National Park Service
U.S. Department of Interior
Arches National Park
Moab, Utah

Finding of No Significant Impact

Delicate Arch/Wolfe Ranch Site Plan

Background

Arches National Park (Arches) proposes to implement congestion-management strategies to more efficiently manage visitor use in the Delicate Arch/ Wolfe Ranch parking area. Strategies proposed are to expand the existing parking lot at the Delicate Arch/Wolfe Ranch trailhead, eliminate roadside parking, implement a reservation system for parking at the Delicate Arch/Wolfe Ranch parking lot, and re-channelize Winter Camp Wash to reduce the frequency of road closures due to flooding and sediment deposition.

The project area is the parking area for one of the most popular sites in Arches. The project area is the trailhead for Delicate Arch, a 65-foot (20 m) tall freestanding natural arch. It is the most widely-recognized landmark in Arches National Park and the state of Utah and as such is depicted on the Utah state license plates. The Olympic torch relay for the 2002 Winter Olympics passed through the arch as well. Visitors come from all over the world to see Delicate Arch which is touted as a "must see" and on many visitor's bucket list. The splendor of the arch can't be seen from the roadway and is only a moderate three mile round trip hike. There is also a Delicate Arch viewpoint area below the arch that can be viewed by visitors who are short on time or are restricted in their hiking abilities.

Historic Wolfe Ranch is also located near the project site off of the trail to Delicate Arch. Wolfe Ranch was settled in 1888 by Civil War Veteran John Wolfe and his son. The Wolfe's built a one-room cabin, a corral and a small dam across Salt Wash. This site was added to the National Register of Historic Places in 1975. An additional cultural resource, a Ute Indian rock art panel depicting bighorn sheep, horses and dogs on boulders, can be found near the trail to Delicate Arch as well.

Daily visitation to the site during the peak seasons is approximately 2,000 people per day and the parking lot is one of the smallest of the popular park sites. Current parking capacity of 73 parking spaces is not sufficient for today's visitation. Parking capacity was initially designed and limited through Visitor Experience and Resource Protection (VERP) analysis in the early 2000's. However demand for parking has exceeded available parking capacity ever since. According to park occupancy and duration data collected in 2010 and staff observations, the parking lot fills to capacity for most of the day starting at 9:30 a.m. and it has become the new norm to see more than 100 vehicles parked along the road shoulders.

Selected Action

The selected action will protect park resources, improve traffic safety, facilitate maintenance, and provide a better visitor experience. The objectives of the project are to:

1. Protect the park's natural and cultural resources from potential impacts attributable to vehicles and visitor use;

2. Improve visitor experience in the project area;
3. Improve parking and visitor safety;
4. Improve functioning of the Winter Camp Wash floodplain system;
5. Identify management options to continue to positively manage visitation in this high use area.

The National Park Service (NPS) will implement the preferred alternative which proposes to expand the existing parking area to a size that will only accommodate current roadside parking overflow. The parking lot will be expanded by an additional 67 standard vehicle spaces and 15 oversized spaces (i.e. RV's, SUV's, truck's) for a total of 155 parking spaces at the trailhead (127- standard, 26- oversized, 2- accessible). The design of the expansion will fit the current design of the existing parking area and will be located on the northern end (Figures 1 and 2). A total area of ground disturbance for this expansion will be 37,200 square feet or 0.85 acres. The area proposed for the expansion will require fill dirt to be brought in to bring the site to grade with the existing lot.

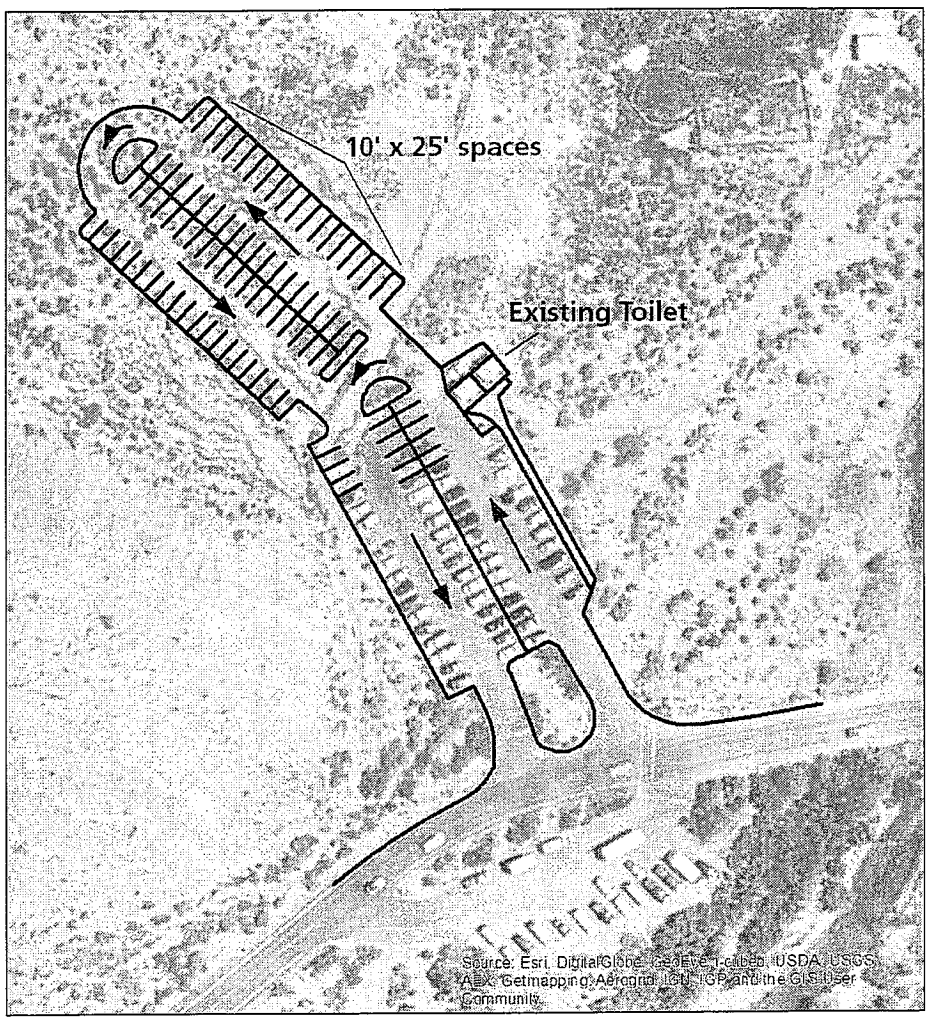

Figure 1: Conceptual drawing of proposed expansion

Two-rail fence will be constructed on the eastern side of the expanded parking area to prevent visitors from short cutting to the trail from their vehicles.

A new cut-off trench will be constructed to channel run-off water from the new expanded parking area and existing topography. Total ground disturbance for the new cut off trench will be 4,723 square feet (0.1 acres).

The preferred alternative proposes no roadside parking. Hard barriers, such as large boulders and/or two rail fencing, will be installed along both sides of the road where the natural topography does not naturally prevent roadside parking. Strict enforcement with posted signs, ticketing and potential booting of vehicles will also occur.

The oversize parking area to the south of the trailhead or the Delicate Arch Viewpoint parking area will not be expanded. Delicate Arch Viewpoint parking area will be used as

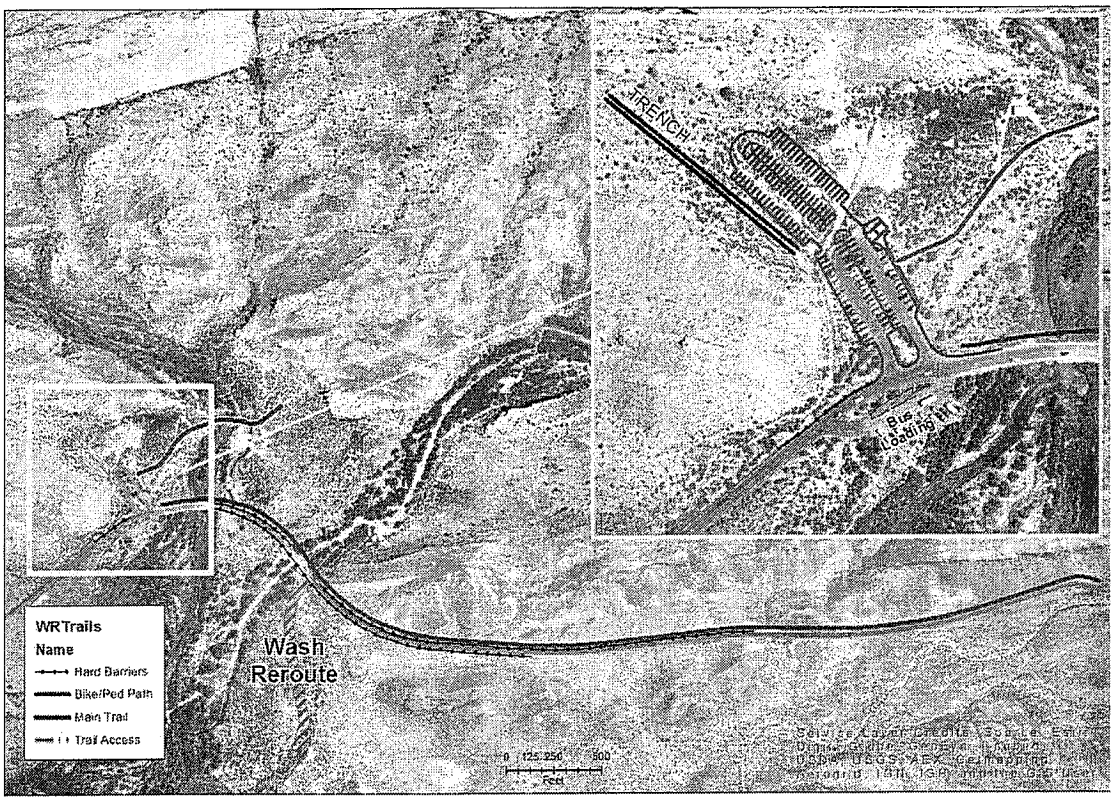

Figure 2: Preferred Alternative

parking for oversized vehicles and as overflow parking when capacity has been reached at the Delicate Arch/Wolfe Ranch parking area. Delicate Arch Viewpoint parking area has 73 parking spaces (53 standard, 17 oversized and 3 accessible).

Visitation

The average duration at the Wolfe Ranch/Delicate Arch parking area is approximately 2.5 hours with a turnover rate of 4.8 times. Using the 2.7 multiplier for visitor per vehicle, under the preferred alternative, this new parking lot of 155 parking spaces will accommodate 749 vehicles and approximately 1,987 visitors a day. Due to the restriction on roadside parking, there will be no vehicles parked along the roadway.

Adaptive Management

The park will use adaptive management strategies to manage and operate Delicate Arch/Wolfe Ranch site under the preferred alternative. Adaptive management is the process by which the park will closely monitor or test the effectiveness of initial improvements before any additional actions are taken. The park will evaluate the effectiveness of strategies toward meeting plan goals, adapt strategies as needed, and modify the timing or intensity of improvements as information and feedback is gathered and patterns are tracked. Adaptive management promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. The following table (Table 1) is provided to demonstrate indicators and standards to which management actions may be implemented to assess effectiveness of improvements.

Table 1: Indicators and Standards for Adaptive Management

Indicator Topic	Indicator	Standard	Management Strategies
Parking and traffic congestion	# of incidents of illegal parking (when parking lots are full)	No more than 5 incidents of illegal parking during peak days	• Education and signage to direct visitors elsewhere. • Enforce parking stall capacity and size • Communicate with large tour bus operators about taking turns (different days, or different locations) • Have parking attendants at congested areas to direct parking during peak times • Limit the number of commercial tour buses that are allowed to park in the area. • Vehicle size restrictions • Restrict parking access through a reservation system
	# of incidents of vehicles parking in spaces too small or too large (appropriate size) for the vehicle type	No more than 5 incidents of inappropriate size vehicle parking during peak days.	
Closure of road due to flooding	# of times Winter Camp Wash is flooded	No more than 5 times per year	• Improve the frequency of the maintenance of the wash • Conduct an intensive sediment transport study of washes along Delicate Arch road. • Reevaluate the idea of constructing a bridge over the wash

Reservation System

The park recognizes the fact that parking lots cannot be expanded indefinitely to accommodate increasing visitation and still adhere to NPS policies and federal requirements to protect park resources. At some point in the future, if and when other strategies included in each alternative fail to keep pace with increasing visitation, it may become necessary to explore other means of accommodating and managing visitor demand. Therefore, in the future, the park will explore a reservation or time-based entry system to the Delicate Arch/Wolfe Ranch site or to the park overall to manage visitor demand.

It is important to note that any implementation of a reservation system will only occur as a future effort separate from the EA. At that time, the NPS staff will engage with partners, agencies, and the public to determine the best way to design and implement that kind of visitor use management system. Any visitor use management system or technique will be based on a reservation system study.

While details of a possible reservation system will be determined in the future, as appropriate, the following explanation provides some ideas for how the park and public may choose to design the system. For example, a reservation system may only apply to visitors in a private vehicle who may be allowed to enter the park or certain areas of the park during a designated time of day and/or limited only during period of peak visitation. A reservation could be in effect throughout the year or only during peak periods, and reservations could be allocated on a per day, per hour or other basis. Another option will be to make all reservation slots available in advance or to make a portion of the slots available in advance and the remainder available the same day. Specific techniques will be developed through a public process as discussed above.

Bus Load/Unload Area

A bus load/unload area will be created at the southern lot of the Wolfe Ranch/Delicate Arch parking area. This will require removing six standard parallel parking spaces. This area will be then signed as "Bus Loading and Unloading Only". Shade structures will also be constructed. Buses will not be able to park in this parking area but will be required to drop off visitors in the south lot and then proceed to the Delicate Arch Viewpoint parking area to park.

Bike/Pedestrian Path

A 1.1 mile six foot wide bike/pedestrian sidewalk will be constructed in a sustainable trail design to allow safe pedestrian passage for visitors to bike or walk from the Delicate Arch Viewpoint parking area to the main trailhead and to encourage the use of the viewpoint parking area. The sidewalk will be predominately separated from the road by delineated posts or concrete curbing.

Winter Camp Wash

The plan proposes to reconstruct Winter Camp Wash in an effort to recreate a natural channel shape by removing vegetation from within the wash and reshaping the channel to a new alignment (Figure 3). This will assist in creating an open passage for the flood waters which could increase the velocity of water flowing over the road and reduce sediment collection on the road and the need for continued road maintenance. Therefore, 0.3 acres of tamarisk within the channel will be removed using chainsaws and heavy equipment north of the road so the flood waters will flow unimpeded in the wash just above the road.

A bulldozer and backhoe will be used above and below the road within the wash to create a wide stream channel with the sediment distributed out from along the streambed sides. A Section 404 permit will be required for any channel in-stream work.

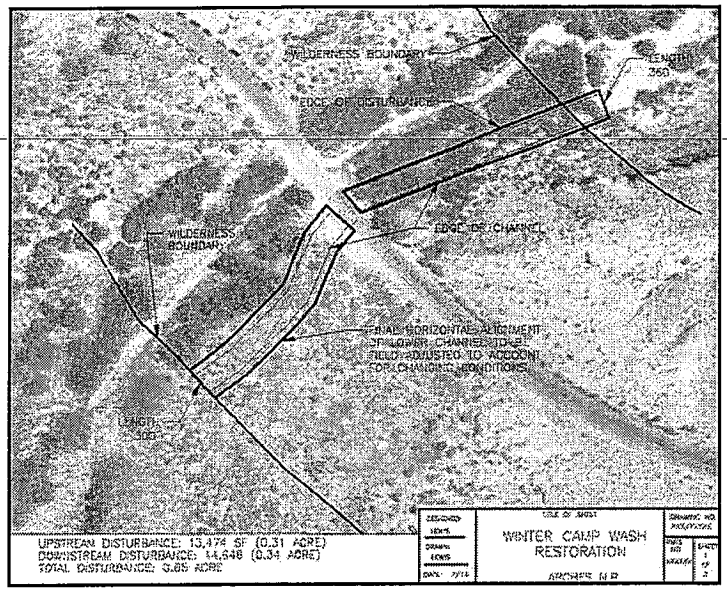

Figure 3: Winter Camp wash proposed restoration

Best Management Practices

The following best management practices were developed to minimize the degree and/or severity of adverse effects and will be implemented during construction of the action alternative, as needed:

General:

- The National Park Service will ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors will also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.
- Construction workers and supervisors will be informed about the special sensitivity of park's values, regulations, and appropriate housekeeping.

Soil/Vegetation:

- To minimize the amount of ground disturbance, staging and stockpiling areas will be in previously disturbed sites, within the construction zone (area to be disturbed) and away from visitor use areas to the extent possible. All staging and stockpiling areas will be returned to pre-construction conditions following construction.
- Disturbance to existing native vegetation shall primarily be contained in previously disturbed areas or within narrow construction limits. Whenever practicable, soils and plants affected by construction shall be salvaged for reuse in site restoration.
- Revegetation and recontouring of disturbed areas will take place following construction and will be designed to minimize the visual intrusion of the parking lot and paved bike/pedestrian path. Revegetation efforts will strive to reconstruct the natural spacing, abundance, and diversity of native plant species using native

species. All disturbed areas will be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed. Weed control methods will be implemented to minimize the introduction of noxious weeds.

- Sources of fill will be inspected for weed species and approved by NPS vegetation staff prior to transport to site, and all equipment will be cleaned and free of residual soil prior to construction. Similarly, all equipment must be carefully monitored and cleaned to prevent moving on-site weed seed to other areas post construction.
- Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as silt fences and/or sand bags will be used to minimize any potential soil erosion.
- Fugitive dust generated by construction will be controlled by spraying water on the construction site, if necessary.

Water Resources:

- To minimize possible petrochemical leaks from construction equipment, the project leader will regularly monitor and check construction equipment to identify and repair any leaks.

Special Status Species:

- Contract provisions will require the cessation of construction activities if a species were discovered in the project area, until park staff re-evaluates the project. This will allow modification of the contract for any protection measures determined necessary to protect the discovery.

Cultural Resources:

- Although there is no surface evidence of archeological resources, clearance to proceed is recommended with the condition that if concealed archeological resources are encountered during project activities, all necessary steps will be taken to protect them and the Park Cultural Resources Manager will be notified immediately.
- Should construction unearth previously undiscovered cultural resources, work will be stopped in the area of any discovery and the park will consult with the State Historic Preservation Officer and the Advisory Council on Historic Preservation, as necessary, according to §36 CFR 800.13, *Post Review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) will be followed.

Visitor Use and Experience:

- Visitors shall be informed of construction activities by posting information at the visitor center, trailhead, or park website. The project leader shall work with the Public Information Office (PIO) to determine the best methods of informing the public.
- Provide the Public Information Officer with the project schedule as soon as it is known and provide periodic updates of project work.

- To protect park resources and alleviate vehicle congestion, visitor access to the park may be restricted during the construction of the parking lot.
- Half of the current parking lot may be closed during construction for the week (Monday-Thursday).
- To reduce noise and emissions, construction equipment will not be permitted to idle for long periods of time.

Safety:

- Construction zones will be identified and fenced with construction tape, snow fencing, or cones prior to any construction activity. The fencing/cones will define the construction zone and confine activity to the minimum area required for construction. All protection measures will be clearly stated in the construction specifications and workers will be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Alternatives Considered

Three alternatives were evaluated in the EA: a no action alternative (Alternative 1) and two action alternatives (Alternative 2 and 3). Alternative 1 described the current management and the day to day condition of a frequently congested parking area. Under this alternative, congestion management site strategies will not occur. The parking lot will remain at a 73 car capacity and will not be expanded. One action alternative (Alternative 2- No expansion) addresses the implementation of a reservation system in lieu of expanding the parking area and Alternative 3 (Preferred Alternative) outlines both expanding the parking area and implementing a reservation system to the site. Elimination of roadside parking, construction of a bike/pedestrian path along the road between Delicate Arch Viewpoint and the Delicate Arch/Wolfe Ranch parking lots, and re-channeling Winter Camp Wash were included in both Alternative 2 and 3.

Environmentally Preferable Alternative

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative."

Alternative 2 (No Expansion) will cause the least damage to the natural and cultural, biological and physical environment and will protect, preserves, and enhances historical, cultural, and natural resources of the site, therefore it is considered an environmentally preferable alternative. With only the construction of a paved path and installation of hard barriers along the disturbed road shoulders to prevent roadside parking, ongoing impacts to soil and vegetation resources will be reduced. Rechanneling Winter Camp wash will also enhance the natural hydrologic process of the floodplain within the site and help alleviate the frequent flooding of the road.

Alternative 3, (Expansion), is also an environmentally preferable alternative. The Expansion Alternative will provide the most efficient means of managing the high level of visitor use

and protecting the elements of the biological and physical environment of the site. Given the relatively small footprint of the proposed expanded parking area and the nature of the soils and vegetation found there, adverse effects to natural resources will be minor. The expansion of the current parking area will accommodate the average number of vehicles parked along the roadsides and installation of hard barriers along the disturbed road shoulders will prevent roadside parking and reduce ongoing impacts to soil and vegetation resources. Expansion of the parking lot, construction of the bike/pedestrian path and installation of hard barriers has an overall beneficial effect on the natural environment because these actions will reduce impacts to soils and vegetation by trampling and parking in undesignated areas and along the roadside. Rechanneling Winter Camp wash will also enhance the natural hydrologic process of the floodplain within the site and help alleviate the frequent flooding of the road.

Why the Selected Action Will Not Have a Significant Effect on the Human Environment

As defined in 40 CFR §1508.27, significance is determined by examining the following criteria:

Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Implementation of the preferred alternative will result in some adverse impacts; however, the overall benefit of the project outweighs the adverse effects. Overall, visitor enjoyment and safety will benefit from the expansion of the parking area as it will improve visitor experience by providing designated parking areas which are safer and easier for visitors to use. The visitor experience will be adversely impacted by construction activities required to construct the larger parking lot and the bike/pedestrian path along the Delicate Arch road but these actions will only be short-term. Park operations will also improve and have beneficial impacts as a result of the selected action. The need to ticket and monitor illegal parking will be greatly reduced. With the rechannelization of Winter Camp wash, flooding and closures of the road will be reduced further improving a visitors experience at the site.

Overall the selected action has a beneficial effect on vegetation in that it reduces vegetation trampling by eliminating social trails and parking in undesignated areas and along the roadside. It also improves Winter Camp Wash channel by removing nonnative plant species that are inhibiting the water flow of the channel to create a more natural hydrologic flow regime.

The proposed expansion of the parking lot and construction of the sidewalk / bike path will result in localized but long-term (effectively permanent) adverse impacts to soil resources due to covering and paving approximately 1.65 acres of the soil surface. Installation of barriers to prevent roadside parking will reduce adverse soil impacts along a 0.5-mi segment of the road corridor. Resource protection measures as listing in the best management section will reduce adverse effects.

The degree to which the selected action affects public health or safety

Under the selected action, construction of parking improvements will improve visitor safety by providing designated parking areas which are safer and easier for visitors to use than parking along the shoulders and walking along the busy road. Bus and overflow parking will be provided by the use of the Delicate Arch Viewpoint parking lot and the newly constructed path will allow visitors a safe place to walk or ride their bike to the main trailhead.

Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas

The preferred alternative will not impact unique characteristics of the area including park lands, prime farmlands, or wild and scenic rivers, because these resources do not exist in the project area. The project area is within a 100 year floodplain and does include a persistent, ponded wetland where the Delicate Arch road crosses Salt Wash at Wolfe Ranch. However, the project will not impact the wetland because there are no proposed actions near the wetland. Archeological resources do exist near the project area but the preferred alternative actions will have a *No Adverse Effect* because the site will not be directly impacted by the proposed actions.

Since the project area is within a floodplain a Statement of Findings for Floodplains was prepared and is appended. The selected action is designed to mitigate the conditions at the Winter Camp Wash road crossing by removing approximately 0.3 acres of vegetation (primarily exotic *Tamarix* with a limited amount of native woody and herbaceous vegetation) and the channel of the wash will be excavated and straightened to facilitate greater conveyance of water and sediment across the road. The channel also will be excavated and reconfigured downstream of the road crossing to direct flow away from the current aggraded channel and towards a former channel with a lower surface elevation. Due to the continued presence of the road and the dynamic characteristics of the wash system, impacts of these actions likely will be short term and adverse. Construction of the sidewalk / bike path across the Winter Camp Wash and Salt Wash floodplains will have negligible impacts to floodplain characteristics.

The degree to which the effects on the quality of the human environment are likely to be highly controversial

Arches began public scoping with a notice released on March 7, 2014 describing the proposed alternatives and soliciting comments or concerns with the proposal to conduct congestion management strategies at Delicate Arch/Wolfe Ranch trailhead. Based on the input received during public scoping, there was no evidence that the effects were highly controversial. The public also was given an opportunity to comment on the completed EA. At the conclusion of the 30 day public review and comment period, which ended on September 25, 2014, the park had received 27 letters from the public and one response from a Native American Tribe. Given the substance of the comments, there is no evidence that the effect to the quality of the human environment is highly controversial.

The degree to which the possible effects on the quality on the human environment are highly uncertain or involve unique or unknown risks

The expansion of the parking lot, installation of hard barriers, the construction of a pedestrian/bike path and rechannelization of Winter Camp Wash will meet project objectives and will address public safety, provide for visitor enjoyment, and protect park natural and cultural resources. The anticipated effects on the human environment, as analyzed in the EA, are not highly uncertain or unique, nor were any unknown risks identified.

The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration

Proposed actions will not result in significant adverse effects to the natural environment, cultural resources, or visitor experience because the project was designed to minimize and

improve resource and visitor impacts and resource protection measures were incorporated into the project to further reduce identified adverse effects. The parking lot cannot be expanded indefinitely to accommodate increasing visitation and still adhere to NPS policies and federal requirements to protect park resources. At some point in the future, if and when other strategies included fail to keep pace with increasing visitation, it may become necessary to explore other means of accommodating and managing visitor demand, such as a reservation system. The preferred alternative will provide for the long term protection of resources and will not set a precedent for future actions that could have significant effects.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

The EA concluded that past, present and future activities, when coupled with the proposed actions will have localized, long-term adverse and beneficial cumulative impacts on soils, vegetation, floodplains, visitor use and park operations and impacts will be less than significant. Cumulatively, the selected actions will not contribute substantially to the overall effect to the environment.

The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

In accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing §106 (36 CFR 800.8, Coordination with the National Environmental Policy Act), consultation and comment were solicited from the Utah State Historic Preservation Officers (SHPO) and ACHP. As discussed in the EA, archaeological resources will not be affected by implementation of the preferred alternative.

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Section 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative will have *no adverse effect* on archeological resources within the project area. One archeological site, the Wolfe Ranch Historical District, near the project area was previously determined an eligible historic property. The park recommended to SHPO that there will be *No Adverse Effect* because the site is outside the area of potential effect and will not be directly impacted by the proposed undertaking. The SHPO concurred with the park's recommendation on April 4, 2014.

The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

As part of the EA process, the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources was contacted with regards to federally- and state-listed species to determine those species that could potentially occur on or near the project area. A letter from the U.S. Fish and Wildlife Service (USFWS) dated May 6, 2014 indicated that there may be Mexican spotted owls present in the project area. The NPS determined that the Mexican spotted owls are not present within the project area and the proposed actions "may affect but are not likely to affect" the owls. The USFWS concurred with the NPS in a letter dated September 8, 2014 and no further consultation under §7 of the Endangered Species Act is needed.

Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment

The action will not violate any federal, state, or local laws or environmental protection laws.

Public Involvement and Native American Consultation

The EA was made available for public review and comment during a 30-day period ending September 25, 2014. To notify the public of this review period, a letter was mailed to stakeholders, Native American tribes, interested parties, and newspapers. Hardcopies were made available at the park Visitor Center, Southeast Utah Group headquarters, and Grand County Library. The EA was posted on the NPS PEPC website at http://parkplanning.nps.gov/arch. Twenty-seven correspondences were received and the majority of the letters were in support of the preferred alternative. One letter was received from Native American tribe who stated they concurred with the SHPO determination for the project. Eight comments are addressed in the Errata Sheets attached to this FONSI. The FONSI will be available on the NPS Planning, Environment and Public Comment (PEPC) website at http://parkplanning.nps.gov/arch.

Conclusion

As described above, the preferred alternative does not constitute an action meeting the criteria that normally require preparation of an environmental impact statement (EIS). The preferred alternative will not have a significant effect on the human environment. Environmental impacts that could occur are limited in context and intensity, with generally are adverse and beneficial impacts that are localized, short- to long-term, and minor to moderate. There are no unmitigated adverse effects on public health, public safety, threatened or endangered species, sites or districts listed in or eligible for listing in the National Register of Historic Places, or other unique characteristics of the region. No highly uncertain or controversial impacts, unique or unknown risks, significant cumulative effects, or elements of precedence were identified. Implementation of the action will not violate any federal, state, or local environmental protection law.

Based on the foregoing, NPS has determined that an EIS is not required for this project and thus will not be prepared.

Approved:

Sue E. Masica 11/3/14

Sue E. Masica Date

Regional Director, Intermountain Region, National Park Service

Errata Sheets

Delicate Arch/ Wolfe Ranch Site Plan

Arches National Park

According to NPS policy, substantive comments are those that 1) question the accuracy of the information in the EA, 2) question the adequacy of the environmental analysis, 3) present reasonable alternatives that were not presented in the EA, or 4) cause changes or revisions in the proposal.

Some substantive comments may result in changes to the text of the EA, in which case, they are addressed in the *Text Changes* section of the Errata Sheets. Other substantive comments may require a more thorough explanatory response and are addressed in the *Response to Comments* section. NPS responds to all substantive comments in either or both of these sections.

Of the 27 correspondences that were received during public review of the EA, eight comments were pulled out and are considered substantive.

Text Changes:

On page 21, in the section **Alternatives Considered and Dismissed** of Chapter 2, **Alternatives**, insert the following text for the section **Widen the road to accommodate safe roadside parking**: *"This alternative was considered but dismissed because it does not meet the projects objectives and it is identified in the general management plan as a need to eliminate roadside overflow parking near parking lots."*

Response to Comments

Social Crowding/Visitor Experience

Comment 1 – The Delicate Arch/Wolfe Ranch EA must tier off the General Management Plan and must be consistent with the Visitor Experience and Resource Protection implementation plan. The carrying capacity provisions of those plans cannot be readily dismissed.

Response 1 – The Delicate Arch/Wolfe Ranch EA is tiering off of the General Management Plan. The General Management Plan identified the need to eliminate roadside overflow parking near parking lots and incorporate a carrying capacity. The Visitor Experience and Resource Protection implementation plan was a pilot study. The park has not been monitoring for Visitor Experience and Resource Protection since the mid 2000's. Park management has continued to address carrying capacity as parking capacity according to the levels presented in parking capacity tables in the 2006 Transportation Implementation Plan.

Comment 2 – The EA should disclose whether the park took the management actions in the 1995 Visitor Experience and Resource Protection implementation plan.

Response 2 – The NPS did not include the management actions proposed from Visitor Experience and Resource Protection (VERP) since VERP monitoring was discontinued in the mid 2000's and the data is not relevant to the management of current visitation.

Comment 3 – The EA should disclose the results of the [Visitor Experience and Resource Protection] monitoring of the social crowding indicators. It should disclose what social crowding conditions are at Delicate Arch during current peak use periods.

Response 3 – Social crowding conditions at Delicate Arch are outside of the scope of this EA. The EA focused on the social crowding/visitor experience conditions at the parking lot and along the roads.

Comment 4 – The EA should predict the likely effect that expanding the parking lot will have on the social crowding visitor experience at Delicate Arch.

Response 4 – The EA did predict the likely effect of visitation to the area. The expansion of the parking lot will only accommodate roadside overflow parking to allow visitors a safe designated parking space and will not increase current visitation to the site. There will be no net change to current visitation at Delicate Arch. The EA has identified indicators and standards in Chapter 2 to monitor the site to gauge if congestion management strategies are effective. Additional management options will be implemented if standards are not met. A reservation/permit system may be implemented if standards are not met.

Comment 5 – The NPS should provide an update of the VERP analysis and the required monitoring to justify accommodating the increased number of visitors the site has been receiving since the original VERP plan was developed.

Response 5 –This EA does identify updated monitoring concepts and management options to adaptively manage visitation in this high use area as outlined in Chapter 2. The site will be monitored to ensure the indicators and the standards identified in the EA are being met and to gauge the effectiveness of congestion management strategies.

Comment 6 – The NPS should to take a step back from expanding the parking lot at this point and incorporate updated data on visitor experience and resource impacts from the significant number of visitors at Delicate Arch every day.

Response 6 –The expansion of the parking lot is a means to only accommodate roadside overflow parking to allow visitors a safe designated parking space and, along with installation of hard barriers, parking capacity for the site will be achievable. The EA proposes the concept of adaptive management to evaluate the effectiveness of implemented congestion management strategies with using indicators and standards and monitoring visitor use and park resources. A reservation/permit system may be implemented if standards are not met.

Parking

Comment 7 – The preferred alternative should also include the construction of a parking lane on one or both sides of the road along with proposed trail and some barriers.

Response 7 – Roadside parking was considered and dismissed as an alternative in the EA because it will not meet the objectives of the project. It is also stated in the general management plan the need to eliminate roadside overflow parking near parking lots as a means to ensure parking lots are the capacity of current visitation.

Shuttle

Comment 8 – The NPS should reconsider a shuttle service in Arches NP.

Response 8 – The NPS has considered and dismissed a park shuttle at this time as described in the EA. However, if funding does become available the park could consider implementing some kind of limited shuttle service in the park.

Appendix: Non Impairment Finding

National Park Service's *Management Policies, 2006* require analysis of potential effects to determine whether or not actions would impair park resources. 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, adversely impacting park resources and values.

However, the laws do 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 a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within park, 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. The prohibited impairment is an impact that, in the professional judgment of the responsible 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 these resources or values. An impact to any park resource or value may, but does not necessarily, constitute impairment, but an impact would be more likely to constitute an impairment when there is a major or severe adverse effect upon 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
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to pursue or restore the integrity of park resources or values and it cannot be further mitigated.

The park resources and values that are subject to the no-impairment standard include:

- the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park

system; and any additional attributes encompassed by the specific values and purposes for which the park was established.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The NPS's threshold for considering whether there could be impairment is based on whether an action would have major (or significant) effects.

Impairment findings are not necessary for visitor use and experience and par operations, because impairment findings relates back to park resources and values, and these impact areas are not generally considered park resources or values according to the Organic Act, and cannot be impaired in the same way that an action can impair park resources and values. After dismissing the above topics, topics remaining to be evaluated for impairment include geologic resources, soil resources, special status species, archeological resources, and wilderness character.

Fundamental resources and values for Arches National Park are identified in the parks Foundation Document. According to that document, of the impact topics carried forward in this environmental assessment, Colorado Plateau ecosystems (soil and vegetation resources) are considered necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park. These values are key to the natural or cultural integrity of the park; and/or are identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

- **Soil Resources** – Arches National Park protects representative examples of Colorado Plateau ecosystems. A component to these ecosystems is soil resources which are fundamental to the integrity of natural ecosystems protected in the park. For the purposes of this document, soil is defined as a surficial deposit of fine, unconsolidated material composed primarily of minerals weathered from rock, but also including organic matter and soil organisms. The concept of soil resources includes these components as well as mineral nutrients, soil moisture, associated natural processes such as nutrient cycling and water infiltration, and the soil properties necessary for sustaining these processes. NPS policy is to strive to understand and preserve soil resources of parks, and to prevent or minimize accelerated erosion or other impacts that degrade soil functions and contributions to park natural systems (NPS 2006).

  An important soil-surface attribute in the park is the presence, composition, and structure of biological soil crust (biological crust hereafter). Biological crusts are soil-surface assemblages of cyanobacteria, mosses, and lichens that are functionally significant for soil stabilization (Warren 2003), nutrient cycling (Evans and Lange 2003), hydrologic processes (Warren 2003), and mediation of vascular plant establishment (Belnap et al. 2003). Well-developed biological crusts characterized by a high degree of surface roughness and high cyanobacterial biomass confer greater soil stability than weakly developed biological crusts with less surface roughness and biomass (Belnap et al. 2008). Degree of development increases with duration of surface stability and also is affected by soil properties and site conditions. The functional significance of biological crust is countered by its high vulnerability to damage from surface disturbances that can result in long-term reductions of crust structure and functionality (Belnap and Eldridge 2003). In sparsely vegetated landscapes such as those found in the park, disturbance-induced declines in biological crust often are accompanied by accelerated soil erosion and persistent, long-term reductions in surface roughness and associated functions (Miller et al. 2011). Where well-developed biological crusts are lacking due to surface disturbance or other factors, soils may be stabilized by weakly developed biological

crusts or by physical crusts. In the area of the proposed parking lot expansion, weakly developed cyanobacterial crusts are predominant. But the area also is characterized by significant patches of roughened crusts with mosses and lichens. In the area where the proposed sidewalk / bike path is to be located, biological crusts generally are absent due to human-caused disturbance along the road corridor and due to natural characteristics of residual soils formed from shale.

The proposed expansion of the parking lot and construction of the 1.1 mile sidewalk / bike path will result in localized but long-term (effectively permanent) adverse impacts to soil resources due to covering and paving approximately 1.65 acres of the soil surface. Due to the spatial extent of new pavement, the magnitude of the adverse impacts will be greater than those of Alternative 1 and 2. Installation of barriers to prevent roadside parking will however, reduce adverse soil impacts along a 0.5-mi segment of the road corridor. Because the preferred alternative will occur primarily on the previously described disturbed and predominantly dominated by residual soils impact to soils that will be local, long-term, and adverse and these impacts do not rise to the level of significance for impairment of soil resources.

- **Vegetation Resources** – Arches National Park protects representative examples of Colorado Plateau ecosystems. A component to these ecosystems is vegetation communities which are fundamental to the integrity of natural ecosystems protected in the park. Vegetation communities in the park consist of varying assemblages of annual and perennial herbs including grasses and broad-leaved plants, numerous types of drought-tolerant shrubs and succulents, and dwarf trees. A recent inventory and mapping project identified 75 distinct vegetation types in the park (Coles et al. 2009). Here, as elsewhere on the Colorado Plateau, patterns in the distribution, composition, and productivity of vegetation communities are strongly controlled by soil properties, long-term climatic conditions, short-term weather fluctuations, and disturbances attributable to human activities or other factors.

  Vegetation in the footprint of the proposed expanded parking lot, the hard barrier installation along the roadway, the 1.1 mile of the bike/pedestrian path adjacent to the road and the Winter Camp Wash channel consists primarily (50~67%) of non-native annual plants, with the highest percentage of invasives occurring in the proposed parking lot expansion footprint. These species include annual wheatgrass (*Eremopyrum triticeum*,) notably abundant in the proposed parking area, and other annual exotic grasses (*Bromus tectorum, Hordeum murinum*), Russian thistle (*Salsola sp.*), burr buttercup (*Ranunculus testiculatus*), invasive mustards (*Malcolmia africana, Sisymbrium altissimum*,) and halogeton (*Halogeton glomeratus*). Native vegetation consists of relatively common plants and includes seepweed (*Suaeda torreyana*,) greasewood (Sarcobatus *vermiculatus)*, globemallow (*Sphaeralcea parviflora*), tansy mustard (*Descurainia incana*), cryptanths (*Cryptanthus sp.*) and a small number of alkali sacaton grasses (*Sporobolis airoides*) growing along a run-off ditch. The vegetation present in the proposed .65 acre Winter Camp Wash re-channelization includes primarily the non-native tamarisk (Tamarisk chinensis,) but also the common shrubs seepweed (Suaeda torreyana,) rabbitbrush (Chrysothamnus nauseosus) and greasewood (Sarcobatus vermiculatus). Herbaceous vegetation consists of primarily non-native forbs including Russian thistle (Salsola sp.), burr buttercup (Ranunculus testiculatus) goosefoot(Chenopodium album,) nonnative mustards (Malcolmia africana, Sisymbrium altissimum,) and grasses ((Bromus tectorum, Hordeum murinum), but with some occurrences of native forbes including tansy mustard (Descurainia incana), curlycup

gumweed (Grindellia squarrosa,) veiny dock (Rumex venosus,) and a native grass, Canada wildrye (Elymus Canadensis).

The proposed parking lot expansion, bike/pedestrian path construction, and installation of hard closure barriers will occur primarily on the previously described disturbed and predominantly weed infested sites. Eliminating these areas by either hardening or preventing further disturbance (in the case of the hard closures) will eliminate some of the seed source for many undesirable species that inhabit the area and have the potential to invade adjacent areas. The preferred alternative will also eliminate relatively few common native plants in the expanded parking lot including the sparse *Alkali sacaton* growing along a run-off ditch, but it is likely that the new cut-off trench that will channel run-off water from the parking lot (0.1 acres) will host the same species in a new location. Some native plants will be eliminated during the sidewalk construction and rechannelization of Winter Camp Wash, but an equal or higher number of non-native plants will be eliminated and a hardened surface adjacent to the road makes newly dispersed weed seed (via tires) more difficult to establish.

Parking and sidewalk improvements outside of the existing paved surface will be limited to approximately 2.3 acres (0.85 parking expansion, 0.8 sidewalk construction, and 0.65 acres within Winter Camp Wash) with additional minimal disturbance for roadside barrier installation. Sources of fill will be inspected for weed species and approved by NPS vegetation staff prior to transport to site, and all equipment will be cleaned and free of residual soil prior to construction. Similarly, all equipment must be carefully monitored and cleaned to prevent moving on-site weed seed to other areas post construction. Construction activities will be confined to the smallest area necessary to complete the work. Adjacent surface disturbance could facilitate the establishment and spread of invasive exotic plants, but several best management practices will be implemented to minimize the potential for exotic plant establishment and spread including monitoring and treatment for invasive weed species. Revegetation of disturbed areas is expected to take more than one year due to effects of variable seed dormancy and precipitation conditions. Overall, the preferred alternative will result in beneficial effects on vegetation. Expansion of the parking lot, construction of the bike/pedestrian path and installation of hard barriers has a beneficial effect on vegetation in that it reduces vegetation trampling by eliminating social trails and parking in undesignated areas and along the roadside. The effects of the proposed Winter Camp Wash reroute will have temporary minor adverse impacts to native vegetation due to heavy pruning or removal, but will have long term beneficial impacts due to removal of some of the competitive tamarisk and the restoration of more natural flow regimes. Overall, this alternative will result in long-term beneficial effects on vegetation resources and these impacts do not rise to the level of significance for impairment of vegetation resources.

- **Floodplains** – Arches National Park protects representative examples of Colorado Plateau ecosystems. Components to these ecosystems are floodplains which are fundamental to the integrity of natural ecosystems protected in the park. The existing Wolfe Ranch / Delicate Arch Viewpoint Road was constructed across the floodplains of three significant drainage systems that converge in the immediate vicinity of the Wolfe Ranch project area. From west to east, these systems include Salt Valley Wash, Salt Wash, and Winter Camp Wash. All three are ephemeral stream systems that flow only in direct response to precipitation events that are of sufficient magnitude and intensity to generate runoff and streamflow, although Salt Wash in the vicinity of Wolfe Ranch is characterized by perennial surface water resulting from subsurface groundwater

discharge. Flashy hydrologic regimes, sparsely vegetated watersheds characterized by eroding sedimentary formations, the low-gradient valley setting in which the washes converge and cross the road, and road-wash crossings that were inadequately designed for such conditions have long resulted in frequent over-road flows at all three wash crossings and significant repeated sediment deposition on the road at Salt Valley Wash and Winter Camp Wash. These conditions likely are exacerbated by the extensive presence of exotic woody plant populations (*Tamarix chinensis*) in the floodplain both upstream and downstream of the road crossings, resulting in altered streamflow and channel configurations. The frequency and magnitude of over-road flow and sediment deposition events both appear to be increasing with time due to repeated deposition and floodplain aggradation. Over-road flows and sediment deposition frequently cause road closures that strand visitors and that require costly management actions to protect visitor safety and clear the road. One component of the proposed action is designed to mitigate the conditions at the Winter Camp Wash road crossing. Immediately upstream of the road crossing, approximately 0.3 acres of vegetation (primarily exotic *Tamarix* with a limited amount of native woody and herbaceous vegetation) will be removed, and the channel of the wash will be excavated and straightened to facilitate greater conveyance of water and sediment across the road. The channel also will be excavated and reconfigured downstream of the road crossing to direct flow away from the current aggraded channel and towards a former channel with a lower surface elevation. In addition to these actions within the floodplain, portions of the proposed sidewalk / bike path also will be constructed across the floodplains of Winter Camp Wash and Salt Wash.

Removal of floodplain vegetation upstream of the road crossing, and channel excavation and reconfiguration upstream and downstream of the road crossing will result in localized beneficial impacts to the characteristics and functioning of the Winter Camp Wash floodplain. Due to the continued presence of the road and the dynamic characteristics of the wash system, impacts of these actions likely will be short term and adverse. Construction of the sidewalk / bike path across the Winter Camp Wash and Salt Wash floodplains will have negligible impacts to floodplain characteristics. The net impacts of the preferred alternative will be localized, beneficial, short-term, and these impacts do not rise to the level of significance for impairment of floodplains.

National Park Service
U.S. Department of the Interior
Arches National Park
Moab, Utah

Appendix A – Statement of Findings for Floodplains

Recommended by:

Kate Cannon, Superintendent, Arches National Park, National Park Service

Concurred by:

for Forrest E. Harvey, Chief of the Water Resources Division, National Park Service

Approved by:

Sue E. Masica, Intermountain Regional Director, National Park Service

Introduction

Executive Order 11988 *Floodplain Management* requires the National Park Service (NPS) and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of Executive Order 11988 is to avoid, to the extent possible, the long- and short- term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. NPS Director's Order 77-2: *Floodplain Management* and NPS Procedural Manual *77-2: Floodplain Management* provides NPS policies and procedures for complying with Executive Order 11988. This Statement of Findings for Floodplains (SOF) documents compliance with Executive Order 11988 *Floodplain Management*, NPS Director's Order 77-2: *Floodplain Management*, and NPS Procedural Manual 77-2: *Floodplain Management*.

The purpose of this Floodplain SOF is to review the actions associated with the proposal to restore Winter Camp Wash within Arches National Park in sufficient detail to:

- Provide an accurate and complete description of the flood hazard assumed by implementation of the selected alternative (without mitigation);
- Provide an analysis of the comparative flood risk among alternative sites;
- Describe the effects on floodplain values associated with the selected alternative;
- Provide a thorough description and evaluation of mitigation measures developed to achieve compliance with Executive Order 11988 *Floodplain Management*, NPS Director's Order 77-2: *Floodplain Management*, and NPS Procedural Manual 77-2: *Floodplain Management*.

Proposed Action

The NPS prepared an Environmental Assessment (EA) for the proposal to expand the parking lot at Delicate Arch/Wolfe Ranch parking area, restrict roadside parking, construct a paved path from Delicate Arch Viewpoint parking area to Delicate Arch/Wolfe Ranch parking lot and rechannel Winter Camp Wash. All of these actions will be constructed or implemented within Arches National Park, as follows:

Parking Expansion – The parking lot will be expanded by an additional 82 standard vehicle spaces and eight oversized spaces (i.e. RV's, SUV's, truck's) for a total of 156 parking spaces at the trailhead (135- standard, 19- oversized, 2- accessible). The expanded parking area will only accommodate current roadside parking overflow.

The design of the expansion will fit the current design of the existing parking area and will be located on the northern end (Figure 1). A total area of ground disturbance for this expansion will be 33,600 square feet or 0.8 acres. The area proposed for the expansion will require fill dirt to be brought in to bring the site to grade with the existing lot. A sidewalk and two-rail fence will be constructed on the eastern side of the expanded parking area to enable visitors to safely access the trailhead and to prevent visitors from short cutting to the trail from their vehicles. The oversize parking area to the south of the trailhead or the Delicate Arch Viewpoint parking area will not be expanded.

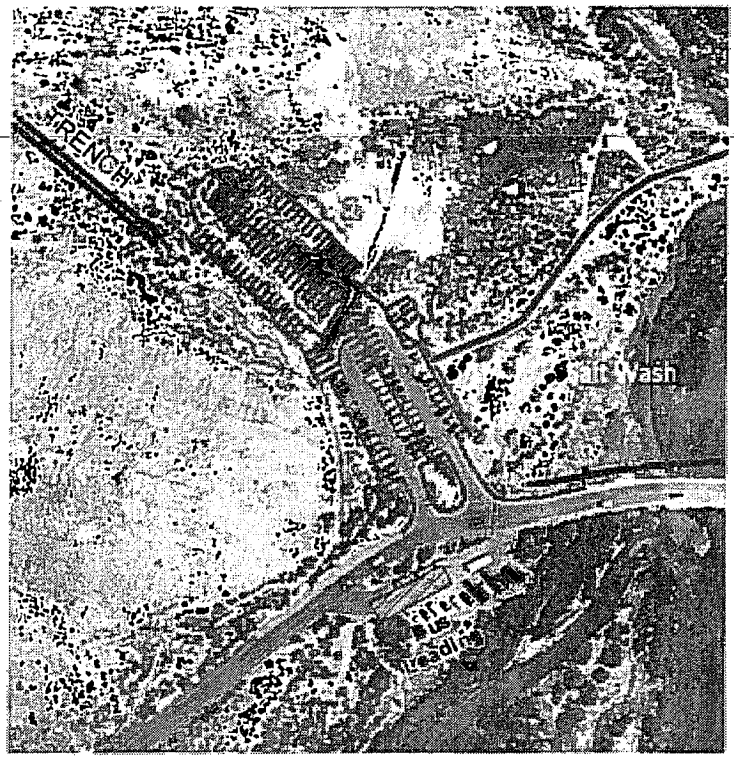

Figure 1: Proposed Parking Expansion

Restrict Roadside Parking- In order to prevent vehicles from parking along the road shoulders, hard barriers, such as large boulders and/or two rail fencing, will be installed along both sides of the road where the topography does not naturally prevent roadside parking. Strict enforcement with posted signs, ticketing and potential booting of vehicles to enforce no roadside parking policy will also occur.

Paved Bike/Pedestrian Path- A 1.1 mile six foot wide bike/pedestrian sidewalk will be constructed along the road to allow safe pedestrian passage for visitors to bike or walk from the Delicate Arch Viewpoint parking area to an access trail that ties into the main trail. The path will not be constructed over Salt Wash.

Rechannel Winter Camp Wash- The plan will restore Winter Camp Wash in an effort to recreate a natural channel shape by removing vegetation from within the wash and reshaping the channel to a new alignment (Figures 2 and 3). Immediately upstream of the road crossing, approximately .3 acres of vegetation (primarily exotic Tamarisk with a limited amount of native woody and herbaceous vegetation) will be removed, and the channel of the wash would be excavated and straightened to facilitate greater conveyance of water and sediment across the road. The channel also will be excavated and reconfigured downstream of the road crossing to direct flow away from the current aggraded channel and towards a former channel with a lower surface elevation. In addition to these actions within the floodplain, portions of the proposed sidewalk / bike path also will be constructed across the floodplains of Winter Camp Wash. A footbridge may be installed over the wash in the future, once the wash has been restored.

A culvert will not be installed under the road. The road will be managed as a low water crossing.

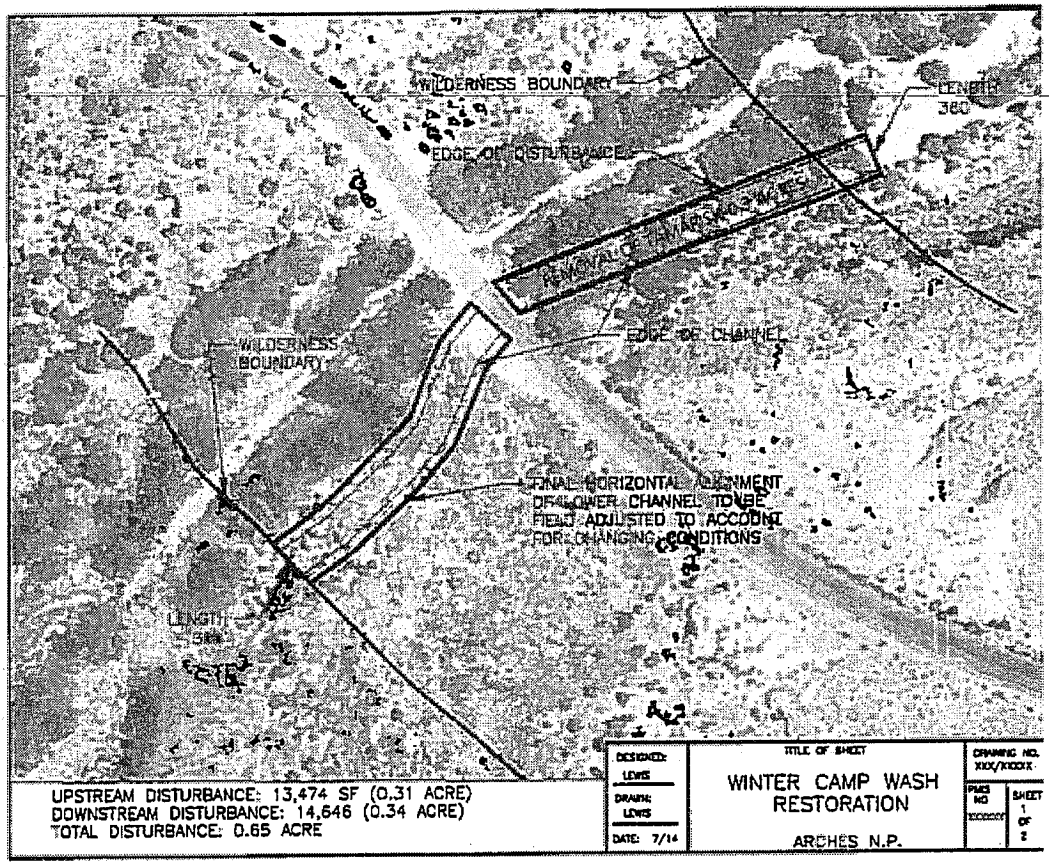

Figure 2: Winter Camp Wash Proposed Site Plan

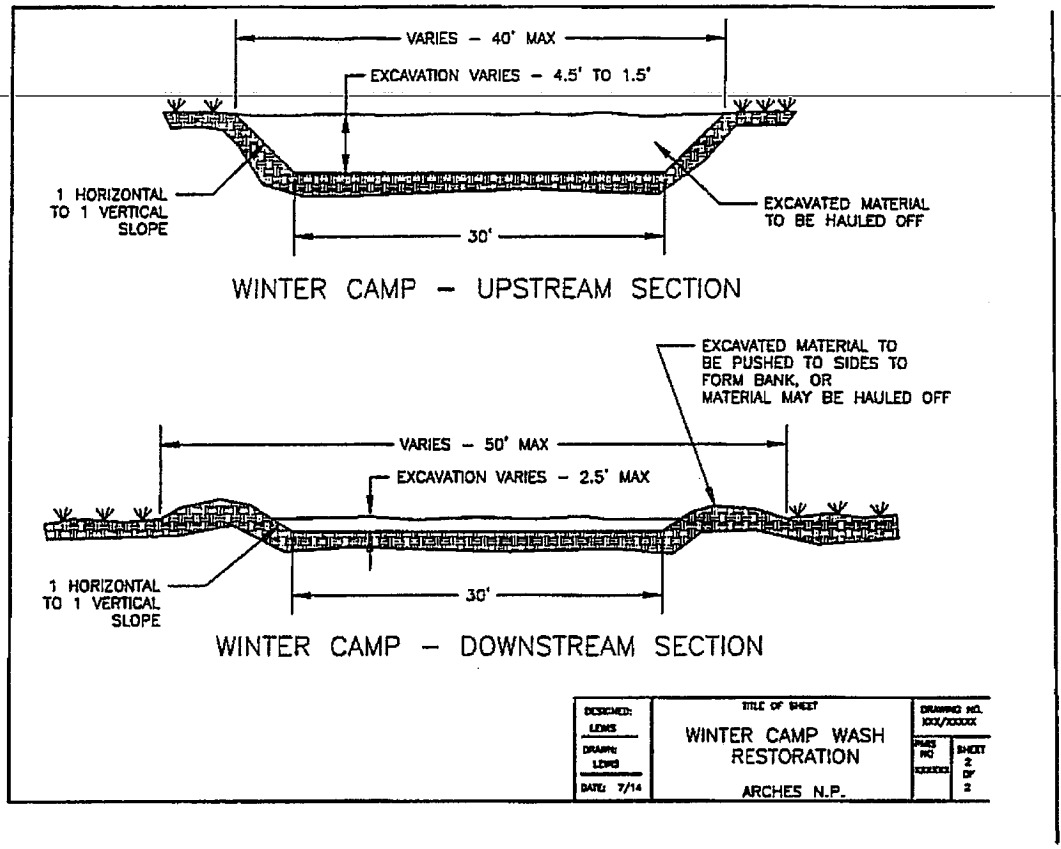

Figure 3: Winter Camp Wash Restoration Detail

A bulldozer and backhoe will be used above and below the road within the wash to excavate the wash channel and to distribute the sediment out from along the streambed sides. A Section 404 permit will be required for any channel in-stream work.

Site Description

The project area is the area for one of the most popular sites in Arches, the trailhead for Delicate Arch, a 65-foot (20 m) tall freestanding natural arch. Delicate Arch is the most widely-recognized landmark in Arches National Park and the state of Utah and as such is depicted on the Utah state license plates. Visitors come from all over the world to see Delicate Arch which is touted as a "must see".

Historic Wolfe Ranch is also located near the project site off of the trail to Delicate Arch. The Wolfe Ranch was settled in 1888 by Civil War Veteran John Wolfe and his son. The Wolfe's built a one-room cabin, a corral and a small dam across Salt Wash. This site has been added to the National Register of Historic Places in 1975. An additional cultural resource, a Ute Indian rock art panel depicting bighorn sheep, horses and dogs on boulders, can be found near the trail to Delicate Arch.

Daily visitation to the site during the peak seasons is approximately 2,000 people and the parking lot is one the smallest of the popular park sites. Current parking capacity of 73 parking spaces is not sufficient for today's visitation. Parking capacity was initially designed and limited through Visitor Experience and Resource Protection (VERP) analysis in the early 2000's, however demand for

parking has exceeded available parking capacity ever since. According to park occupancy and duration data collected in 2010 and staff observations, the parking lot fills to capacity for most of the day starting at 9:30am and it is the new norm to see more than 100 vehicles parked along the road shoulders.

Physical Setting

The project area is located approximately 18 miles north of Moab, Utah at a latitude of 38°44'11.3" N and a longitude of 109°31'12.5" W. Elevation is approximately 4290 ft (1308 m). The climate is arid and characterized by hot, dry summers and cool to cold winters. From 1981 through 2010, mean annual precipitation at park headquarters (approximately 10 mi away and 200 ft lower in elevation) was 8.75 in (222 mm) and mean annual temperature was 58.2 deg F (14.6 deg C). Mean maximum temperature in July was 98.9 deg F (37.2 deg C) and mean minimum temperature in January was 20.3 deg F (-6.5 deg C). Despite the arid climate, intense rain events are common and often occur in association with convective storms during summer and early fall. October is the month with the highest mean monthly precipitation (1.05 in, 26.7 mm) and also the month with the greatest inter-annual variability in precipitation due to occasional heavy rains associated with late-season tropical storms. In October 2006, the park received a record 4.86 in of rain. Similar to the surrounding region, the project area is visually dominated by colorful exposures of various sandstones and shales with upland vegetation consisting of sparse shrublands, woodlands, and occasional grasslands. Riparian areas are vegetated by heavier growth of woody plants that often are dominated by the exotic tamarisk (*Tamarix* sp.).

Hydrology

The existing Wolfe Ranch / Delicate Arch Viewpoint Road was constructed across the floodplains of three significant drainage systems that converge in the immediate vicinity of the Wolfe Ranch project area. From west to east, these systems include Salt Valley Wash, Salt Wash, and Winter Camp Wash. All three are ephemeral stream systems that flow only in direct response to precipitation events that are of sufficient magnitude and intensity to generate runoff and streamflow, although Salt Wash in the vicinity of Wolfe Ranch is characterized by perennial surface water resulting from subsurface groundwater discharge and Winter Camp Wash is a small ephemeral stream system that flows only in direct response to precipitation events. Salt Valley Wash is outside the project area and proposed actions would have no effect on this wash system.

Winter Camp Wash is also characterized by a flashy hydrologic regime controlled by storm occurrence and the surface characteristics of the 12,294 ac watershed. Approximately 75 percent of the watershed surface is dominated by extensive exposures of sandstone bedrock (the Kayenta Formation, Navajo Sandstone, and the Slickrock Member of the Entrada Formation). The remaining 25 percent consists primarily of sandy residuum and aeolian deposits. Extensive exposed bedrock contributes to the relatively high frequency of flash flood events that typically result in the deposition of sandy alluvium where the wash crosses the road in a low-gradient, aggradational setting. Downstream of the road, Winter Camp Wash converges into a delta with Salt Wash which drains then to the Colorado River. The delta is very broad, long, flat and aggradating. The center of the delta is supporting dense, tamarisk, which enhances the capture of most sediment that enters. This has occurred to the point where there is little slope to provide a positive drainage path for the Winter Camp Wash during a flow event.

Flood Frequency and Conditions

Flashy hydrologic regimes, sparsely vegetated watersheds characterized by eroding sedimentary formations, the low-gradient valley setting in which the wash crosses the road, and culverts that were inadequately designed for such conditions have long resulted in frequent over-road flows and significant repeated sediment deposition on the road at Salt Wash and Winter Camp Wash. These

conditions likely are exacerbated by the extensive presence of exotic Tamarisk in the floodplain both upstream and downstream of the road crossings, resulting in altered streamflow and channel configurations. The frequency appears to be increasing with time due to repeated deposition and floodplain aggradation and the closure of the road typically occurs five times to ten times a year.

Justification for Use of the Floodplain

Objectives of the project are to provide a safer visitor experience, reduce closures of the Delicate Arch road during and after flood events over the road and to return Winter Camp Wash to a functioning wash system once again. Expanding the existing Wolfe Ranch parking area would cover and pave approximately 0.8 acres of the soil surface within a floodplain. However, as the current parking area does not interfere with flood flows it is anticipated that the design of the new expanded area would also not interfere with flood flows. The new parking area is designed to be cantered at an angle away from Salt Wash.

The majority of actions affecting the floodplain would occur within Winter Camp Wash. Rechanneling of the wash would enhance and improve visitor experience in the project area by reducing the frequency the road is closed due to accumulation of sediment. Since the main road was paved in 1994, sediment from Winter Camp Wash, over the last 20 years has completely filled in the box culverts and now the wash is at the same grade with the road on both sides. The wash over the years transports large amounts of sediment during a flow event and deposits very fine sand to silt on or near the roadway. The road itself has impeded the natural process of the wash system. The wash on the south side of the road is currently pooling water as water cannot flow freely down the wash. This pooling of water causes sediment and water to back up on the road. This section of road currently functions as a low water crossing. Most intermittent flood events cause the road to Delicate Arch Viewpoint to flood and trap visitors on the east side of the road until the water level recedes. Once the water recedes, the amount of sedimentation deposited on the road surface requires heavy equipment for removal prior to opening the road. There is a need to address the maintenance of the road and the wash system. By moving the wash to the east of the existing wash which has become the natural direction of current flow and excavating a channel, the park is confident that the velocity of the water will increase and significantly reduce sediment build-up on the road surface.

Investigation of Other Alternatives

Several alternatives for managing Winter Camp Wash were considered, including improving the existing channel and constructing a bridge over both Salt Wash and Winter Camp Wash. These alternatives were considered but dismissed and are discussed in the EA.

Mitigation

The following best management practices will be implemented to minimize the degree and/or severity of adverse effects to floodplains and water quality. By using best management practices the impacts of the action will minimize the adverse effect of restoring Winter Camp Wash.

- Best management practices will be implemented to ensure no pollutants enter Winter Camp Wash as a result of the project.
- Only biodegradable, vegetable-based hydraulic fluid will be used in excavators that may reach into Winter Camp Wash.
- All fueling will occur more than 100 feet from the wash in a location where a fuel spill will not be able to enter the wash.

- To minimize possible petrochemical leaks from construction equipment, the park will regularly monitor and check construction equipment to identify and repair any leaks.
- A fuel/lubricant spill absorption kit will be in place to address potential land and water spills and leaks.
- Stormwater runoff control measures, including silt capture techniques such as silt fences will be employed to improve quality of runoff and prevent degradation of the wash.
- Fuel and oil services for construction machinery will be provided in a designated area away from the wash when feasible. This will include a secondary containment for all fuel storage tanks and on-site availability of a spill kit.
- All staging and stockpiling areas will be situated outside of the 100-year floodplain.
- Sediment curtains will be used when needed to contain sediment to the immediate work zone.
- Staging and stockpiling areas will be situated outside of the floodplain.

Conclusion

The preferred alternative was designed to achieve project objectives while considering the floodplain values of the Salt Wash and Winter Camp Wash areas. There would be no significant impact to floodplain resources and values under the proposed actions. The expansion of the parking area and paved bike path would not have any impact to the flow events of Salt Wash and Winter Camp Wash. The new channel for Winter Camp Wash would be designed and located to minimize reduction of flow velocity near the road crossing. By maintaining higher velocities within Winter Camp Wash, sediment will be less likely to drop out of transport and accumulate in the vicinity of the road and therefore create again a functioning wash system. Best management practices will be implemented to minimize the adverse effects to floodplain values, water quality, during and after the construction. Although expanding the parking area and rechanneling the wash is considered optional, the purpose of the project strongly supports these actions to meet the project objectives. In addition, individual state and federal permits will be obtained prior to the commencement of construction activities. Therefore, the National Park Service finds the preferred alternative to be acceptable per Executive Order 11988 *Floodplain Management*, NPS Director's Order 77-2: *Floodplain Management*, and NPS Procedural Manual 77-2: *Floodplain Management*.

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NPS 2003. Director's Order 77-2 *Floodplain Management*

NPS 2003. NPS Procedural Manual 77-2, *Floodplain Management*