill and tailings sites over the next 15- 20 years as Department of Energy remediation and reclamation of the sites proceeds.

The County also has plans to redevelop Lions Park. This park is connected to Arches National Park via a new shared use path adjacent to US 191.

## Impairment of Park Resources or Values

In addition to determining the environmental consequences of the preferred action and other alternatives, National Park Service *Management Policies* (USDI National Park Service 2001b) and Director's Order 12 require analysis of potential effects to determine whether or not actions would impair park resources. Impairment is defined as an impact that, in the judgment of the National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource of value may constitute impairment. Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, provided the impact does not constitute impairment of the affected resources and values. Although Congress gave managers the discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a

particular law directly and specifically provides otherwise.

An impact would be more likely to constitute impairment if it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

This Environmental Assessment analyzes potential effects of the alternatives presented to determine if the alternatives would result in an impairment of park resources. Adverse impacts determined to have moderate or below (i.e., no impact, negligible, minor) intensities are not analyzed further relative to the impairment standard because of their relatively low magnitude. A finding regarding impairment appears in the concluding section for all impact topics except Visitor Use, Experience and Recreation Resources, Park Operations, and Socioeconomics because these topics are not resource- based

## Analysis of Effects

### Soils and Biological Soil Crusts

#### Methodology

The analysis below addresses potential impacts on two distinct but related resources: soils and biological soil crusts. While soil is the loose surface material of the earth created through erosion of rock by wind and water, biological soil crusts are a thin and fragile veneer of living organisms on top of the soil that may contain lichens, mosses, microfungi, bacteria, and green algae. In many areas of Arches National Park they comprise a large portion of the living ground cover that reduces erosion, increases water retention, and increases soil fertility.



Soils and biological soils crusts are addressed together in this section because the actions that can damage them are the same, though the thresholds for damage and the time required for recovery are quite different for each resource. Those actions include human foot traffic, livestock, vehicle tires, grading and construction, and (ultimately) total coverage or removal by buildings, roads or other structures.

### *Soils*

Information on soils was derived primarily from the *Arches General Management Plan/Development Concept Plan and EA* (USDI National Park Service 1989), *Arches Resource Management Plan* (USDI National Park Service 1996), and *Arches Visitor Center and Park Entry Road Realignment EA* (USDI National Park Service 2002). Predictions about short- and long- term site impacts were based on previous projects with similar soil conditions, and other recent studies.

The thresholds of intensity for impacts on soils are defined as follows:

*Negligible:* The effects on soils would be below or at the lower levels of detection. Any effects on soils would be slight and no long- term effects on soils would occur.

*Minor:* The effects on soils would be detectable. Effects on soil area would be small. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.

*Moderate:* The effect on soil would be readily apparent and would result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse effects and likely be successful.

*Major:* The effect on soil would be readily apparent and would substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

The duration of impacts on soils are defined as follows:

*Short- term:* recovers in less than 3 years.

*Long- term:* takes more than 3 years to recover.

### *Biological Soil Crusts*

Information on biological soil crust was obtained primarily from the *Visitor Experience and Resource Protection (VERP) Implementation Plan*, Arches National Park (USDI National Park Service 1995a), the US Department of the Interior Soil Crust website ([www.soilcrust.org](http://www.soilcrust.org)), and *Biological Soil Crusts: Ecology and Management* (Belnap et. al. 2001).

The impact intensity thresholds for biological soil crusts are defined as follows:

*Negligible:* The biological crust is disturbed or improved, but the change is not readily visible. Existing vegetation is not damaged or threatened. Any effects on soil crust productivity or stability would be slight.

*Minor:* The biological crust is visibly disturbed or improved, but not enough to affect existing vegetation or the success of rehabilitation efforts. Effects to soil crust productivity or stability would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

*Moderate:* The biological crust and portions of surrounding vegetation are destroyed or restored within a small area or damaged or enhanced within a larger area. Effects to soil crust productivity or stability would be readily apparent, and would result in a change to soil crust character. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

*Major:* The biological crust is destroyed, highly disturbed, or restored over a large contiguous area or in numerous areas. Effects to soil crust productivity or stability would be readily apparent and would substantially change soil crust character. Mitigation measures to offset adverse effects would be needed, they would be extensive, and their success would not be guaranteed.



The duration of impacts on biological soil crusts is defined as follows:

*Short-term:* recovers in less than 5 years.

*Long-term:* takes more than 5 years to recover.

## Environmental Consequences

### Alternative A – No Action

#### Soils

**Impact Analysis** Under Alternative A the park would continue managing existing transportation facilities in their current condition, with minimal improvements to roads and parking areas on a case-by-case basis. For example, the shoulders of park roads would continue to be repaired and widened in some areas as part of annual maintenance projects. Minor improvements to roadway and parking areas may also continue to occur as part of periodic maintenance projects.

Continued road and parking area maintenance may result in a small loss of soils if repairs or widening occur adjacent to the existing roadbed or parking area. Under Alternative A there would also be continued use at more than 200 social pull offs located throughout the park. These activities would result in long-term soil compaction and associated loss of productivity along roadways and at the developed activity areas. Compaction would also continue as a result of vehicles parking on the road shoulder.

Under Alternative A, continuation of current efforts related to traffic calming improvements, motorized tour programs, ITS applications, the park's long-term partnerships with regional interests, ongoing VERP monitoring, and visitation and congestion management activities would have no effect on soils because these programs and activities would take place on existing disturbed ground and would result in no net new soil disturbance in the park.

Short-term impacts to soil resources from maintenance activities and continued use of social pull offs would be localized, minor, and adverse. Continued long-term adverse impacts on soil resources would be negligible to minor since impacts would be limited to relatively small and

often previously disturbed areas. Furthermore, measures to mitigate impacts contained in the General Management Plan and Environmental Assessment (National Park Service 1989) such as best management practices that call for reclamation of disturbed areas would successfully offset adverse long-term effects on soils.

**Cumulative Impacts** Soils in the park are impacted by past, present, and reasonably foreseeable actions implemented under the current General Management Plan, including the paving of Delicate Arch Road and construction of a new Visitor Center and park entry road. In implementing these types of actions, soils are excavated and replaced, buried beneath concrete, and eroded, resulting in localized and adverse impacts to soils. However, these activities have occurred in areas where human activities are already concentrated, resulting in minor impacts to soils in previously undisturbed areas. In addition, application of measures in the General Management Plan and VERP Implementation Plan to preserve the park's natural resources, have further minimized impacts on soils.

There are also several ongoing and planned projects in the park vicinity, including UDOT and City projects that could adversely affect soils. For example, construction of new pavement and trails along portions of U.S. 191 and State Route 128 would disturb soil resources over a relatively wide area, thereby contributing to cumulative soils impacts in the surrounding region.

Overall, impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long-term, negligible to minor, adverse cumulative impacts on soils.

Implementation of Alternative A would contribute to cumulative impacts on soil resources. However, the contribution would be negligible because impacts would not affect a wide area of the park and land bordering areas of disturbance would be protected and managed to return to a more natural condition. Therefore, overall, short- and long-term, cumulative impacts would be negligible to minor and adverse.



**Conclusions** Continued soil disturbance and compaction associated with road and parking area maintenance and social pull off activity under Alternative A would result in short- term, localized minor adverse impacts and long- term negligible to minor adverse impacts on soil resources in the park. The long- term impacts are considered negligible to minor because detectable effects on soil resources would only occur in small, often previously disturbed areas and could be successfully mitigated by reclaiming disturbed areas through protection, raking, and contouring.

The cumulative effects of Alternative A in combination with past, present, and reasonably foreseeable future actions would have short- and long- term, negligible to minor, adverse impacts on soils. Alternative A would contribute a negligible amount to overall cumulative impacts. Therefore, overall, short- and long- term, cumulative impacts would be negligible to minor and adverse.

There would be no impairment of the park resources or values related to soils.

#### *Biological Soil Crust*

**Impact Analysis** Under Alternative A, the park would continue to manage existing transportation facilities in their current condition, with some minimal improvements as a result of ongoing maintenance and operations activities on a case-by- case basis (i.e. roadway and shoulder repairs, pavement patching, etc.). These current and ongoing maintenance and operations programs and activities would take place on existing disturbed ground and would not result in net new disturbances to biological soil crusts in the park. In accordance with the park's resource management objectives, current and ongoing maintenance and operations programs and activities would avoid new disturbance of soil crusts in the park to the maximum extent possible.

Over time, the creation of more than 200 social pull offs located throughout the park, as well as social pull off activity near parking areas, has resulted in disturbance of biological soil crusts throughout Arches National Park. Disturbance has occurred in the pull off and parking areas, as

well as adjacent to these areas, with the creation of social trails as a result of pedestrian activities. Continued social pull off, parking, and pedestrian activity may result in some additional disturbance and compaction of sensitive biological soil crust in these areas and new areas.

Short- term impacts to biological soil crusts from continued social pull off, parking, and pedestrian activities would be localized, minor to moderate, and adverse. Continued long- term adverse impacts on soil crust resources would be minor to moderate and adverse, with impacts generally limited to relatively small and often previously disturbed areas along roadside shoulders, social pull offs, and parking areas throughout the park.

**Cumulative Impacts** A number of past and present actions implemented under the park's 1989 General Management Plan (GMP), including the paving of Delicate Arch Road and construction of the new Visitor Center and park entry road, have disturbed areas of sensitive soil crusts. Ongoing and planned projects in the park vicinity would also adversely affect biological soil crusts.

Impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable future actions both within the park and in the park vicinity, would have short- and long- term, minor to moderate, adverse cumulative impacts on biological soil crusts. Implementation of Alternative A would continue to affect the park's soil crust resources, contributing at minor to moderate levels to short- and long- term cumulative impacts.

**Conclusions** Under the No Action Alternative, there would be minor to moderate, short- and long- term adverse impacts on biological soil crusts, primarily as a result of existing and ongoing social pull off, parking, and pedestrian activities. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.



## Alternative B – Preferred Alternative

### Soils

#### Impact Analysis

During construction of the formalized roadside pull offs, approximately 11,900 square feet would be newly disturbed. Within the newly disturbed areas there would be increased potential for soil erosion that is typically aggravated by removing vegetation, altering topography, and uncontrolled storm water runoff. Minor short- term adverse effects would occur where soils are disturbed during construction. Once construction is complete, the potential for erosion would be minimal because soils exposed during construction would be covered. Some existing disturbed areas in the vicinity of these locations (approximately 10,025 square feet) would be environmentally rehabilitated through protection, raking, contouring, and other means.

Under Alternative B, more than 170 other existing social pull offs in the park totaling approximately 191,664 square feet (4.4 acres) would be environmentally rehabilitated through protection, raking and contouring to aid the natural recovery process. Additionally, 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). No biological soil crusts have been identified within these disturbed social pull offs. With protection and rehabilitation some soil crusts may establish in or near these locations over time.

Existing social pull off locations in the park would be removed and treated using a combination of techniques to deter usage and to aid in natural recovery, such as edging areas with large boulders, signing, and in some cases erecting barriers such as fencing. The length of time required for re-establishment of natural vegetation after construction would vary depending on site-specific conditions, but could take several seasons of growth. The intent would be to protect areas so that they may recover over time on their own. These measures would result in less social pull off

activity throughout the park and protect soils from further disturbance. This would be a long-term beneficial effect.

Mitigation measures designed for the project would help to minimize soil excavation, erosion, and off- site soil migration during and after construction. For example, ground disturbance and site management would be carefully controlled to prevent undue damage to soils and to minimize soil degradation. Effective stormwater management measures specific to each construction site would be implemented and appropriate erosion and sediment control measures would be in place at all times.

Implementation of Alternative B would also disturb approximately 12,650 square feet for construction of a new parking area at the Sand Dune Arch Trailhead. During construction there would be increased potential for soil erosion caused by clearing, grading, and uncontrolled stormwater runoff. Once construction is complete, the potential for erosion would be minimal because soils exposed during construction would be covered. Approximately 13,600 square feet of existing paved and social parking areas would be rehabilitated through removal of existing pavement, raking, contouring, and other means at The Windows/Double Arch, Sand Dune Arch Trailhead, and Devils Garden parking areas, resulting in a long- term beneficial effect.

Construction of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in impacts on soils. Although the type and magnitude of impacts on soils would depend on the specific site location, impacts are expected to be short-term and adverse and range from negligible to minor if construction is in compliance with City grading regulations and occurs in the developed urbanized area.

Traffic calming measures could include advance-warning signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic. The long- term effect of these measures on soils would be negligible because all construction activities



would occur in previously disturbed areas along existing roadways.

ITS recommendations would help to monitor and manage traffic flow and reduce congestion at the park's key visitor destinations. These actions would have negligible impacts on soils because the components of the ITS system would occupy small footprints in already disturbed areas along roadways.

Other recommended actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and implementing various visitation and congestion management strategies, including development of a new picnic area at the Delicate Arch Viewpoint parking lot to disperse visitation. Most of these actions would not result in any physical improvements or changes to the park, other than potential changes in visitation patterns. Any improvements associated with these recommendations (such as picnic tables) would be installed in developed areas. Therefore, any long-term adverse effects of these actions on soils would be negligible. These measures may also have a beneficial effect to soils by dispersing visitation to additional formal destinations within the park, thereby relieving the pressure to create social pull offs and minimizing the potential for further soil disturbance.

Short-term impacts to soil resources from implementation of Alternative B would be localized, negligible to minor, and adverse. Long-term adverse impacts on soil resources would be negligible since proposed improvements would either be installed in previously disturbed areas and would not result in net new soil disturbance or would be offset by proposed restoration measures. Restoration of previously paved and compacted social parking areas at The Windows, Sand Dune Arch Trailhead, and Devils Garden parking lots and reclamation of existing social pull offs would have a long-term beneficial effect by helping to reduce soil runoff and erosion in these areas.

**Cumulative Impacts** Past, present, and reasonably foreseeable projects within and in the

vicinity of Arches National Park that would adversely impact soils under Alternative A would also apply to Alternative B. Past cumulative impacts on soil resources in the park include alteration and removal of soils along the park's existing roads and at destination areas such as the Visitor's Center. Past, present, and reasonably foreseeable actions in the immediate vicinity of Arches National Park would continue to disrupt soil resources in the surrounding region.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long-term, negligible to minor, adverse cumulative impacts on soils. Implementation of Alternative B would contribute to cumulative impacts on soil resources. However, the contribution would be negligible because improvements would either be installed in previously disturbed areas and therefore would not result in net new soil disturbance or would be offset by proposed restoration measures. Overall, short- and long-term, cumulative impacts would be negligible to minor and adverse.

**Conclusions** Implementation of Alternative B would result in negligible to minor, localized, short- and long-term, adverse effects on soil resources. Also, the long-term beneficial effects resulting from the rehabilitation of over 170 existing social pull offs and removing pavement at existing parking lots and protecting and rehabilitating these areas would offset these adverse impacts.

Impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long-term, negligible to minor, adverse cumulative impacts on soil resources. Alternative B would contribute a negligible amount to overall cumulative impacts. Therefore, overall, short- and long-term, cumulative impacts would be negligible to minor and adverse.

There would be no impairment of the park resources or values related to soils.



*Biological Soil Crusts*

**Impact Analysis** Alternative B would result in the permanent conversion of approximately 12,650 square feet of land for construction of a new parking area at the Sand Dune Arch Trailhead. The presence of biological soil crusts at this proposed site has been confirmed, although site surveys have not been conducted to determine the exact surface coverage of the crusts. Review of aerial photos in relation to the conceptual site plan, indicates that biological soil crust would be destroyed within a small, localized area. Some areas affected during construction likely would naturally recover within five years, but other areas would not. Therefore, the impact would be considered short- term and long- term, moderate, and adverse.

Final design of the new parking area and trail connection would include configuration of improvements to avoid biological soil crusts present in the vicinity to the maximum extent possible.

Measures to mitigate the loss of soil crusts at the Sand Dune Arch site would be finalized during the final design process and would involve extensive collaboration with NPS biologists and resource specialists. Mitigation measures may include, but would not be limited to rehabilitation of a partially- disturbed soil crust area in another part of the park to compensate for the on- site loss, using crust “mined” (excavated and removed) from the development site area.

Other impacts associated with Alternative B would create new disturbance of approximately 11,900 square feet to pave and formalize 21 pull offs currently being used as social pull offs. This square footage of new disturbance area includes small, isolated areas located directly adjacent to previously disturbed areas in several locations (not all 21). Formalizing these pull offs would focus on existing developed areas to the greatest extent possible. Some existing disturbed areas in the vicinity of these locations (approximately 10,025 square feet) would be environmentally rehabilitated through protection, raking and contouring, and other means. No biological soil crusts have been identified within the 11,900

square feet that would be newly disturbed during improvements to the pull offs. Formalizing these pull off locations likely would not affect biological soil crusts in some areas, but may result in short-term, negligible adverse effects in areas where pedestrian activity may occur adjacent to the pull off. Mitigation would include ongoing education of visitors about the potential damage of foot traffic to biological soil crusts.

Under Alternative B, more than 170 other existing social pull offs in the park totaling approximately 191,664 square feet (4.4 acres) would be environmentally rehabilitated through protection, raking and contouring to aid the natural recovery process. Additionally, 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). No biological soil crusts have been identified within these disturbed social pull offs or within the sections of paved parking areas to be removed. With protection and rehabilitation some soil crusts may establish in or near these locations over time.

Treatment techniques in addition to replanting with native vegetation, would include edging areas with large boulders and in some cases erecting barriers such as fencing. Additional treatments, such as soil crust transplanting or the application of soil amendments, might also be implemented in some locations where appropriate under the direction of resource specialists. These measures would result in a long- term benefit to biological soil crusts by discouraging further social pull off and parking activity throughout the park, protecting soil crusts from further disturbance, and aiding the natural recovery process.

Traffic calming measures would include advance- warning signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic. In some areas, these improvements would not likely effect biological soil crusts since construction activity would be limited to previously disturbed areas along and within existing roadways. However, short- term, negligible adverse impacts may occur in some



areas where traffic calming improvements coincide with pedestrian crossings. Pedestrian social trails could appear in these areas. This potential activity could be mitigated by ongoing visitor education related to the damage of foot traffic on sensitive biological soil crusts. Installation of new signs would specifically avoid areas where there are established soil crusts.

If a new centralized operation and maintenance facility in Moab were constructed to support motorized interpretive tours, this could result in adverse impacts on biological soil crusts if present. However, the site location in the Moab vicinity, and therefore the location of soil crusts, if any, is not known at this time. The intensity and duration of impacts on soil crusts would depend on the specific site location, whether a new facility were to be constructed, and if so whether the site is currently developed or undeveloped. It is likely that the operations facility would be either newly constructed or retrofitted within an already existing disturbed and developed site in Moab. Given that Moab is a developed urbanized area, the presence of biological soil crust is less likely than in natural areas, such as at the park. Locating the operation and maintenance facility in Moab would avoid adverse effects on biological soil crusts inside the park by precluding development of a new facility in potentially sensitive areas, and by reducing the number of private vehicles entering the park overall.

Proposed Intelligent Transportation System (ITS) actions would help to monitor and manage traffic flow and reduce congestion at the park's visitor destinations. These actions would not likely affect biological soil crusts because proposed improvements would not involve construction of new facilities. New components of the ITS system would be housed in existing facilities in already developed areas of the park.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and other various visitation and congestion management strategies. Any improvements associated with these proposed actions (such as picnic tables and temporary, seasonal shade

structures) would be installed in already developed parking areas. Restriping and minor construction activities would be limited to already paved and disturbed areas. Although construction activities would not affect biological soil crusts in these areas, creation of a new picnicking area at Delicate Arch Viewpoint could result in short-term, negligible adverse effects if pedestrian activity occurs in nearby natural areas. Mitigation would include ongoing education of visitors about the potential damage of foot traffic to biological soil crusts.

Protection and rehabilitation of roadside areas and congestion management strategies, including ITS applications, also would result in beneficial effects on biological soil crusts by dispersing visitation to other developed destinations within the park and relieving the pressure of visitor use on sensitive soil crust areas, such as at the Windows, aiding the natural recovery of soil crusts in these affected areas.

**Cumulative Impacts** Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with adverse effects to biological soil crust under Alternative A would also apply to Alternative B. Past and present actions in Arches National Park have contributed to the gradual alteration of biological soil crusts at social pull offs along the park's existing roads and primary visitor destinations. Past, present, and reasonably foreseeable actions in the immediate vicinity of Arches National Park also have affected and would continue to affect biological soil crust resources in the surrounding region.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions within the park and in the immediate vicinity of the park would have short- and long- term, moderate and adverse cumulative impacts on soils.

Implementation of Alternative B would contribute to soil crust impacts inside the park, particularly at the Sand Dune Arch Trailhead parking area, and potentially outside the park. The contribution of Alternative B to these cumulative impacts would be moderate due to the small amount of soil crusts that would be disturbed in localized locations,



such as at the Sand Dune Arch Trailhead parking area. Therefore, overall, cumulative impacts would be short- term and long- term, moderate and adverse.

**Conclusions** Under Alternative B, there would be moderate, short- term and long- term, adverse effects on biological soil crusts inside the park, primarily as a result of construction of the Sand Dune Arch parking area. There would also be the potential for adverse effects on biological soil crusts outside the park if a new centralized operation and maintenance facility in Moab were constructed to support motorized tours. However, since the site location is unknown, the potential intensity and duration of these effects is not known at this time, and the location of this facility outside the park would avoid adverse effects inside the park. Other long- term beneficial effects would occur as a result of proposed actions of Alternative B. Overall, short- and long- term, cumulative impacts would be moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.

## Visual Resources

### Methodology

Assessment of potential impacts on visual and scenic resources is based primarily on a determination of the anticipated change in the character of the existing visual landscape, in comparison to existing conditions and observations based on site visits, photographs, and maps. The amount of area disturbed, the resulting landscape character in the areas of disturbance, and the ability to reclaim disturbed areas are used as indicators of the level of potential impacts on visual and scenic resources in the park.

For the purpose of this analysis, the thresholds of intensity for visual impacts are defined as follows:

**Negligible:** The action would introduce only the perception of some additional movement by cars or by people. The change to the viewshed (defined as the area comprised of all the surface areas visible from an observer's viewpoint) would be so small or localized that it would have no

measurable or perceptible consequence to the visitor experience of the viewshed.

**Minor:** The action would introduce perceptible non- natural, human- made additions to the viewshed. These actions would include structures that affect a relatively small portion of the viewshed, either the foreground, middleground, or background, and have barely perceptible visual consequences to the visitor experience of the viewshed.

**Moderate:** The action would introduce perceptible non- natural, human- made additions to the viewshed. These actions would include facilities, parking, and other structures and built elements that would affect a moderate portion of the viewshed. This might include the foreground and middleground, or the foreground and background. These actions would not completely alter the viewshed, but would be a visual addition to the existing conditions.

**Major:** The action would introduce multiple and drastic non- natural, human- made additions that affect the entire viewshed as experienced by the visitor. These actions would include facilities and parking areas, as well as other structures and built elements that would completely alter the foreground, middleground, and background of the existing viewshed.

The duration of impacts on visual resources is defined as follows:

**Short- term:** occurs only during the six- year construction/implementation period.

**Long- term:** occurs after the six- year construction/implementation period.

## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A the park would continue to manage existing transportation facilities in their current condition. Only minor improvements would be implemented, as already planned through the park's GMP and typical ongoing park maintenance and operations activities, on a case- by- case basis.



No additional development would occur in the park's viewsheds other than continued road and parking area maintenance. The GMP proposal to develop the Sand Dune Arch parking area would have resulted in alteration of the viewshed within that vicinity of the park, but the previously proposed configuration of the parking area has been changed, and instead a new configuration is proposed under Alternative B.

Visitation at the park is expected to increase over time, resulting in increases in the amount of motor vehicle traffic on park roads and at parking areas, as well as increases of people on trails and at park features. Consequently, views from along the road corridors and parking areas would include additional vehicles, and parking areas and turnouts would be somewhat more congested. Increased motor vehicle traffic would introduce new night light sources. These sources would be limited to localized areas in the park and would not be expected to contribute to sky glow.

Under Alternative A, existing roadside social parking and the related creation of social trails and possible disturbances to soil crusts and vegetation would continue to occur, creating potential impacts to the visual quality of areas immediately visible from park roads.

Continuation of current activities under this alternative would result in some changes to the visual landscape over time as a result of small scale maintenance improvements to roads and visitor facilities and increased visitation levels. These affects would result in negligible impacts on visual quality because no physical improvements would be installed that would adversely affect park viewsheds.

Alternative A would result in negligible, long-term adverse impacts on visual quality overall because changes would be limited to small areas around existing disturbed and developed areas and therefore would affect only small portions of viewsheds.

**Cumulative Impacts** Cumulative impacts to visual and scenic quality would include past, present, and planned additional development and/or modification to the natural and human-

made environment. Within the park, past projects include construction of the new Visitor Center, parking areas, the Delicate Arch road, and other visitor facilities. Those improvements have resulted in short- term impacts on visual quality during periods of construction due to placement of construction equipment, fencing, and other intrusions into a natural setting. These past projects also have contributed to the long- term alteration of the visual landscape in some areas of the park. However, the application of measures in the GMP to achieve architectural compatibility and minimize visual intrusion has resulted in only minor visual impacts within the park. Park projects proposed under the GMP, including trail rehabilitation and vegetation and fire management plans, would be anticipated to have only negligible visual impacts in the long- term because they would not involve constructing new additions that would dramatically alter the park's viewshed.

Past actions in the immediate vicinity of the park, namely from historical uranium- ore processing at the Moab uranium mill tailings site, have contributed to minor, long- term, adverse visual quality and sky glow impacts in the surrounding region. Ongoing and planned projects, including widening and resurfacing portions of US 191 in the vicinity of the park, also have and would continue to contribute to visual effects.

Overall, impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable actions within the park and in the surrounding region would result in negligible to minor, long- term, adverse cumulative impacts to visual and scenic quality. Short- term, minor adverse impacts would occur at locations of construction projects during the period of construction. The contribution of Alternative A to adverse effects on visual quality in the park would be minor because improvements would be limited to small areas around existing disturbed areas and would affect only a small portion of the viewshed. Overall, short- and long- term, cumulative impacts would be negligible to minor and adverse.

**Conclusions** Under Alternative A, No Action, there would be negligible to minor, long- term adverse impacts on the park's visual character and



resources, including night skies. Overall, short- and long- term, cumulative impacts would be negligible to minor and adverse. There would be no impairment of park resources or values related to visual quality.

#### Alternative B – Preferred Alternative

**Impact Analysis** Preservation of the visual resources inherent to the unique geologic character of the landscape is vital to the visitor experience at Arches National Park. In general, landscape changes associated with Alternative B would be compatible with the visual character of the park and, in many cases, would provide additional opportunities for scenic viewing and enjoyment of park resources.

Proposed improvements to existing parking areas would have varying effects on visual quality. Parking areas at the Windows/Double Arch, Wolfe Ranch/Delicate Arch Trailhead, Delicate Arch Viewpoint, and Devils Garden would simply be restriped and reconfigured within the existing paved areas to achieve more efficient parking. These improvements would be expected to have negligible adverse long- term impacts on visual quality because changes to viewsheds would be small and localized and would have no measurable or perceptible consequence to the visitor experience.

Proposed removal of 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). Rehabilitation of these areas to a more natural condition would result in beneficial effects, helping to offset negligible visual quality impacts in these areas.

The proposed expansion of the parking area at Sand Dune Arch would have a localized, but moderate, long- term effect on visual quality. These impacts would be considered moderate because the expanded parking areas would be a perceptible newly built addition in the viewshed at this location. The visitor viewing experience at these locations would not be completely altered,

but visual additions to existing conditions would be introduced in foreground views.

Proposed improvements at pull off areas throughout the park would provide the public with enhanced opportunities for scenic viewing. Placement of boulders and/or fencing is proposed at some pull offs, including pull offs 14, 15 and potentially at informal pull off D. Fencing would help to contain visitors at these viewpoints and minimize damage to soils and vegetation. Fencing would also be used to discourage and prohibit motorists from using some of the existing social pull off areas. Fencing would be designed and constructed to be compatible with the desert landscape. The visual impacts of these elements (fencing, boulders, etc) would be long- term and adverse but minor because they would be offset by the recovery of soil and vegetation in areas that previously experienced heavy foot traffic, and the design character of these elements would blend with the natural surroundings.

For safety and sight distance purposes, signs are proposed to be located in advance of several of the pull offs to be paved and formalizes (e.g., pull offs 1, 6, 7, 9, 10, 11, 13, 15, 16, 19, and 21). Proposed signs would have a long- term effect to viewsheds along park roads, particularly along the main park road, as a result of introducing new fixed structures in the roadside landscape. However, signs would be designed and sited to minimize their visual intrusion in a way that would be sensitive to the context of the desert landscape and compatible with the scenic characteristics of the Arches National Park driving experience, and that would result in barely perceptible consequences to the visitor experience. Therefore long- term impacts would be considered adverse but minor.

Traffic calming measures implemented in the park would include additional warning/regulatory signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic in appropriate areas such as pull offs, pedestrian crossings and trailheads. Such measures would have a minor, adverse long- term effect on visual quality, particularly along the main roads within the park. These impacts would be considered minor because the traffic calming



measures would be placed in and along existing roadways or other areas that are already developed. In addition, these measures would be designed and sited to minimize their visual intrusion in a way that is sensitive to the context of the desert landscape and compatible with the scenic characteristics of the Arches National Park driving experience. Therefore long- term impacts would be adverse but minor.

The creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in short-term and long- term impacts on visual resources outside the park. However, the type and intensity of potential impacts would depend on the size and character of the new facilities and the number and location of sensitive receptors. Temporary short-term visual impacts would include large equipment working in construction areas; dust and fumes created by earth- moving activities; and temporary parking of contractor and staff vehicles. Because of the facility's proposed location in Moab, a developed, urbanized area, long- term adverse impacts on visual quality likely would be negligible to minor. Short- term, adverse impacts during construction likely also would be negligible to minor. Assuming that tours would not operate during nighttime hours, impacts to night skies and corresponding sky glow effects would not occur. The design and development of the tour operations facility in Moab would comply with all applicable local, state and federal standards and requirements including applicable design requirements of the city of Moab.

Over the long term, operation of motorized interpretive tours would potentially decrease the use of motor vehicles in the park, particularly during periods of peak visitation. This in turn would help to reduce some of the most prevalent visual impacts that currently affect the park: congestion in parking areas due to vehicles circulating to find spaces, and social pull off and parking activity in undesignated areas throughout the park. Reducing these activities would result in an overall long- term beneficial effect on visual quality within the park.

Proposed ITS actions would help to monitor and manage traffic flow and reduce congestion at the park's visitor destinations. These actions would not affect visual or scenic quality because proposed improvements would not involve construction of new facilities. New components of the ITS system would be housed in existing facilities and developed areas of the park.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and implementing various visitation and congestion management strategies, such as the development of a new picnic area at the Delicate Arch Viewpoint, which would help disperse this activity in the park and reduce congestion in other areas. Any improvements associated with these proposed actions (such as picnic tables) would be installed in an already developed area, with specific care to site the facilities so as not to interfere with prominent viewsheds or appreciably change visual character. Therefore, any long- term adverse effects of these measures on visual quality in these areas would be negligible to minor because the improvements either would not be perceptible or would have barely perceptible visual consequences on the visitor experience.

Protection and rehabilitation of roadside pull off areas and congestion management strategies, including ITS applications, also would result in beneficial effects on scenic and visual quality by dispersing visitation to other developed destinations within the park and helping to relieve vehicle congestion and social pull off and parking activities in other areas.

Construction activities proposed under Alternative B would result in temporary short-term, negligible to minor, adverse impacts to visual resources.

**Cumulative Impacts** Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with adverse impacts to visual quality under Alternative A would also apply to Alternative B. Implementation of Alternative B would alter visual quality both



within park boundaries, particularly within the corridors of the park's main roads and at the proposed Sand Dune Arch parking area, and outside the park at the site of the new centralized operation and maintenance facility in Moab.

The impacts of past, present, and reasonably foreseeable future activities, in conjunction with Alternative B, would result in minor to moderate, long- term adverse impacts to visual quality both within and in the immediate vicinity of the park. Negligible to minor, short- term, adverse impacts to visual resources would occur at the locations of construction projects temporarily, during the construction period. Alternative B would contribute at negligible to moderate levels to long- term cumulative impacts on visual resources and at negligible to minor levels to short- term cumulative impacts. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse.

**Conclusions** Under Alternative B, there would be negligible to minor short- term and negligible to moderate long- term adverse impacts on visual quality both within and outside the park. Some long- term beneficial effects would occur. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to visual quality.

## Visitor Use, Visitor Experience, and Recreational Resources

### Methodology

Potential impacts on visitor use, visitor experience, and recreational resources are assessed qualitatively for each alternative. Visitor use, experience, and recreational resources information and analysis is based on a review of several documents, including the *Arches National Park GMP* (1989), the park's *VERP Implementation Plan* (1995), the *Superintendent's Annual Narrative Report* (2004), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park

staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for visitor use, experience and recreational resource impacts are defined as follows:

*Negligible:* Effects are not detectable – and action would have no measurable or discernible effect on recreational opportunities, visitor use, or visitor experiences. Visitors would not be affected or changes in visitor experience would be below the level of detection and visitors would not likely be aware of the effects associated with the alternative.

*Minor:* Impacts are slightly detectable, but would not be expected to have an overall effect on recreational opportunities, visitor use or experience. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

*Moderate:* Impacts are clearly detectable and would have an appreciable effect on recreational opportunities, visitor use, or experience. Changes in visitor experience or safety would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

*Major:* An action would have substantial, highly noticeable effects on recreational opportunities, visitor use, or experience. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

The duration of impacts on visitor use, visitor experience, and recreational resources is defined as follows:

*Short- term:* occurs only during the six- year construction/implementation period.

*Long- term:* occurs after the six- year construction/implementation period.



## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A, the No Action alternative, planned improvements as well as ongoing operations and maintenance activities in the park would continue as authorized under the existing GMP. The park would continue to manage facilities and services to meet NPS and park planning objectives with the objective of maintaining a high quality visitor experience to the maximum extent possible, balanced with other objectives such as resource preservation and protection. However, some existing and ongoing activities in the park likely would continue to adversely affect visitor use, visitor experience, and recreational resources in minor to moderate levels over the long- term. For example, social pull off activity along the roadsides and the associated effects to visitor experience and safety would continue (at approximately 200 locations).

Creation of social trails would continue near social pull off areas and surrounding parking areas as attractions within the park continue to experience crowding and congestion during peak visitation periods. Parking areas would continue to experience congestion and visitors would continue to experience disorientation during peak periods trying to find places to park and pull off the road, particularly at key features such as the Windows and Devils Garden. Instances of noncompliance with the visitor experience standards and key indicators of the *VERP Implementation Plan* likely would continue at popular features during peak periods, and the frequency that visitor experience conditions fail to meet standards may increase if visitation continues to increase in the coming years, signifying degradation of visitor experience where measured.

Ongoing monitoring of VERP under this alternative would provide a tool to support ongoing management of visitor experience and may help to mitigate potential impacts if interim actions are implemented to correct noncompliance and if funding continues to be made available for VERP monitoring and implementation. However, annual funding is not

assured for this program, and over the long- term, visitor experience could continue to degrade without implementation of more permanent measures and actions.

There would continue to be an unmet demand for general motorized sightseeing tours of the park, and other new enhancements to visitor experience would not occur. Visitor safety and orientation enhancements through traffic calming and ITS improvements also would not be implemented.

**Cumulative Impacts** Past, present, and reasonably foreseeable future actions have resulted in short- term, minor to moderate, adverse effects on visitor use and experience and recreational resources during construction of improvements along US 191, the new entrance to the park and the new Visitor Center. However, completion of these projects has resulted in an overall long- term beneficial effect on visitor experience, particularly due to the reduction in time related to queuing and waiting at the park entrance and enhanced visitor opportunities associated with the new Visitor Center.

With ongoing cooperation and coordination between regional tourism and recreation interests, the potential for cumulative adverse impacts of past, present, and reasonably foreseeable future projects in the region would be minimized.

The recently completed project extending a multi- use pathway to the park along US 191, along with other existing and planned trails and linkages (bridge across the Colorado River) would increase the level of visitors coming to the park by bicycle.

Overall, the cumulative impact of past, present, and reasonably foreseeable future activities combined with implementation of Alternative A would result in short- term and long- term minor to moderate adverse effects on visitor use, visitor experience and recreational resources. Alternative A would contribute to these cumulative effects at a minor to moderate level, depending on future park visitation levels, over the long term. (If visitation increases, the level of impact would likely increase.) Recent completion of improvements to US 191, the park entrance and



the new Visitor Center have resulted in long- term beneficial effects localized at the entrance area.

**Conclusions** Alternative A would result in minor to moderate, long- term adverse impacts to visitor use, visitor experience and recreational resources. The level of impact would be expected to become more intensive if the level of visitation increases and conditions at key features and along the park roadways become more congested. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although some beneficial effects have resulted from past, present and reasonably foreseeable cumulative actions. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.

#### Alternative B – Preferred Alternative

**Impact Analysis** Long- term beneficial effects to visitor experience and recreational opportunities would be expected under Alternative B. Although visitor use may increase over time as a result of proposed actions being implemented, the proposed actions under Alternative B include improvements, management tools and strategies to help ensure that increased visitation would be managed effectively.

Long- term beneficial effects would result from proposed improvements for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would be improved, which would in turn enhance the visitor experience at these locations. Reduced congestion on trails at key features also likely would result since parking capacities would be more easily maintained to a level acceptable in accordance with VERP standards.

Long- term beneficial effects to visitor experience and expanded recreational opportunities would result from formalizing some of the existing roadside pull off areas for permanent use. Other existing roadside pull off areas being used socially by visitors would be removed. These pull offs are in locations that are not suitable for ongoing use in consideration of roadway design standards and are causing damage and disturbance to park resources, which in turn detracts from the visitor

experience overall. The excessive number of pull offs concentrated in certain areas and the pedestrian social trails created in these areas also tend to diminish visitor experience due to congestion and confusion – a problem that would be addressed by this alternative.

Long- term beneficial effects to visitor experience would be expected as a result of implementing traffic calming improvements in areas where there is excessive vehicular speeding near and at pedestrian activities areas.

Short- term, minor to moderate adverse effects to visitor use, visitor experience and recreational resources would occur during construction of proposed parking area, pull off, and traffic calming improvements. These effects would be mitigated by the dissemination of information to visitors (through printed materials, signing, radio broadcasts and other means) about construction activities, which would include suggestions for visiting areas of the park not under construction. Also, where possible, construction would be phased and staged to avoid peak annual visitation periods and cause the least amount of disruption during peak daily use periods.

Motorized interpretive tours would expand interpretive and recreational (sightseeing) opportunities for visitors and address an increasing demand for this type of service in the park. Additionally, lower- capacity motor vehicle trips would be replaced by tour bus trips, resulting in fewer overall vehicles in the park and reduced congestion along the park road and at key feature and trailhead parking areas. Tour routing and frequency would be programmed to avoid creating crowded conditions at park features and trailheads. Guided tours at key features would provide visitor education and management opportunities that would benefit park resources over the long- term. One of the most important benefits motorized interpretive tours would provide related to visitor experience would be the opportunity for a “car free” experience in the park. Visitors would be able to leave their cars behind in Moab and travel to, through, and from the park in a comfortable sightseeing vehicle equipped with onboard interpretation. This



would enable more visitors to enjoy the scenery and learn about special features of the park.

Implementation of ITS proposed actions would result in long- term beneficial effects through enhanced visitor experiences due to improved visitor orientation and wayfinding (both pre- trip and on- site), as well as reduced traffic congestion in the park.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation, would all be expected to enhance visitor experience over the long term. Reduced overall congestion at key features and trailhead parking areas throughout the year would result, improving visitor experience in the park.

The provision of an additional picnicking facility in an existing, developed parking area (Delicate Arch Viewpoint) would help to disperse visitation to an area of the park that is not typically as congested other areas, and it would provide enhanced recreation opportunities.

The strategy related to limiting visitation to key features (such as Delicate Arch) through permit systems, park- guided tours or other means at peak visitation periods would help to ensure that visitor experience goals are met overall. More intensive management of visitation to features (like is done for Fiery Furnace) could be negatively perceived by some visitors. This adverse effect likely would be long- term and minor to moderate in that it would be discernable to some park visitors during peak visitation periods. Some visitors would be aware of the action and likely would express an opinion, but the overall effect would be beneficial for most visitors and park resources over time. Closure of features would not occur. Rather, access would be managed to minimize congestion and overcrowding during peak periods (through permit systems or guided tours, specific time assignments for visits, and managing the number of people at one time at these features). Managed access to and within the vicinity of key features during peak visitation periods would preserve visitor opportunities overall.

*Cumulative Impacts* Past, present, and reasonably foreseeable actions within and in the vicinity of Arches National Park with impacts to visitor use, visitor experience, and recreational resources related to Alternative A also would apply to Alternative B. Short- term, minor to moderate, adverse effects on visitor use and experience have occurred during construction of improvements along US 191, the new entrance to the park and the new Visitor Center. However, completion of these projects has resulted overall in long- term beneficial effects on visitor experience, particularly due to the reduction in time related to queuing and waiting at the park entrance and opportunities associated with the new Visitor Center.

With ongoing cooperation and coordination between regional tourism and recreation interests, the potential for cumulative impacts of past, present, and reasonably foreseeable future projects would be minimized. For example, ongoing coordination and management would help in making visitors aware of bicycling conditions in the park and restrictions on mountain biking on trails and off- road in the park and the opportunities for mountain biking that can be found in other areas of the region.

The cumulative impact of past, present, and reasonably foreseeable future activities combined with implementation of Alternative B would result in minor to moderate, short- term adverse effects on visitor use, visitor experience, and recreational resources during construction and long- term minor to moderate adverse effects related to visitor management at key features during peak visitation periods. Overall, proposed actions of Alternative B combined with cumulative effects of past, present, and reasonably foreseeable future actions would result in long- term beneficial effects.

Alternative B would contribute at a minor to moderate level to short- term impacts during construction and at a minor to moderate level to long- term adverse impacts as a result of visitor management at key features. Alternative B proposed actions would contribute to beneficial cumulative effects to visitor use, visitor experience, and recreational resources.



**Conclusions** Alternative B would result overall in short- term, minor to moderate adverse effects during construction of proposed improvements that would be mitigated. Proposed visitor access management would result in long- term, minor to moderate, adverse effects to some visitors at localized areas of the park during peak visitation periods. These adverse effects would be offset by substantial long- term beneficial effects to all park visitors and visitor experience, as well as park resources. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although beneficial effects would continue to be realized from past, present and reasonably foreseeable actions combined with Alternative B. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.

## Transportation and Traffic

### Methodology

Potential impacts related to transportation and traffic conditions are assessed qualitatively for each alternative. Traffic and transportation information and analysis is based on a review of several documents, including the *Arches National Park GMP* (1989), the *Arches National Park Engineering Study for Roads* (RS Engineering, 2002), *Arches National Park Road Pullout Analysis Report* (EDAW, March 2001), *Arches National Park Intelligent Transportation Systems Study* (LTK and Jonathan Upchurch, 2005), *Arches National Park Roadside Pull Off Analysis* (Otak, Inc., 2005), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for transportation and traffic impacts are defined as follows:

**Negligible:** Effects are not detectable – and action would have no measurable or discernible effect related to transportation conditions and/or traffic flows and safety.

**Minor:** Impacts are slightly detectable, but the action would not be expected to have an overall effect on transportation conditions and/or traffic flows and safety.

**Moderate:** Impacts are clearly detectable and would have an appreciable effect on transportation conditions and/or traffic flows and safety. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

**Major:** An action would have substantial, highly noticeable effects to and permanent alterations of conditions related to transportation conditions and/or traffic flows and safety. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

The duration of impacts related to transportation and traffic conditions is defined as follows:

**Short- term:** occurs only during the six- year construction/implementation period.

**Long- term:** occurs after the six- year construction/implementation period.

## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue in accordance with the existing GMP. Social pull off activity along the roadsides and the associated effects to transportation and traffic flows and safety would continue (at approximately 200 locations). The creation of social trails alongside social pull offs and parking areas would continue, particularly as key park features continue to experience crowding and congestion during peak period visitation levels. Parking areas would continue to experience congestion and visitors would continue to experience disorientation during peak periods trying to find places to park and pull off the road, particularly at key features such as the Windows and Devils Garden. If visitation grows



over the long term, these problems would worsen if not addressed.

There would continue to be an unmet demand for general motorized sightseeing tours of the park. Under Alternative A, traffic and transportation problems would continue, as would burdens on park ranger and staff time related to managing parking congestion, social pull off and parking activity, and vehicle/visitor access and circulation throughout the park. Over the long- term, traffic and transportation conditions likely would continue to degrade without implementation of more permanent measures.

These conditions under Alternative A would result in minor to moderate, long- term, adverse impacts on transportation and traffic conditions and facilities.

**Cumulative Impacts** Cumulative impacts associated with past, present, and reasonably foreseeable future projects under Alternative A include several recent projects completed in the vicinity of the park entrance, as well as past projects such as development of parking areas and the Delicate Arch road. These actions resulted in minor to moderate, short- term adverse effects to transportation and traffic in those areas during construction. However, completion of these projects resulted in an overall long- term beneficial effect on transportation and traffic. For example, recent improvements at the park entrance resulted in an appreciable reduction in time, and more space for vehicles off the highway for waiting in line to enter the park. Implementation of the proposed improvements of the 2002 roadway safety study also would help to improve conditions for travelers in the park (within the parameters of allowable improvements under the existing GMP).

However, overall under Alternative A, it is anticipated that traffic and transportation problems would persist throughout the park over the long term. As such, the cumulative effect of other past, present, and reasonably foreseeable future actions, combined with Alternative A, would result in minor to moderate, long- term, adverse impacts. Alternative A would contribute a minor to moderate level to these to overall

cumulative impacts, with the level of effect correlating with future visitation and congestion levels in the park.

**Conclusions** Alternative A would result in minor to moderate, long- term, adverse impacts related to traffic and transportation, with the level of effect depending on future visitation and congestion levels and conditions at key features and throughout the park. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse (although some localized beneficial effects have resulted from recent improvements at the park entrance and past park improvements). There would be no impairment to park resources or values related to transportation and traffic conditions.

#### Alternative B – Preferred Alternative

**Impact Analysis** Long- term beneficial effects related to traffic and transportation would be expected under Alternative B. Although visitor use and the potential for associated traffic congestion may increase over time, the actions proposed include improvements, management tools, and strategies to ensure that increased visitation (and associated increases in traffic) would be managed effectively. Short- term, minor to moderate, adverse impacts would occur during construction of proposed improvements. These impacts would be mitigated by traffic control and signing, construction phasing, visitor communications and other measures.

Long- term beneficial effects would result from improvements proposed for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would be improved. Reduced congestion within the parking areas for key features and along trails would result since parking capacities would be more easily maintained to acceptable levels in accordance with VERP standards.

Long- term beneficial effects to traffic safety throughout the park would result from formalizing the proposed roadside pull off areas for permanent use. Existing social pull off areas that present hazards to travelers would be removed from ongoing use. Formalizing pull offs



in suitable locations consistent with roadway safety standards would ensure that park visitors have sufficient space to pull to the side of the road in emergencies and to let other vehicles pass.

Long- term beneficial effects to traffic, pedestrian, and bicycle safety would be expected as a result of implementing proposed traffic calming improvements in areas where there is excessive vehicular speeding, particularly near and at pedestrian activity areas.

Motorized interpretive tours also would result in long- term beneficial effects by expanding visitor access opportunities, improving transportation and traffic conditions in the park, and providing an alternative means of access and travel to, through, and from the park. Lower capacity motor vehicle trips would be replaced by higher capacity tour bus trips, resulting in less overall vehicles in the park and reduced congestion along the park roads and at key feature and trailhead parking areas. Implementation of the parking and pull off improvements of this alternative also would help to ensure that tour vehicles would be accommodated at key locations throughout the park.

Implementation of proposed ITS actions would result in long- term beneficial effects from reduced congestion throughout the park, including at key feature parking areas. Through improved orientation to parking conditions and typical times of congestion in the park, visitors may choose to plan their trips to avoid peak visitation periods.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would all be expected to reduce traffic problems and enhance access and circulation to, from, and within the park over the long- term. Reduced overall congestion at key feature and trailhead parking areas throughout the year would result.

**Cumulative Impacts** Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with impacts to

transportation and traffic under Alternative A also would apply to Alternative B. Short- term, minor to moderate, adverse effects have occurred during construction of improvements along US 191, as well as improvements in the park such as at the new entrance and Visitor Center. These cumulative effects have been offset by overall long- term beneficial effects on transportation and traffic flows and safety with completion of these projects. Implementation of the proposed actions of the 2002 roadway study (to the level allowable according to the provisions of the current GMP) would help to improve the overall function of the road for use by various vehicles. The addition of proposed actions under Alternative B would further result in long- term, beneficial effects to transportation and traffic conditions. Minor to moderate, short- term impacts during construction of proposed improvements would contribute to the level of cumulative impacts, but these impacts would be mitigated through various measures and offset by the longer term beneficial effect.

**Conclusions** Long- term beneficial effects related to transportation conditions and traffic flows and safety would occur under Alternative B. These effects would be expected as a result of reduced traffic congestion in parking areas, improved safety on the park roadways from pull off and traffic calming improvements, and improved operations of the park's overall transportation system. Minor to moderate, short- term adverse effects would occur during construction, but would be mitigated. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by long- term beneficial impacts resulting from recent past and improvements at the park and proposed actions of Alternative B. There would be no impairment of park resources or values.

## Park Operations

### Methodology

Potential impacts on park operations are assessed qualitatively and quantitatively (at a general level) for each alternative. Park operations information and analysis is based on a review of several



documents, including the *Superintendent's Annual Narrative Report* (Fiscal Year 2004), *Arches National Park GMP* (1989), the park's *VERP Implementation Plan* (1995), and various other documents, as well as National Park Service website information, visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purposes of this analysis, the thresholds for impacts on park operations are defined as follows:

**Negligible:** Effects would not be detectable – an action would have no measurable or discernible effect on park operations.

**Minor:** Impacts would be slightly detectable, but would not be expected to have an overall appreciable effect on park operations. If mitigation is needed to offset adverse effects, it would be relatively simple and likely successful.

**Moderate:** Impacts would be clearly detectable and readily apparent and would result in changes to park operations that would be noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful, (but mitigation such as increased staffing and resources, such as equipment, and vehicles may not be assured).

**Major:** An action would have substantial, highly noticeable effects on park operations, resulting in substantial, highly noticeable changes. Mitigation measures to offset adverse effects would be needed, would be extensive, and success would not be assured.

The duration of impacts on park operations is defined as follows:

*Short-term:* occurs during the six- year construction/implementation period

*Long-term:* occurs after the six- year construction/implementation period

## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue, consistent with the existing GMP. Social pull off activity along the roadsides and the associated effects to visitor experience and safety would continue (at approximately 200 locations) and more would be created over time. The creation of social trails would continue adjacent to social pull offs and parking areas for popular features in the park, particularly with increases in visitation, crowding, and congestion during peak periods.

As such, it is anticipated that demands on park staff and resources would continue to increase. A considerable amount of staff time would continue to be needed for managing parking congestion, patrolling park roadways and assisting visitors in finding parking and accessing park attractions, particularly during peak periods of visitation. A considerable level of park resources and staffing would also continue to be devoted to monitoring damages caused by social pull offs and social trail activity in these areas and near the parking areas of popular attractions.

Under Alternative A, there would not be an additional need for staff support for new tour programs or development of capital projects (such as interpretive staff/guides to support tours). There would be a need for ongoing funding and staffing for VERP monitoring.

Overall, Alternative A would result in minor to moderate, long- term adverse effects on park operations. These impacts could be mitigated through the provision of increased staff time and resources.

**Cumulative Impacts** The impacts of other past, present, and reasonably foreseeable actions combined with Alternative A would result in minor to moderate long- term adverse effects. A number of past and present actions implemented under the current GMP (including development of the new visitor entrance station and Visitor Center) and various improvements to key feature



and trailhead parking areas throughout the park have provided and continue to provide long-term beneficial effects to park operations – improving visitor services and facilities and maximizing efficiency in maintenance and management activities. However, over the long term, Alternative A (No Action) would contribute at minor to moderate levels to adverse cumulative effects as a result of ongoing social pull off, social trails, and parking activities, as well as increased visitation and congestion at key features. Impacts would be mitigated by the park’s capability to provide adequate staff and resources in the future to address these issues. The park regularly evaluates opportunities for improving park operations through ongoing management initiatives, programs, and projects.

**Conclusions** Under Alternative A, there would be long-term, minor to moderate adverse impacts to park operations that would need to be mitigated through additional staffing and resources. Overall, long-term cumulative impacts would be minor to moderate and adverse. The National Park Service does not analyze park operations for impairment.

#### Alternative B – Preferred Alternative

**Impact Analysis** Long-term beneficial effects to park operations would be expected under Alternative B. There would be a need for ongoing funding for VERP monitoring, as well as the need for staffing during capital project implementation and in support of motorized interpretive services. These needs would result in short-term, minor to moderate, adverse impacts. These impacts could be mitigated by additional staff time and resources as discussed in Chapter 2.

Over the long term, staff time dedicated to law enforcement, patrolling, and management of roadside pull offs in undesignated areas, speeding on park roads, and traffic circulation and pedestrian safety conditions throughout the park may appreciably decrease and if so, staff could be reassigned and reallocated to other park needs, including VERP monitoring, visitor education and interpretation, and other activities.

Visitor use may increase over time as a result of proposed actions being implemented, particularly

during the shoulder seasons, which may require reallocation of staff time. However, these changes would be expected to be gradual and manageable, and as such would result in negligible to minor adverse effects on park operations. Proposed actions under Alternative B include improvements, management tools, and strategies help ensure effective management of increased visitation levels.

During the implementation of proposed actions, it is anticipated that a minimum of one full-time, permanent staff person with transportation knowledge and expertise would be needed to assist in implementing and directing the proposed actions under Alternative B. In addition, one half-time to full-time permanent staff person would be needed to assist with development of interpretive programs for the motorized sightseeing tours. This position could be temporary or permanent during the implementation phase, depending on how the motorized tour program is structured. Over the long term, reallocation of staff time as a result of reduced demands related to management of traffic and parking conditions may decrease or eliminate the need for these additional staff positions beyond the six-year implementation period.

Additional staff would be needed as interpretive tour guides if this service is provided by the park. (This could also become a service covered by the tour provider under the mid-range and higher cost tour operation scenarios.) If the park provides interpretive guides, a minimum of four additional staff during the tour pilot program and a total of seven additional staff with full implementation of the tour program would be needed, with some potential fluctuations seasonally. The provision of these interpretive tour guides by the park is optional; the motorized tour provider could be responsible for these services instead. If the park provides the guides, they would be needed over the long term unless this responsibility is transferred to the tour provider at some time in the future.

The staff positions during implementation would in part help to support the establishment of the motorized interpretive tour program. The transportation staff person specifically would



assist in directing proposed parking area and roadside pull off improvements in conjunction with existing park management staff, in addition to helping establish the tour program.

Implementation of the actions proposed under Alternative B would be contingent upon availability of capital funding. Estimated capital costs of implementing improvements are provided in Chapter 2.

Long- term beneficial effects to park operations would result overall from improvements proposed for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would improve, which would in turn reduce the need for park staffing to manage congestion and assist with visitor orientation in these areas. Reduced congestion on trails at key features also likely would result since parking capacities would be more easily maintained to a level acceptable in accordance with VERP standards. In the near term (the next six years), implementation of parking proposed actions would require capital funding. Project funding would be needed for improvements to existing parking areas, as well as construction and demolition associated with the Sand Dune Arch parking area.

Long- term beneficial effects to park operations would result from formalizing roadside pull off areas for permanent use since less staff time would be needed for management of roadside pull off activities. Removal of existing roadside pull offs in undesirable locations would lessen the demand on staff time for monitoring and patrolling of these areas. In the near term (the next six years), implementation of the roadside pull off improvements would require capital funding for formalizing 21 pull offs and retaining 5 pull offs, as well as for closure, protection, and environmental rehabilitation of over 170 social pull offs.

Long- term beneficial effects to park operations would result from implementation of traffic calming improvements in areas where there is excessive vehicular speeding near and at pedestrian activity areas. Improving traffic safety in the park would reduce demand on staff time devoted to responding to incidents and collisions.

In the near term (the next six years), implementation of traffic calming would require capital funding.

Implementation of ITS proposed actions would result in long- term beneficial effects to park operations due to improved levels of visitor orientation and reduced traffic congestion in key feature parking areas during peak periods, thus lessening demands on park staff time devoted to these efforts. Implementation of proposed ITS actions would require capital funding during the implementation phase.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would all be expected to reduce demands on park staff and operations related to transportation facilities and services over the long term. Reduced overall congestion at key feature and trailhead parking areas throughout the year would result, reducing the need for park operations to focus in these areas. Park staff time and resources would be able to be reassigned and reallocated to programs that enhance the visitor experience, such as additional guided tours and interpretive programs and VERP monitoring.

The provision of an additional picnicking facility in the existing Delicate Arch Viewpoint may require park management to adjust maintenance and operations plans and staffing accordingly. However, the addition of the picnicking facility would not be expected to create an appreciably higher demand for staffing, and as such, related adverse impacts would be negligible to minor. Implementation of an additional picnicking facility would require capital funding.

The strategy related to managing visitation at key features (such as Delicate Arch) through guided tours or other means at peak visitation periods would help to ensure that VERP goals are met. Such methods would require additional staff time devoted to more intensive management of visitation to features (like is done for Fiery Furnace). With the expected reduction in staff time devoted to roadside pull off monitoring, parking management, and other transportation



related activities, more staff time over the long term could be devoted to more intensive management of key features, when and if needed, depending on future visitation levels and conditions at popular features.

**Cumulative Impacts** Past, present, and reasonably foreseeable actions within and in the vicinity of Arches National Park with impacts on park operations under Alternative A also would apply to Alternative B. Over the long term, beneficial effects would result from these cumulative effects, and when combined with the proposed actions under Alternative B beneficial effects would intensify.

During the short term, additional staff and resources would be needed to support implementation of proposed improvements and programs, contributing to short- term, minor to moderate, and adverse cumulative impacts. These impacts would be mitigated by the provision of staffing and resources as prescribed in Chapter 2. Over the long- term, there would be beneficial cumulative effects on park operations overall, with less demand for staffing and resources devoted to managing transportation functions in the park.

**Conclusions** Under Alternative B, beneficial, long- term effects on park operations would occur, resulting from reduced overall demand for park staffing and resources focused on transportation and traffic management. Additional staffing and resources would be needed to mitigate short- term, minor to moderate, adverse effects during the implementation period. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by mitigation, as well as long- term beneficial impacts resulting from recent improvements at the park entrance and the proposed actions of Alternative B. The National Park Service does not analyze park operations for impairment.

## Socioeconomics

### Methodology

Potential impacts on socioeconomics are assessed qualitatively for each alternative. Socioeconomics information and analysis is based on a review of several documents, including the *Impacts of Visitor Spending on the Local Economy: Arches National Park* (2003), the *Superintendent's Annual Narrative Report* (2004), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for impacts on socioeconomics defined as follows:

*Negligible:* Effects to socioeconomic conditions would be below the level of detection with no discernable effect on the character of the social and economic environment.

*Minor:* The effects to socioeconomic conditions would be slightly detectable. Any effects would be small, and if mitigation is needed to offset potential adverse impacts, it would be simple and successful and not be expected to alter the character of the established social and economic environment.

*Moderate:* The effects to socioeconomic conditions would be readily apparent and any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it would be more extensive, but would likely be successful and would have an appreciable effect on the social and economic environment.

*Major:* The effects to socioeconomic conditions would be readily apparent and would cause substantial changes to the social and economic conditions of the region. Mitigation measures to offset potential adverse effects would be extensive, and their success would not be guaranteed and would likely have a noticeable effect on the social and economic environment.



The duration of impacts on socioeconomics is defined as follows:

*Short-term:* occurs only during the six-year construction/implementation period.

*Long-term:* occurs after the six-year construction/implementation period.

## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue consistent with the park's existing GMP. Socioeconomic opportunities associated with implementation of the motorized interpretive tour program would not be realized. No additional beneficial or adverse impacts would be expected as a result of implementation of Alternative A.

Under current conditions, Arches National Park is a major tourism destination and economic development generator for the region. Current visitor spending and revenue generation statistics, as well as projected trends would not be affected either adversely or positively by implementation of Alternative A since this alternative would do nothing to change current patterns or trends in visitation or spending.

Since no construction activities are proposed, this alternative would not affect the local economy or housing supply.

**Cumulative Impacts** No short-term or long-term adverse or beneficial impacts to regional socioeconomic conditions as a result of implementation of Alternative A, combined with other past, present, and reasonably foreseeable future actions would be expected. The potential for long-term beneficial effects related to strengthened economic vitality at the local and regional level in combination with other cumulative actions would exist with or without implementation of Alternative A.

Future development of land along US 191 between the park entrance and Moab is planned as part of the *North Corridor Gateway Plan*. The plan

proposes to develop a variety of interim uses on the Atlas mill and tailings site over the next 15- 20 years. In the long range, development of this area and other economic growth and development in the community overall, combined with ongoing park management and operations under Alternative A, could result in effects to local and regional socioeconomic conditions, but these effects can not be specifically defined and quantified at this time.

**Conclusions** No beneficial or adverse, short-term or long-term impacts to socioeconomic conditions would be expected under Alternative A and current trends in economic growth and development would be expected to continue. Overall, no beneficial or adverse, short-term or long-term cumulative impacts would be expected. The National Park Service does not analyze socioeconomic values for impairment.

### Alternative B – Preferred Alternative

**Impact Analysis** Long-term beneficial effects to socioeconomic conditions would be expected under Alternative B. The proposed actions under this alternative include park improvements, management tools, and strategies to ensure ongoing effective management if visitation increases. Construction of proposed parking area, pull off, and traffic calming improvements likely would result in short-term beneficial socioeconomic effects during construction related to construction labor opportunities and economic benefits resulting from the spending of construction contractors in the region.

The action proposed under Alternative B with the greatest potential for long-term, beneficial economic effect would be implementation of the motorized interpretive tour program. Motorized interpretive tours would expand interpretive and recreational (sightseeing) opportunities for visitors and would address an increasing demand for this type of service in the park. Implementation of the motorized interpretive tour program would create long-term beneficial effects to the regional economy. This program would expand visitor access opportunities to Arches National Park.



The tour program would bring the direct benefit of additional employment opportunities and business related revenue to the region. The tour program has the potential to indirectly benefit other businesses in the region as well (i.e. restaurants, lunch catering businesses, overnight facilities if visitors choose to extend their stays to include a tour in their trip, and other establishments.) Financial feasibility analysis has confirmed that the tour program could become a self- sustaining private enterprise with some initial support from the government to help establish operations. Proposed prices for tours would be within a range that is comparable to the costs for similar tours at other national parks in the region and around the country and marketable to general park visitors.

The specific level of anticipated beneficial economic effects is difficult to quantify at this time since operational details related to the tour program are still undetermined. However, it is important to note that the tour program would provide additional local business, employment, and income opportunities in a region where per capita income typically ranks below the Utah state and national averages and the rate of unemployment typically is significantly higher than state and national levels overall.

Since there currently are no tour services or programs in the region offering the specific type of general sightseeing experience proposed under Alternative B, no economic impacts to other types of tour businesses and enterprises would be expected. Other tour programs cater to adventure- seekers and customers seeking outdoor guided experiences that provide a higher range of services and in turn are offered at higher prices than proposed for the motorized interpretive tour program. Refer to Chapter 3 for more description related to existing tour services in the region.

Implementation of proposed ITS actions may increase visitor awareness about tourism and recreation opportunities associated with the park and region, and as such likely would have a long-term, beneficial effect on socioeconomic conditions, but these effects probably would not

be at a level that would affect local and regional economic conditions.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would not be expected to impact socioeconomic conditions to a discernable degree.

The strategy related to limiting visitation at key features (such as Delicate Arch) through permit systems, guided tours or other means at peak visitation periods would not be expected to affect socioeconomic conditions. A small amount of visitors potentially would be required to change their visitation plans while in the region, but any potential adverse effects would be negligible, and possibly would be offset by the beneficial effects resulting from visitors spending time in other areas and/or making arrangements for longer stays in the region. Visitation levels at the park overall likely would not change due to management at key features during peak visitation periods.

Regarding potential impacts to housing as a sub-element of the Socioeconomics topic, construction of pull offs, expanded and new parking areas, and other plan actions may result in a temporary influx of construction contractors and workers in the area. There may be short-term impacts on housing as workers would need to relocate to Moab if traveling from a remote location. However, these impacts would be negligible to minor and short- term to the local housing supply.

**Cumulative Impacts** Overall, implementation of Alternative B in combination with other past, present, and reasonably foreseeable future actions would not be expected to result in adverse impacts. Rather, long- term, beneficial impacts to regional socioeconomic conditions would be expected, and actions proposed under Alternative B would contribute appreciably to these effects.

**Conclusions** Implementation of Alternative B would be expected to create long- term beneficial effects on socioeconomic conditions in the region.



The proposed motorized interpretive tour would be an important contributor to the anticipated beneficial effect. Short-term beneficial socioeconomic effects likely would occur during the construction period of proposed improvements, while at the same time, there would be negligible to minor, short-term impacts to the local housing supply. Overall, long-term and short-term, beneficial cumulative impacts would occur. The National Park Service does not analyze socioeconomic values for impairment.

## Land Use

### Methodology

All available information on land use was compiled, including land use within Arches National Park, as well as surrounding land uses in Grand County and the City of Moab. The primary sources of information included the *Arches GMP* (1989), *BLM Grand Resource Area Management Plan* (USDI 1996), *VERP Implementation Plan* (USDI National Park Service 1995), *Moab/Grand County North Corridor Gateway Plan* (City of Moab and Grand County 2001), *Grand County General Plan Update* (Grand County 2003), *Grand County Land Use Code* (Grand County 1999), *City of Moab General Plan* (City of Moab 2001), and *City of Moab Zoning Code* (City of Moab 2004).

For purposes of this analysis, the thresholds of intensity for land use impacts are defined as follows:

*Negligible:* Relatively little change in land use would occur.

*Minor:* The proposed land use would be similar to existing uses and be in character with surrounding uses. It would not conflict with the designated use of the land as proposed under existing land use plans for the area.

*Moderate:* Land use changes would be within the allowable range of uses designated for the site by existing land use plans, but mitigation would be needed to avoid conflicts with other land uses.

*Major:* Development would change the type of land use and extensive mitigation would be necessary for the new land use to be compatible

with existing and surrounding development. May require modification to existing land use plans to accommodate use.

The duration of impacts on land use is defined as follows:

*Short-term:* occurs only during the six-year construction/implementation period.

*Long-term:* occurs after the six-year construction/implementation period.

## Environmental Consequences

### Alternative A – No Action

**Impact Analysis** Under Alternative A, the park would continue to manage existing transportation facilities in their current condition. Ongoing maintenance and operations activities and minimal improvements proposed in the park's GMP but not yet implemented would occur, on a case-by-case basis. There would be no changes to existing pull offs and parking areas other than continued road and parking area maintenance.

These ongoing activities, in combination with measures to mitigate impacts contained in the park's GMP, would result in no short-term, adverse impacts and no to negligible, long-term, adverse impacts on land use. Impacts are expected to be negligible or less because relatively little change is expected to occur to land uses in the park since most of the improvements proposed in the park's current GMP already have been implemented.

**Cumulative Impacts** Land uses in the park have been and would continue to be impacted by past, present, and reasonably foreseeable actions, including several projects completed under the current GMP (i.e. paving of the Delicate Arch road, constructing a new Visitor Center, park entry road improvements, etc.). These improvements have resulted in long-term conversion of parkland from undisturbed to developed uses. There are also several ongoing and planned projects in the park vicinity that would impact land use. For example, future development of land along US 191 between the



park entrance and Moab is guided by the *North Corridor Gateway Plan*.

Overall, actions described under Alternative A, combined with effects of other past, present, and reasonably foreseeable actions that would affect land use within the park and in the surrounding region, would result in negligible to minor, long-term, adverse cumulative impacts on land use. Alternative A would contribute to land use impacts in the park to a negligible level or not at all because very little change would occur.

**Conclusions** Under the No Action alternative, there would be either no or negligible, long-term, adverse impacts on land use in the park. Overall, long-term, cumulative impacts would be negligible to minor and adverse in the park and surrounding vicinity. There would be no impairment of park resources or values related to land use.

#### Alternative B – Preferred Alternative

**Impact Analysis** Alternative B would convert approximately 12,650 square feet of existing natural area to a developed parking area at the Sand Dune Arch Trailhead. The proposed development and reconfiguration of the parking area at this location would be similar to and in character with existing adjacent parking uses. The commitment of this land to a developed use is consistent with the GMP, and final design efforts would ensure that the parking area is configured in a way that minimizes impacts on the resources and values of Arches National Park. The 12,650 square feet of newly disturbed area would be offset by the proposed removal of 13,600 square feet of existing pavement and compacted social pull offs at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). These areas would be rehabilitated through protection, raking, contouring, and other measures and protected to encourage natural recovery. Long-term land use impacts would be adverse but minor as a result of Sand Dune Arch parking development and adverse but negligible at other parking areas proposed for improvements.

Alternative B proposes paving of 11,900 square feet of existing disturbed land to create 21 roadside pull offs for formal use, as well as retaining 5 existing pull offs in informal use. Land area disturbance would be offset by the proposed removal of 10,025 square feet of disturbed area at these locations and 191,664 square feet at more than 170 other existing social pull off areas in the park. These areas would be environmentally rehabilitated and protected to encourage their return to a more natural condition. The majority of land area to be paved at formalized pull offs has been previously disturbed due to existing social pull off activities. The commitment of this land to a developed use is consistent with the GMP. Final design of pull off improvements would minimize impacts on the resources and values of Arches National Park. Because formalized roadside pull offs would be similar to existing uses, the resulting long-term land use impacts would be adverse but minor.

Proposed traffic calming treatments, improvements to support motorized interpretive tours, and ITS components would not adversely affect land uses in the park because they would be installed in existing developed areas. However, these improvements would have a beneficial long-term effect on park land use by helping to manage traffic flow and by reducing congestion at the park's key visitor destinations thereby enhancing the visitor experience, and these actions reinforce the goals and objectives of the park's management plans.

Short-term, adverse impacts to land uses in the park during construction of proposed parking, pull off, traffic calming, and related improvements would be negligible to minor because construction activities would occur in previously disturbed areas along and within existing roadways.

Creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in short-term and long-term impacts to land use. The type and intensity of potential impacts would depend on the location of the facility in Moab, and whether the selected site is currently developed with other uses or undeveloped. Existing uses at



the selected site may need to be converted to accommodate a vehicle/bus storage area, maintenance facility, office, and fueling station. The level of impact intensity would depend on these and other variables. However, given the pattern of existing uses and zoning in Moab and its character as a developed, urbanized area, adverse long- term impacts would be expected to be negligible to minor assuming the proposed site design and development complies with existing City of Moab land use plans and zoning and building requirements and all other applicable local, state, and federal standards and requirements. Construction of new facilities in Moab would require a building permit. Short-term impacts during construction also would be expected to be negligible to minor.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor interpretation and recreation opportunities (such as temporary shade structures and picnic tables), ongoing VERP monitoring, and implementing various visitation and congestion management strategies. Improvements associated with these proposed actions would be installed in developed parking and trailhead areas and, therefore, would have negligible, long- term, adverse impacts on land use.

**Cumulative Impacts** Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park that would adversely impact land use under Alternative A would also apply to Alternative B. As with Alternative A, a number of past and present actions completed under the current GMP at Arches National Park have resulted in the long-term conversion of land in the park from undisturbed to developed uses. Long- term impacts resulting from these cumulative actions would range from negligible to minor.

Development authorized under the Moab General Plan and the North Corridor Gateway Plan would coincide with future planned and authorized improvements in Arches National Park. The US Department of Energy likely would proceed with its proposed clean up of surface contamination and implement a groundwater compliance strategy at the Atlas Mill and tailings site near the park entrance. These and other related projects would result in negligible to minor adverse land use impacts in areas outside park boundaries assuming development complies with existing land use plans and zoning requirements.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable actions affecting land use, would result in negligible to minor long- term, adverse cumulative land use impacts. Alternative B would contribute to land use impacts both within and outside the park. Alternative B's contribution to land use impacts inside the park would be negligible to minor. The intensity of this alternative's contribution to land use impacts outside park boundaries would depend on the function and use of the selected site in Moab for the new centralized operation and maintenance facility to support motorized interpretive tours, but would be expected to range from negligible to minor. Accordingly, overall, long- term cumulative impacts would be negligible to minor and adverse.

**Conclusions** Alternative B would result in long-term, negligible to minor adverse effects, as well as long- term beneficial effects on land use. Short-term adverse impacts to land use during construction would range from negligible to minor. Overall, long- term, cumulative impacts would be negligible to minor and adverse. There would be no impairment of park resources or values related to land use.





## Public Involvement

Public involvement has been an important and integral component of the transportation planning process for Arches National Park. Key stakeholders from the local community and the region, park visitors, and the public-at-large have been involved since the onset of the process and have provided input on potential actions to address transportation related needs in the park and the surrounding region.

The public involvement process included stakeholder and community workshops, general public meetings, distribution of project information sheets, website postings, visitor travel surveys conducted in the park, and development of a project update newsletter that was mailed to parties of interest and posted on the park's website. Additional details related to each of these various outreach activities and tools are described below.

## Project Information Sheets

The project information sheet has been an effective tool for keeping the public informed about the project. This informational two-page flyer was designed for public distribution and posting on the park's website. The project information sheet included a project description, schedule, meeting announcements, and contact information. Two updates were distributed during the course of the project. (Three editions of the project information sheets were created.)

## Website Postings and Project Email Address

The Arches National Park website has also been used to update the public on the project status. Project information sheets and meeting announcements were posted on the website, as well as meeting notes and other project-related information. A specific email address was set up for this project and comments were received via

email and documented as part of the project record.

Project website:  
<http://www.nps.gov/arch/pphtml/newsdetail15906.html>

Project email address: [arches.tp@otak.com](mailto:arches.tp@otak.com)

## Visitor Travel Surveys

During the spring and summer of 2003, comprehensive visitor travel surveys were conducted to gather data and information from the general public to help guide the planning process and learn about the general needs interests and concerns of park visitors related to transportation. The findings from these surveys are summarized in the Transportation Implementation Plan and Environmental Assessment and available as a separate document from Arches National Park. The planning team also conducted park employee and overnight camper surveys to gather specific information about their transportation needs, interests, and concerns.

## Public Workshops and Meetings

Public workshops and meetings have been very successful in providing a forum for gathering input, ideas, and comments on development of the transportation plan. Two public workshop series were held in February 2003 and November 2003. During each of these multi-day series, evening public meetings were held. Meetings were advertised in the *Moab Times* and on the park's website. An additional public meeting will be held in Moab in the summer of 2006 to present the alternatives analyzed in this Transportation Implementation Plan and Environmental Assessment, including the proposed actions of the preferred alternative.

## February 2003 Workshops and Public Meetings

During February 3-7, 2003, a week-long public involvement effort took place in Moab, Utah. Regional and local stakeholders were invited to attend small, interactive workshop sessions.



Stakeholders were grouped with “like interests” to facilitate non- confrontational and open discussions. A total of nine workshop sessions were conducted and included the following stakeholder groups:

- City of Moab
- Grand County
- Utah Department of Transportation
- Bureau of Land Management
- Recreational interests
- Economic development/chamber of commerce/tourism interests
- Tour/shuttle service interests

Each workshop session included a brief project presentation and informal discussion about transportation ideas for Arches National Park.

Two public meetings were held on February 6, 2003. One goal of the public meetings was to provide a venue for environmental scoping. Normally, a public scoping meeting is not required for an environmental assessment. However, at this earlier stage of the project it was not yet known if an environmental impact statement would be required, and the team felt it was important to gather as much public input as possible about elements of the environment to be considered during the planning process.

A press release announcing the public meeting and the anticipated environmental scoping discussion was advertised on January 23, 2003. The press release stated that the public was invited to attend either of the two identical public meetings, from 2:00 pm to 6:00 pm or 6:00 pm to 9:00 pm on February 6, 2003. The purpose of the meeting was to gather ideas and input on options and ideas being considered as part of the transportation plan development and to comment on elements that should be addressed by the scope of the environmental analysis.

A diversity of opinions and a wide range of comments were heard at the workshop sessions and public meetings. The public commented on a variety of topics related to transportation at

Arches National Park. The public commented on regional transportation, Arches National Park transportation, and the visitor experience at Arches National Park. Overall, the public was interested in making some changes at Arches National Park that would improve the visitor experience and to diversify the range of transportation options available to park visitors.

A majority of meeting participants was interested in a shuttle and/or tour program at Arches National Park. The public was also interested in providing more opportunities for hikers and bicyclists in the park. Most people also agreed that visitor experience is important, and minimizing crowding at key locations is essential in preserving visitor experience and protecting natural and cultural resources.

Some of the perspectives shared by meeting participants are highlighted below.

#### Comments Related to Transportation in Moab and the Region

- Two million people travel through the Moab area each year, most have their own car.
- Moab town representatives would like to see a shuttle system connect from town to the park.
- Tourism gets many calls for “car free” visitor information. Many want to know about the availability of bus tours to Arches National Park.
- A travel host program is in place; employees are trained to provide high quality service to tourists. This program should be expanded to area businesses, which are unofficial visitor centers for the town, park, BLM recreation lands, etc.
- Shuttle system should start in Moab.
- Need shuttle from I- 70 to Moab.
- The new UDOT multi- use path will enable bicyclists to access Arches; bicycling facilities at the park should be expanded.
- It’s a good idea for visitors to leave cars in town – a town- based shuttle would help to encourage the use of alternative modes of transportation.



**Comments Related to Transportation Options at Arches National Park**

- Need to assess the existing tour services in the Moab area.
- Bicyclist needs vary greatly. Bike lanes vs. bike paths - paths are preferred for families but more difficult to maintain, implement, fund, build, and acquire property for.
- There could be potential partnership opportunities with an internal shuttle route in the park and another route to and from Moab.
- Transportation planning should consider options for bicycles all the way through the park. The community will get behind bicycle solutions.
- How will a transportation plan affect existing commercial tours? Aim to create new opportunities.
- There is a great interest in linking non-motorized routes in Moab and vicinity; need additional funding to create the pedestrian/bicycle bridge over the Colorado River.
- One option would be an express bus from the Visitor Center to Delicate Arch.
- Driving through the park is one of the most important park experiences (maybe people do not want to get out of their car).
- Arches is not a bicycle- friendly park (currently) – roads are too narrow with steep inclines and RVs add congestion.
- Starting a shuttle in the park is a better option – a shuttle can make a loop through the park from the Visitor Center.
- Shuttle/tour companies know the best time to take visitors to the park. Shuttle service should be easy to implement in Moab – drivers/people are already here, licensed, and ready to go.
- Private partnerships could work for a shuttle program.

- Transit system will work for those who want to stay on the tour, as well as those who want to hike.
- Avoid diesel with shuttle and look at alternative fuels.
- Bicycles are a good alternative for transportation.
- Expect support for getting cars out of the park.
- There are times that a bicycle path would receive the most use. But it would not minimize traffic congestion in the park at peak visitation times.
- Many RV renters want to know if tours of the park are available.
- Need to move as many people through the park as possible while still providing them with a “world class” experience.

**Comments Related to Visitor Management at Arches National Park**

- Balanced Rock – large turn- over for vehicles. RVs take up too much space, which causes congestion.
- By 11:00 am, Delicate Arch parking is full, on peak days we have to station rangers to control traffic; their time should be spent on other efforts.
- Plan should look at ways to deal with “peak, peak” visitation flows.
- Delicate Arch trails are reaching VERP capacity. Nothing is being done about it though.
- Devils Garden parking lot fills up by 11:00 a.m. during peak, peak times. By noon, many people circle around the parking areas in search of a parking spot.
- Overcrowding at key features is a big problem.
- Places with crowds during peak times include Sand Dune Trailhead, Skyline Trailhead, Klondike Bluffs, and the junction of Windows and the main park road.



- It is important to preserve the visitor experience; crowding affects the ability to do this.
- Need to look at long- term priorities for the park.
- Why not treat the five key sites in the park with reserved parking? A set number of tickets could be issued per day then require overflow visitors to take a shuttle.
- Shuttle could be designed so as not to put key features over capacity with number of visitors (limit vehicle capacity and frequency of drop offs).
- Would like to see park consider a north entrance through Salt Valley. It would be closer to I- 70; could disperse people at both ends of the park.
- Is there a way to disperse visitation within the park to other arches in the park? If Landscape Arch was a one- way loop – there would be fewer people on the trail and a better experience.
- Mountain bike trails are not as critical as a family- friendly path.
- Sand Dune and Broken Arch are great locations but they have less parking – could disperse use to these areas.
- Timing of visitation is directly related to tourists' schedules and plans. Plans to disperse visitors over an entire day may not meet visitors' interests and desires.
- Focus of planning should be how to deal with increased visitation/dispersal to trails and prime visitor use areas.

### November 2003 Public Meeting

A public meeting was also held on November 6, 2003. The purpose the meeting was to give the public an opportunity to view the visitor survey results and the existing conditions analysis. The public also provided input on possible transportation options and strategies for the park. The public meeting was held at the Castle Rock Inn in Moab 6:30 p.m. - 8:30 p.m. on Thursday

November 6, 2003. A wide range of comments were heard at the public meeting.

In discussion of potential tour services at Arches National Park, participants were supportive of the idea of tours for the general public. Tour operators in attendance wanted to be sure that new tour programs would not be competitive with existing tours operated through incidental business permits. Existing tour operators also expressed concerns about the high fees they are required to pay to take groups into the park.

Some participants were concerned that implementing additional reservations and ticketing at the park could get too complicated. Others were supportive of the idea if needed to protect resources and avoid overcrowding.

There was a strong interest in enhancing bicycling opportunities in the park if feasible. Public meeting participants expressed interest in widening shoulders and providing more opportunities for bicyclists, such as separate bike paths or multi- use paths. Although in response to the idea of providing bicycling shoulders, some participants were not supportive of widening park roads and concerned that widening might change the scenic character of the part and affect resources.

Meeting participants were supportive of options that would improve some of the existing social pull off areas (paving and formalizing them) but remove all others over time. Participants were concerned about the affects these social pull off have on park resources and scenic qualities.

A few perspectives from meeting participants are highlighted below.

- I have concerns about a reservation system. People come to Arches at a specific time. What will people do when they come here and find out that the park is already booked? This might not work for Arches.
- If you make the transportation system too complicated, you may discourage people from coming to the park at all. If you have an elaborate management scheme, you are going to have to evaluate the visitor experience. May end



up creating a “Disneyland” experience instead of a natural, spontaneous experience – that’s what people like about parks. People would rather have a spontaneous experience instead of picking a time to go to sites.

- I like bicycle lanes. I would bicycle in the park but I am nervous about the road and the cars. The park could use more hiking trails, like loops. That would also help disperse people throughout the park.
- I think a bike path or route without cars is a good idea too. A lot of people do not want to take a shuttle or make reservations. You (park team) need to maintain flexibility with a shuttle plan. Tour operators would need to call the park to make reservations. Most people like the driving/ sightseeing tour aspect of their visit – they would be satisfied with a motorized sightseeing tour of the park (as passengers in buses).
- It would help if Arches provided a guided tour.
- I would not want the roads widened. I would rather have traffic calming and a separated path for bikes.
- Formalizing some pull outs is a good idea. Some could be formalized, but others should be eliminated.
- Shuttles to specific sites should be free or nominally priced.

### Newsletter

In October 2004, a project newsletter was distributed at the park, to community and regional partners, and also displayed on the park website. The newsletter included a project update, preliminary review of the alternatives to be analyzed in the Transportation Implementation Plan and Environmental Assessment, and the project schedule. The newsletter included the descriptions of the two alternatives in the plan: Alternative A, No Action, and Alternative B, the Proposed Transportation Implementation Plan (also the preferred alternative). Alternative B was labeled “Implementation of Improvements to Enhance Visitor Access and Visitor Experience”

in the newsletter. The newsletter also included a list of longer term options considered during the planning process.

Copies of all public involvement materials and newsletters have been retained in the project record.

## Agency and Tribal Meetings and Consultation

The National Park Service has consulted with American Indian tribes as well as federal, state, and local agencies during the course of this project.

### American Indian Tribes

The National Park Service distributed letters dated January 17, 2003 to American Indian tribes of the region. The letters provided information about the anticipated scope of the transportation plan and contact information. Letters were mailed to the following tribal representatives:

- Hopi Tribe, Kykotsmovi, AZ 86039
- Paiute Tribe of Utah (Letter returned)
- All Indian Pueblo Council (2 letters sent, both returned)
- Southern Ute Indian Tribe
- White Mesa Ute
- Ute Mountain Ute Tribe
- Ute Indian Tribe, Ft. Duchesne, UT 84026
- Navajo Area Office, Gallup, NM
- Zuni Cultural Resources Advisory Team (ZCRAT)
- Petuuche Gilber, Acomita, NM 87034
- Governor’s Office, Isleta, NM 87022
- Governor’s Office, Laguna, NM 87026
- Santa Ana Pueblo, Bernalillo, NM 87004
- Governor’s Office, Santo Domingo, NM 87052
- Governor’s Office. Cochiti, NM 87072



- Governor's Office, Jemez, NM 87024
- Sandia Pueblo, Bernalillo, NM 87004
- Governor's Office, San Felipe, NM 87001
- Governor's Office, Zia Pueblo, NM 87053
- Governor's Office, Nambe Pueblo, Santa Fe, NM 87501
- Governor's Office, Pojoque Pueblo, Santa Fe, NM 87501
- Governor's Office, San Juan Pueblo, San Juan, NM 87566
- Governor's Office, Tesuque Pueblo, Santa Fe, NM 87501
- Governor's Office, Picuris Pueblo, Penasco, NM 87553
- Governor's Office, San Ildefonso Pueblo, Santa Fe, NM 87501
- Governor's Office, Santa Clara, Espanola, NM 87532
- Governor's Office, Taos Pueblo, Taos, NM 87571
- Eight Northern Indian Pueblo, Inc., San Juan, NM 87566
- Five Sandoval Indian Pueblo, Inc., Bernalillo, NM 87004

Letters have been sent to tribal representatives notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment.

### National Park Service

Various resource specialists within the Intermountain Region of the National Park Service and at Arches National Park were consulted in the preparation of the Transportation Implementation Plan and Environmental Assessment. Documentation of these communications has been filed in the project records.

### Bureau of Land Management

The Bureau of Land Management (BLM) manages millions of acres in the vicinity of Arches National

Park, and the agency has been involved as a major stakeholder throughout the transportation planning process. The BLM's Grand Resource Area encompasses all the land adjacent to Arches National Park. BLM representatives participated in multiple workshops at key stages in the planning process and provided information and data related to existing conditions in the region, recreation opportunities, visitor use patterns, and user surveys associated with BLM recreational lands.

BLM representatives assisted with identification of existing issues and considerations related to transportation in the region, desired conditions for transportation at Arches National Park and the surrounding area, and development of strategies and options achieving these desired conditions during workshop sessions.

A letter has been sent to the BLM notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment.

### Other Federal Agencies

Letters have been sent to other federal agencies notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment, including the US Fish and Wildlife Service, NOAA Fisheries, and the US Army Corps of Engineers.

Resource specialists at the US Fish and Wildlife Services were consulted with in preparation of the Transportation Implementation Plan and Environmental Assessment. Documentation of these communications has been filed in the project records.

### State Historic Preservation Officer

The Arches National Park archaeologist completed a Section 106 assessment for the proposed Transportation Implementation Plan on March 15, 2005. The field survey of each of the proposed pull off locations and parking areas did not identify any cultural resources within the project area of potential effect (APE).



The 1995 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers states that "*repaving of existing roads or existing parking areas within previously disturbed areas may be reviewed internally by the National Park Service for Section 106 purposes, without further review by the Advisory Council or the State Historic Preservation Offices.*" Arches National Park has determined that based upon the results of their field survey there would be no effect to cultural resources under the alternatives for activities undertaken within the park.

A copy of the Arches National Park Transportation Implementation Plan and Environmental Assessment has been sent to the State Historic Preservation Officer.

### Utah Department of Transportation

The Utah Department of Transportation (UDOT) was a major stakeholder throughout the planning process. The project team met with state, regional, and local UDOT representatives during both workshop sessions in February and November 2003. UDOT also provided extensive information during the preparation of this plan, including information about their Intelligent Transportation Systems program and its relationship to other national parks, as well as information related to existing and future planned work near Arches National Park that could influence or have a relationship to transportation solutions being developed for the park.

### Coordination with Local Governments

The City of Moab and Grand County have been key stakeholders throughout the planning process. These local agencies participated in the February 2003 and November 2003 workshop sessions. Both agencies also contributed to information in the development of this plan including lists of current and future transportation projects near and around Arches National Park.

Close coordination with local, regional, state, and federal partners would continue to be a priority under both alternatives in the Transportation Implementation Plan and Environmental Assessment.





**National Park Service, Arches National Park**

Name	Position/Organization
Laura Joss	Superintendent
Karen McKinlay- Jones	Park Ranger
Diane Allen	Chief of Interpretation
Shawn Bryant	Former Facility Manager
Natalie Hettman	Supervisory VUA
Gary Salamacha	Park Ranger
Rock Smith	Former Superintendent
Jim Webster	Former Chief Ranger

**National Park Service, Southeast Utah Group**

Name	Position/Organization
Tony Schetzle	Superintendent
Jerry Banta	Former Superintendent
Phil Brueck	Former Deputy Superintendent
Dave Wood	Resource Management Planner
Wayne Nielsen	Canyonlands National Park Facility Manager

**National Park Service, Denver Service Center**

Name	Position/Organization
Mark Tabor	Project Manager
Patricia Sacks	Project Specialist, A/E Management
Steve Stone	Natural Resource Specialist
Patrick Walsh	Cultural Resource Specialist
David Kreger	Supervisory Compliance Technical Specialist

**National Park Service Transportation Planning Specialists and Peer Reviewers**

Name	Position/Organization	Contribution
Patricia Trap	Superintendent Salem Maritime & Saugus Ironworks	Peer Reviewer
Jonathan Upchurch	National Park Transportation Scholar Mesa Verde National Park	Contributing Author Intelligent Transportation Systems



## Consultant Preparers

Name	Position/Organization	Contribution
Mandi Roberts	Otak Team Project Manager, Principal, Otak, Inc.	Principal Author Transportation Implementation Plan
Jodie Vice	Planner Otak, Inc.	Contributing Author Transportation Implementation Plan
Dick Yano	Transportation Engineer Otak, Inc.	Contributing Author Roadside Pull Off Analysis
Lucas Cruse	Transportation Planner Otak, Inc.	Contributing Author Motorized Interpretive Tours
Richard Butler	Senior Environmental Planner AMEC Earth & Environmental	EA Project Manager NEPA Technical Review EA Principal Author Soils and Biological Soil Crusts
Terry Witherspoon	Environmental Planner AMEC Earth & Environmental	EA Principal Author Geological Resources and Hazards Water Quality Wildlife and Vegetation Cultural Resources Visual Resources Energy and Resource Conservation Air Quality Noise and Natural Soundscapes Land Use and Zoning
Lara Rooke	Cultural Resource Specialist AMEC Earth & Environmental	Contributing Author Cultural Resources
Gray Rand	Senior Biologist AMEC Earth & Environmental	Contributing Author Wildlife and Vegetation
Anthony Katsaros	Environmental Planner AMEC Earth & Environmental	Contributing Author Geological Resources and Hazards Soils and Biological Soil Crusts Air Quality Cumulative Effects
Susan Howard	Transportation Planner LTK Engineering Services	Contributing Author Intelligent Transportation Systems
Troy Russ	Transportation Planner Glatting Jackson	Visitor Survey, Parking and Shuttle Analysis
Roger Millar	Transportation Planner	Alternatives Development



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In addition to the sources listed above, research related to existing tour programs provided throughout the National Park Service was conducted. A number of resources were referenced, including numerous websites and brochures.

