



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

Williams Northwest Pipeline Maintenance Environmental Assessment/Assessment of Effect

April 2010



Williams Northwest Pipeline corridor as it crosses through Arches National Park

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Williams Northwest Pipeline Maintenance

Environmental Assessment/Assessment of Effect

Summary

The National Park Service (NPS) is preparing an environmental assessment/assessment of effect (EA/AEF) that analyzes the effects of maintaining the natural gas pipeline in Arches National Park. Currently, Williams Company owns and maintains the 7.2 miles of the Northwest Pipeline that passes through the park. The NPS will issue a Special Use Permit (SUP) to the Williams Company for the purpose of performing this pipeline maintenance within the park. This EA/AEF addresses the planned pipeline maintenance activities during the next five to ten years and the impact of those activities on the natural and cultural resources of the park.

Proposed maintenance activities include surveys of the pipeline by foot, by air, and possibly by vehicle; erosion control; potential recoating or replacing sections of the pipeline; repair of the cathodic protection system on the pipeline and conducting pig runs. Most of these activities can result in minor to moderate adverse impacts on park resources. Moving heavy equipment along the pipeline and digging up sections of pipe for recoating or replacement can create significant adverse impacts to park resources, visitor experience, and park values.

This EA/AEF evaluates two alternatives: a no-action alternative and an action alternative. The no-action alternative describes the continued current management of the pipeline. Currently there is no proactive evaluation of impacts on park resources regarding anticipated pipeline maintenance. Evaluations are only done as a project or activity arises. The action alternative would consider anticipated potential pipeline maintenance needs over the next five to ten years and would evaluate the impacts of this maintenance on park resources to develop mitigation measures.

This EA/AEF has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to Arches National Park resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics included in this document because the resultant impacts may be greater-than-minor include geological resources, paleontological resources, soils, native vegetation, non-native species, water resources including floodplains and wetlands, threatened and endangered species, archeological resources, ethnographic resources, wilderness, natural soundscapes, visitor use and experience, visual resources and park operations. All other resource topics were dismissed because the project would result in negligible or minor effects to those resources. No major effects are anticipated as a result of issuing this SUP. Public scoping was conducted to assist with the development of this document. Only two comments were received.

Public Comment

If you wish to comment on the EA/AEF, you may post comments online at <http://parkplanning.nps.gov/arch> or mail comments to: Planning and Compliance Coordinator, Southeast Utah Group, National Park Service, 2282 S. West Resource Blvd, Moab, Utah 84532

This EA/AEF would be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public view, we cannot guarantee that we would be able to do so.

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Abbreviations

ACHP	Advisory Council of Historic Properties
AEF	Assessment of Effect
APE	Area of Potential Effect
ARCH	Arches National Park
BLM	Bureau of Land Management
CE	Categorical Exclusions
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
DO	Director's Order
DOI	Department of Interior
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EPA	Environment Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historical Protection Act
NPS	National Park Service
SEUG	Southeast Utah Group
SUP	Special Use Permit
SHPO	State Historical Preservation Office
USFWS	United States Fish and Wildlife Service
§	Section

CHAPTER 1: PURPOSE AND NEED

Introduction

Arches National Park is located in southeastern Utah adjacent to the Colorado River, in the high desert physiographic province known as the Colorado Plateau. Arches National Monument was specifically set aside to preserve its outstanding and unusual geologic features by Presidential Proclamation No. 1875 on April 12, 1929 and later became a National Park in 1971. The 75,359 acre park lays entirely within Grand County, Utah, five miles northwest of the county seat of Moab, Utah. The park contains over two thousand sandstone arches, the largest concentration in the country, and a variety of unique geological resources and formations such as balanced rocks, fins, and pinnacles. Its extraordinary geological features are easily accessible, many by vehicle within short walking distances from trailheads and parking areas. In accordance with the overall mission of the National Park Service (NPS), the Arches National Park *General Management Plan* (GMP), published in 1989, states that “*protection and preservation of the natural environment to ensure ecosystem integrity while providing for visitor enjoyment would be the principal consideration.*”

The purpose of this Environmental Assessment/Assessment of Effect (EA/AEF) is to examine the environmental impacts associated with the proposal to issue a SUP to Williams Northwest Pipeline (Williams) for pipeline maintenance over the next 5-years at Arches National Park. This EA/AEF was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and the NPS Director’s Order (DO)-12 (*Conservation Planning, Environmental Impact Analysis, and Decision-Making*). The assessment of effect was developed in conjunction with this EA to meet its obligations for NEPA and under §106, 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).

Background

The 26-inch underground natural gas pipeline was constructed in the mid 1950’s to provide natural gas from the gas fields of the Rocky Mountains to markets in the Pacific Northwest and in-between. The pipeline was installed through 2.6 miles of, what was then, Arches National Monument in 1955, by Pacific Northwest Pipeline Corporation.

In 1960, the NPS issued a new 20-year term Special Use Permit (SUP) to El Paso Natural Gas Company, a successor to Pacific Northwest Pipeline. Arches boundaries expanded and designation was changed from national monument to national park in 1971. Bureau of Land Management (BLM) lands were transferred to the park as part of the 1971 Arches National Park Boundary Change, as a result, the length of pipeline within the park increased from 2.6 miles to 6.8 miles. In 1974, ownership of the pipeline was transferred to Northwest Pipeline Corporation which was ultimately acquired by the Williams Companies. In 1998, Arches National Park expanded its boundaries again to include the Lost Spring area, previously BLM land, as part of the Arches National Park Expansion Act of 1998.

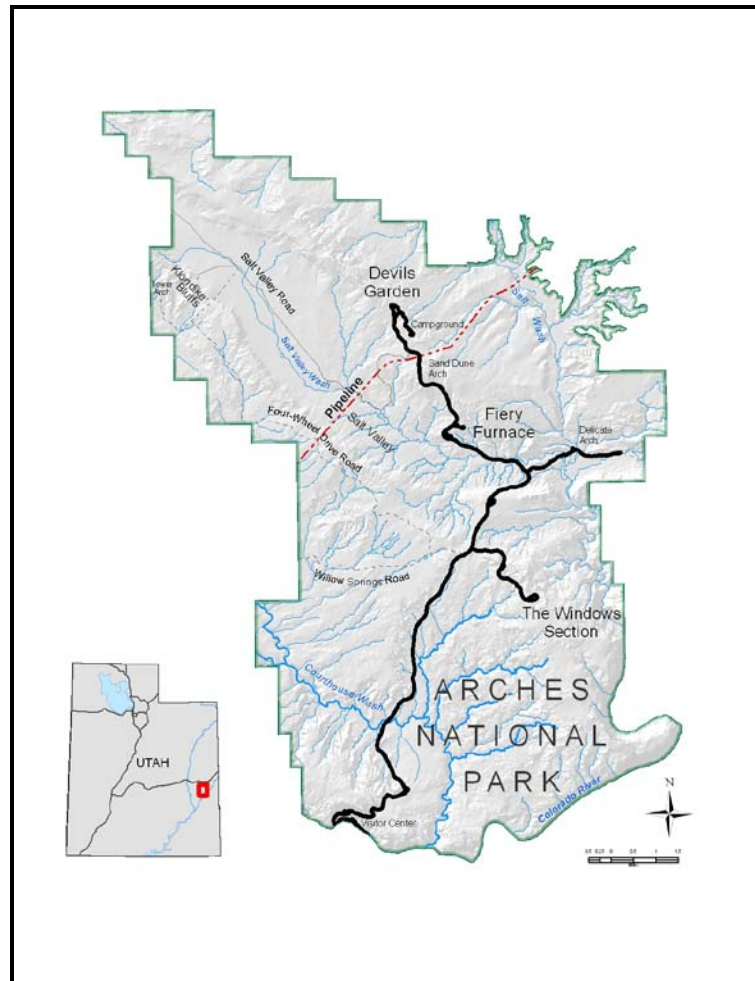


Figure 1. Location of Williams Northwest Pipeline in Arches National Park

Currently, Williams owns and maintains the 7.2 miles of the Northwest Pipeline that passes through Arches National Park (see Figure 1). Of those 7.2 miles, 2.6 miles continue to be authorized under a SUP. The remainder is authorized based on the BLM right-of-way, and by the prescriptions that would result from this analysis and which would be addressed now in the SUP.

There are three primary reasons for issuing a permit for a special use, regardless of type or purpose: impose conditions to manage the activity and prevent impairment or degradation of resources, values and purposes for which the park was established; obtain the signature of the permittee agreeing to the conditions and other statements contained within the document; and establish a written record of the special use as part of the park's administrative record. SUPs or the renewal of an existing use would be evaluated by the superintendent according to the terms of applicable legislation, regulations, and management planning documents. A superintendent must deny initial requests or requests for renewal upon finding that the proposed activity would cause unacceptable impacts. A right-of-way is a special park use allowing a utility to pass over, under, or through a NPS property (30 U.S.C. § 185). It may be issued only pursuant to specific statutory authority, and generally only if there is no practicable alternative. Because the special use was authorized by the Department of Interior, and Williams has relied on the permit to maintain the structure for fifty-four years and it is financially

infeasible to move the pipeline out of the park at this time, the SUP would be considered. Once an application for the SUP is submitted a compliance analysis must be conducted according to NEPA, NHPA, and other statutory authorities.

Issuing a SUP to Williams to maintain the pipeline establishes that Williams has an obligation to properly maintain the pipeline and to adhere to all stipulations that were developed in the SUP to protect park resources. Williams does understand that the SUP does not authorize replacement of the entire pipeline, upgrade or looping of the pipeline within or outside of the permitted right-of-way within Arches National Park.

Background History of Maintenance Work along Pipeline

The U.S. Department of Transportation (DOT) regulates the operation and maintenance of natural gas pipelines pursuant to the Natural Gas Pipeline Safety Act of 1968. The DOT safety standards and regulations are codified under Chapter 49 of the Code of federal Regulations (CFR) Part 192.

As a part of their safety program, Williams sends an In-Line Inspection device also referred to a "pig", to run internal inspection diagnostic measurements inside the pipeline that checks for various conditions that indicate the overall integrity of the pipeline. In addition, Williams conducts testing of the electroconductivity potential of soil along the pipeline and provides cathodic protection of the pipeline. Cathodic protection is an electrical process of slowing down or eliminating the potential for natural galvanic corrosion that can occur with a buried metal pipeline. Williams also conducts erosional control measures in washes where the pipeline most commonly becomes exposed.

The pig is launched from a pig launcher facility that is located outside the park's boundary and the pig is pushed through the pipeline by the flow of natural gas to a receiver facility that is outside the park's boundary on the other side of the park. If the PIG detects anomalies indicating potential corrosion, cracks or dents along the pipeline then maintenance of the pipeline is required. Maintenance in the past has included digging 30-feet wide by 40-feet in length "bell holes" to expose sections of pipeline for repair or recoating. Most of the digging has been by hand using shovels but the use of a backhoe has been required in certain locations. Also some areas along the pipeline are prone to erosional issues and the pipeline has become exposed. These areas require recovering using sand or erosion control structures such as rock check dams to reduce soil erosion and redistribute the soil on top of the pipeline. Until February 2009, maintenance work has been relatively minor. In February 2009, required pipeline anomaly investigation work occurred at two sites, which necessitated the use of heavy equipment and vehicles and extensive salvage of vegetation and restoration work along both access routes and work sites.

The work resulted from a pig run in May of 2008, which revealed the two anomalies on the 26" pipeline within the park (see Figure 2). It was determined that these two anomalies required excavation of the pipeline under the rules and regulations of the DOT. DOT regulations require that anomalies be investigated within a specific time frame after their identification depending upon the perceived severity of the anomaly.

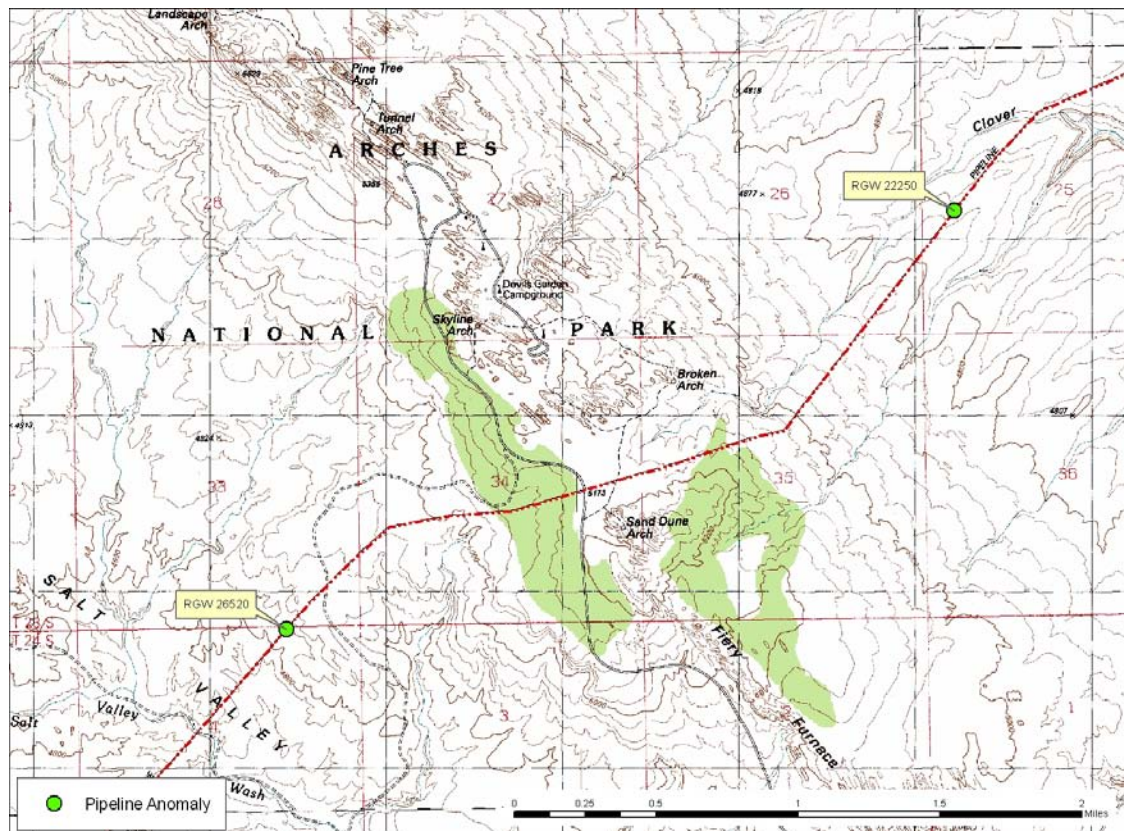


Figure 2: Locations of the two anomalies repaired in February/March 2009

One of the anomalies was located near the rim of Clover Canyon, (Anomaly Site 22250) about halfway between Upper Salt Wash (accessed from I-70 through the Yellowcat area) and the Sand Dune Arch parking area on the main park road. The other was located roughly 1000 feet off the Salt Valley Road (Anomaly Site 26520), 1.2 miles from the main park road. Equipment needed to uncover the two sections of pipeline and perform the assessment on the condition of the pipe included a track hoe, a sand blast truck, and a Maruka transport vehicle at both sites, and additionally at the Clover Canyon site 2 D-6 bulldozers, and three Utility vehicles (UTV's) to transport the crew. Because of human safety risks associated with gas pipeline leaks or ruptures, the pipeline company was required to address repairs within one year of detecting the anomalies. The park was not notified until several months after the pig run. This work was considered a DOT-required action and the park granted access for the use of the vehicles and heavy equipment with stipulations. These stipulations are included in this EA/AEF in the mitigation measures section.

In order to access and repair the anomalies, it was necessary to move heavy equipment and support vehicles across the landscape on or near the pipeline corridor. As a result, repair activities involved the disturbance of established vegetation and soils along the access routes. To mitigate these impacts, native shrubs (mainly blackbrush, *Coleogyne ramosissima*) and some grasses, forbs and soil crusts were salvaged and replanted at the anomaly sites and access routes. Although an attempt was made to salvage or avoid as much blackbrush, grasses and other forbs during initial access to the worksites, a large number of plants were "tracked" over by equipment traffic, (defined as 50% or more of

the plant's above ground stems being pressed flat against the ground, breaking (usually at ground level) or becoming completely detached from the plant).

Equipment was moved into Site 22250 along the access route with plant salvage occurring ahead of the equipment. The access route to Site 22250 is approximately 2 miles long and extended from the park boundary near a thermo-electric generator station on Yellow Cat Flat, crossing Salt Wash Canyon, and then traversing rolling slickrock of the Moab Member of the Entrada Formation with its islands of overlying blackbrush-dominated Tidwell Member (of the Morrison Formation), crossing an upper reach of Clover Canyon just northwest of the work area. A bridge was constructed and the banks of the wash were modified for the track hoe and one bulldozer to cross Salt Wash. Southwest of Salt Wash the access route deviated from the pipeline right-of-way and followed a previously disturbed track, mainly across slickrock, for about ½ mile before rejoining the pipeline right of way. At the worksite, digging revealed a 1.5x.75 inch nick penetrating 47.3% of the thickness of the pipe.

The pipe anomaly was patched and the 30-foot section of pipe that was exposed was stripped of its old coating (which reduces corrosion) and new coating was applied. The pipeline was then backfilled and graded. It was necessary to harden a small ephemeral draw on the southwest edge of the anomaly site and rocks were placed in the draw to prevent erosion. After filling and grading were completed, approximately 150 blackbrush shrubs were transplanted back into the anomaly site as well as four Mormon teas (*Ephedra viridis*, *E. torreyana*) and three broom snakeweeds (*Gutierrezia microcephala*). Salvaged biological soil crust pieces were also placed near the transplants. The site was then hand raked to remove evidence of heavy equipment use, however, a large long dirt mound was left over the pipeline at the worksite. Any vegetation that was salvaged before the heavy equipment rolled in along the access route was replanted with the trackhoe and by hand and watered on the way out. The bridge structure at Salt Wash was removed and the banks were regraded. A bendway weir (rock check dam) was constructed in the channel of Salt Wash downstream of the pipeline to prevent erosion of the wash and exposure of the pipeline. A similar rock check dam was constructed adjacent to this in a small tributary drainage that showed erosion from earlier pipeline activities. Installation of jute erosion matting was placed along the banks of Salt Wash and along the steep sections of the access route on the slopes of Salt Wash Canyon, as well as on some sections of the flat terrace in the bottom of the canyon.

The access route to the Salt Valley site (Site 26520) is approximately 0.15 miles long and extends from the Salt Valley gravel road southwest to the anomaly site, generally following the pipeline right-of-way. Plants were salvaged prior to equipment moving along the access route. Site 26520 revealed that the pipe was buried eight to ten feet below the ground surface. The anomaly here consisted of approximately 30 feet of corrosion on the surface of the pipe, of the bottom of the pipe. Sandblasting the pipe coating was required to determine the type of repair needed then the section was recoated and backfilled. The site was regraded to match the adjacent contours; however, a large long dirt mound was left over the pipeline at the worksite. Approximately 27 blackbrush were transplanted back into the site, along with one rabbitbrush (*Chrysothamnus nauseosus* var. *junceus*), one snakeweed (*Gutierrezia* spp.), one cliff rose (*Purshia stansburiana/mexicana*) and two Utah junipers (*Juniperus osteosperma*). Salvaged biological soil crusts were placed near some transplants. The site was hand-raked to remove evidence of heavy equipment use. Any vegetation that was salvaged before the heavy equipment rolled in along the access route was replanted by trackhoe and hand and watered.

The effectiveness of efforts to mitigate the impacts of anomaly repair to plant communities, soils, and the visual landscape would depend on several factors. Factors include transplant survival rate, tracked plant survival rate, seed germination and seedling survival rate as well as the effectiveness of the jute matting to prevent soil erosion by wind and water, and ability of soil crusts to regenerate, which would also prevent soil erosion. Future monitoring would help to determine the success rate of mitigation practices implemented on this 2009 anomaly work and help serve to guide future efforts of this nature. Williams would be monitoring these mitigation efforts as well as the NPS. To this date quantitative data has been collected regarding the transplanting and initial revegetation efforts undertaken but no quantitative results of viability of transplanted individuals or success of reseeding has been compiled.

Since these anomalies were actions requiring prompt pipeline inspection under DOT rules, there was not adequate time to complete an environmental assessment prior to investigating the anomalies. However, impacts to park resources by similar continued activities would prevent long-term restoration and prolong the incompatibility of pipeline operations with National Park preservation goals. This EA/AEF would plan for potential future repairs and include both the mitigation measures that were developed for the 2009 DOT-mandated repair work, and those that would be implemented for future maintenance activities.

Purpose and Need

The proposed action of this compliance document is to renew an existing SUP authorization for a buried natural gas pipeline for a term of five years. The pipeline is 26 inches in diameter and the corridor is 50 feet wide and 7.2 miles long across Arches National Park. Maintenance activity along the pipeline could require use of a wider zone at a given work site. In issuing previous SUPs, formal environmental analysis and documentation has never been completed. Movement of equipment can result in impacts to soils, soils stability, vegetation and wildlife. Repeated maintenance activity can prevent or delay restoration efforts because of the repeated disturbance.

The need for the project renewal does not necessarily benefit the park, but the need for action is to provide a continuous supply of natural gas to existing customers who are dependent on the pipeline in the nearby town of Moab as well as natural gas consumers in Utah, Wyoming, Idaho, Oregon and Washington. Park managers must focus on mitigating potential impacts from the continued operation of the pipeline within the park during the permit term.

This is also the opportunity for park management to document the past winter's maintenance work's impact to park resources and consider actions necessary to mitigate those impacts and the impacts from future pipeline maintenance activities. This EA/AEF would formalize those actions for a SUP and maintenance agreement with Williams.

Proposed maintenance activities include surveys of the pipeline by foot, by air, and possibly by vehicle; erosion control; recoating or replacing sections of the pipeline; repair of the cathodic protection system on the pipeline and conducting PIG runs. Various activities can result in minor to adverse impacts on park resources. Moving big equipment along the pipeline and digging up sections of pipe for recoating or replacement can create significant adverse impacts to park resources, visitor experience, and park values.

The purpose of the proposal is to evaluate the impacts of issuing a SUP to facilitate the maintenance of Williams Northwest Pipeline facility within the park boundaries for the

next five-years. The stated goals and objectives of the pipeline maintenance SUP would adhere to current plans and policies of the NPS. The project is needed to accomplish the following objectives:

1. To facilitate the maintenance of the Williams Northwest Pipeline facility that meets current safety standards and structural requirements.
2. Analyze the past, present, and anticipated effects of pipeline maintenance on park resources.
3. Establish mitigation measures for anticipated pipeline maintenance.

Relationship to Other Plans and Policies

Current plans and policy that pertain to this proposal include the 1989 Arches National Park *General Management Plan* (NPS 1989), the 2006 *Transportation Implementation Plan* (NPS 2006), and the 2006 *Management Policies* (NPS 2006). Following is more information on how this proposal meets the goals and objectives of these plans and policies:

- This project is consistent with the 1989 Arches National Park *General Management Plan*, which proposes the continuation of the SUP until such a time the pipeline requires entire replacement or reconstruction. Once the life of the pipeline is exhausted it would be abandoned. Future pipeline expansion (known as “looping”) would occur with a right-of-way located outside of the park.
- The Transportation Implementation Plan and Environmental Assessment from September 2006 address plans to enlarge the Sand Dune Arch parking area. This plan recommends a parking area which would include spaces for 15 vehicles. Areas of pavement in the current parking lot would be removed and the natural landscape restored. New disturbance would include approximately 12,650 square feet. The new parking lot would be designed to fit sensitively on the landscape. The center of the proposed parking lot is approximately 530 feet from the pipeline. Currently visitors using the Sand Dune Arch Parking Lot cross over the pipeline on the foot trail leading to Broken Arch. Should the footprint of the parking lot change, Williams would need to be advised and involved in the planning.
- The 1974 Wilderness Recommendation states that areas that contain underground utilities such as gas pipelines and transmission lines would not be excluded from wilderness designation solely for this reason. Where the pipeline occurs the area may be included by making specific mention of it in the proposal legislation indicating that this use would continue and previously established maintenance practices would be allowed to continue.
- The proposal is consistent with the goals and objectives of the 2006 *National Park Service Management Policies* (NPS 2006) that state that special park uses (section 8.6.1) are defined as an activity that takes place in a park area, and that provides a benefit to an individual, group, or organization rather than the public at large; requires written authorization and some degree of management control from the Service in order to protect park resources and public interest; is not prohibited by law or regulation; is not initiated, sponsored, or conducted by the Service; and is not managed under a concession contract, a recreation activity for which the NPS charges a fee, or a lease.

Appropriate Use

Section 1.5 of *Management Policies* (2006), "Appropriate Use of the Parks," directs that the National Park Service must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it would not result in unacceptable impacts.

Section 8.1.2 of *Management Policies* (2006), "Process for Determining Appropriate Uses," provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the Service; and
- whether the public interest would be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it.

The SUP permits access for allowed pipeline maintenance across Arches National Park which has been determined as an accepted action as stated in the park's general management plan and other related park plans until the life of the pipeline is exhausted, or requires looping. With this in mind, the NPS finds that issuing the SUP with the mitigations and restrictions identified in this EA/AEF is an acceptable use at Arches National Park for the next five to ten years.

The next question is whether such use, and the associated necessary and appropriate impacts, can be sustained without causing unacceptable impacts to park resources and values. That analysis is found in the *Environmental Consequences* chapter.

Scoping

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Arches National Park conducted internal scoping with appropriate National Park Service staff, as described in more detail in the *Consultation and Coordination* chapter. The park also conducted external scoping with the public and interested/affected groups and Native American consultation.

External scoping was initiated with the distribution of a scoping brochure to inform the public of the proposal to evaluate the impacts of issuing a SUP to facilitate the maintenance of Williams Northwest Pipeline facility within the park boundaries for the next five-years and to generate input on the preparation of this EA/AEF. The scoping brochure dated August 20, 2009 was mailed to interested parties, various federal and state agencies, affiliated Native American tribes and local governments. Scoping information was also posted on the park's website and in PEPC.

During the 30-day scoping period, two public responses were received. Two Native American tribes responded with no objection to the proposed project and a request to be kept informed of the project's progress. More information regarding external scoping and Native American consultation can be found in *Comments and Coordination*.

Impact Topics Retained for Further Analysis

Impact topics for this project have been identified on the basis of federal laws, regulations, and orders; NPS 2006 *Management Policies*; and National Park Service knowledge of resources at Arches National Park. Impact topics that are carried forward for further analysis in this EA/AEF are listed below along with the reasons why the impact topic is further analyzed. For each of these topics, the existing setting or baseline conditions (i.e. affected environment) within the project area would be used to analyze impacts against the current conditions of the project area in the *Environmental Consequences* chapter.

Geologic Resources

Section 4.8 of National Park Service's 2006 *Management Policies* addresses geological resource management including geologic features and processes. This policy states the NPS would maintain and preserve and protect geological resources as integral components of park natural systems.

Arches National Park preserves over 2,000 natural sandstone arches, like the world-famous Delicate Arch, as well as many other unusual rock formations. In some areas, the forces of nature have exposed hundreds of millions of years of geologic history. The extraordinary features of the park create a landscape of contrasting colors, landforms and textures that is unlike any other in the world. The Williams Northwest Pipeline is buried underground, in several different sedimentary formations as it traverses the park. These geological formations could be impacted from maintenance activities along the pipeline. Therefore, geological resources would be retained for further analysis.

Paleontological Resources

Paleontological resources (fossils and their associated data) are a major source of evidence of past life. They are the basis for our understanding of the history of life on Earth, and are an integral part of our planet's biodiversity.

NPS regulations at 36 CFR §2 prohibit possessing, destroying, injuring, defacing, removing, digging, or disturbing paleontological resources from their natural state on federally-owned NPS lands.

Arches National Park is rich in paleontological resources. Surveys have discovered many dinosaur bones, track sites and fossils. The Morrison and Kayenta Formations are known for their abundance of fossils and the Williams Northwest Pipeline is buried in some areas within these sedimentary formations as well as others. Therefore, paleontological resources would be retained for further analysis.

Soils

According to the National Park Service's 2006 *Management Policies*, the NPS would strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

A large percentage of Arches National Park's land surface is exposed bedrock or shallow soil over bedrock with sparse land cover. The majority of these soils along the pipeline

are generally very susceptible to damage by trampling from unplanned foot traffic at areas of concentrated visitor use, such as parking areas, trails and worksites. Therefore, soil would be retained for further analysis.

Biological Soil Crusts

Biological soil crusts cover much of Arches National Park and are present near most areas along the pipeline. 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.

Construction activities, motor vehicles, foot traffic, and visitors 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. Therefore, biological soil crusts would be retained for further analysis.

Native Vegetation

According to the National Park Service's 2006 *Management Policies*, the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants. The pipeline route through Arches National Park crosses 15 of the 34 primary vegetation map units employed in the recently completed vegetation mapping project for the park. Common species along the pipeline include blackbrush (*Coleogyne ramosissima*), rabbitbrush (*Chrysothamnus spp.*), sagebrush (*Artemisia spp.*), Indian ricegrass (*Stipa hymenoides*), with occasional junipers (*Juniperus osteosperma*). Greasewood (*Sarcobatus vermiculatus*) dominates the benchland in the bottom of Salt Wash Canyon and a few cottonwoods (*Populus fremontii*), tamarisk (*Tamarix chinensis*) and riparian herbaceous species are found where the pipeline crosses Salt Wash.

In order to access and repair the anomalies in February/March 2009, it was necessary to move heavy equipment and support vehicles across the landscape on or near the pipeline corridor. As a result, repair activities caused the disturbance of established vegetation and soils along the access routes as well as within the work sites. The potential maintenance projects along the pipeline may have the same adverse impact to established vegetation. Construction activities also have the opportunity to introduce non-native vegetation into the park. Therefore, vegetation would be retained for further analysis.

Non-Native Species

According to NPS 2006 *Management Policies*, "Native species" are defined as all species that have occurred or now occur as a result of natural processes on lands designated as units of the national park system. Native species in a place are evolving in concert with each other. "Exotic species" are those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as non-native, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place."

Executive Order #13112 (Invasive Species) was signed in 1999, "...to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause..."

Construction activities have been known to introduce non-native species into parks and non-native species thrive in disturbed areas. Non-native species have been found in several locations along the pipeline. Crested wheatgrass, found only along the pipeline in the park, and Russian thistle, more common in the disturbed zone along the pipeline, are the most prevalent. Any proposed maintenance activity along the pipeline has potential to introduce or exacerbate non-native species in the park. Therefore, non-native species would be retained for further analysis.

Water Resources

National Park Service policies require protection of water quality consistent with the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To enact this goal, the U.S. Army Corps of Engineers has been charged with evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the United States.

The pipeline is buried under many ephemeral but usually dry washes in the park, as well as two washes with more frequent and significant flows: upper Salt Wash in the northeast corner of the park, which flows much of the year and after floods, and Salt Valley Wash, which floods rarely but sometimes spectacularly. The pipeline also crosses another important park watercourse, Courthouse Wash, about one mile upstream of the park boundary. At times, erosion of sediment from flash flood events has exposed the pipeline within Salt Wash and other various washes. Planned maintenance of the pipeline includes erosion control by installing gabion baskets, benway weirs and upstream flow control devices in the washes or streams. Therefore, water resources would be retained for further analysis.

Floodplains

Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The National Park Service under 2006 *Management Policies* and Director's Order 77-2 *Floodplain Management* would strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 *Floodplain Management*, certain construction within a 100-year floodplain requires preparation of a statement of findings for floodplains.

Salt Wash is within an extreme flood regulatory floodplain as are most of the water courses that cross the pipeline. However, an underground pipeline is innocuous to floodplain issues and does not require a statement of findings. If maintenance activities would require digging out around sections of the pipeline within these floodplains then the floodplain values have the potential to become impacted. Therefore, floodplains would be retained for further analysis.

Wetlands

For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, §404 of the Clean Water Act authorizes the U.S. Army

Corps of Engineers to prohibit or regulate, through a permitting process, discharge or dredged or fill material or excavation within waters of the United States. National Park Service policies for wetlands as stated in 2006 *Management Policies* and Director's Order 77-1 *Wetlands Protection*, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

In accordance with DO 77-1 *Wetlands Protection*, proposed actions that have the potential to adversely impact wetlands must be addressed in a statement of findings for wetlands. However, the pipeline does qualify as an exempted action according to the Wetlands Procedural Manual which requires several best management practices (mitigation measures) be followed for NPS actions that may have adverse impacts on wetlands.

Perennial stream flow in much of Salt Wash makes it an important corridor for wetlands in the park. As stated previously, the pipeline crosses Salt Wash. Salt Wash is also a Water of the United States (WOUS) as it flows into the navigable waters of the Colorado River. Anticipated maintenance activities along the pipeline have the potential to adversely impact wetlands. Therefore, wetlands would be retained for further analysis.

Threatened, Endangered and State/NPS Species of Concern

The Endangered Species Act of 1973 requires examination of impacts on all federally-listed threatened, endangered, and candidate species. Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service (or designated representative) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, the NPS 2006 *Management Policies* and Director's Order-77 *Natural Resources Management Guidelines* require the National Park Service to examine the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). For the purposes of this analysis, the U.S. Fish and Wildlife Service (USFWS) and the Utah Division of Wildlife (UDOW) were contacted with regards to federally- and state-listed species to determine those species that could potentially occur on or near the pipeline.

The Migratory Bird Treaty Act, 16 United States Code Sections 703-707, prohibits any "take" of migratory birds. The definition of take includes the killing, possessing, or collecting of migratory birds. Migratory birds are listed in the Code of Federal Regulations, Part 50, §10.13.

An email from the USFWS dated September 10, 2009 submitted a county by county list of threatened and endangered species. With regard to Grand County, there are no records of threatened or endangered species in the project area, and no further consultation under §7 of the Endangered Species Act are necessary (USFWS 2009). A species list was retrieved from the UDOW website (UDOW 2009) and several state-listed species have been known to occupy Arches National Park (NPS 2009). Although it was determined after a wildlife survey by a SEUG wildlife biologist that there are neither migratory birds, nor active raptor nests within one mile of the pipeline, there is potential habitat for the migratory Mexican spotted owl and Southwestern willow flycatcher within the Salt Wash area of the pipeline. Also there is potential habitat for white-tailed prairie dogs and burrowing owls in Salt Valley. Therefore, threatened and endangered species would be retained for further analysis.

Archeological Resources

The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve cultural resources for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources. The National Park Service would protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with the policies and principles contained in the 2006 *Management Policies* and the appropriate Director's Orders.

Section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Park Service's Director's Order-28 *Cultural Resource Management Guideline*; and National Park Service 2006 *Management Policies* require the consideration of impacts on historic properties that are listed on or eligible to be listed in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with State Historic Preservation Officers (SHPO) regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

In addition to the National Historic Preservation Act and the National Park Service 2006 *Management Policies*, the National Park Service's Director's Order-28B *Archeology* affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the National Park System. As one of the principal stewards of America's heritage, the National Park Service is charged with the preservation of the commemorative, educational, scientific, and traditional cultural values of archeological resources for the benefit and enjoyment of present and future generations. Archeological resources are nonrenewable and irreplaceable, so it is important that all management decisions and activities throughout the National Park System reflect a commitment to the conservation of archeological resources as elements of our national heritage.

The pipeline was surveyed, and archeological sites were identified in and near the immediate project area (Berry 1975, Woods Canyon 2009). Although effects from the original pipeline installation are apparent along the pipeline, intact cultural deposits of artifacts or other subsurface materials do exist, therefore this topic would be retained for further analysis.

Ethnographic resources

Ethnographic resources are defined by the National Park Service as a "site, substance, object landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order -28). Although no formal survey has been conducted, the monument may have a number of resources that could be considered ethnographic.

Executive Order 13007 directs federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. Specifically, federal agencies are directed to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical

integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

Arches National Park has identified Purple sage (*Poliomintha incana*), in consultation with the Uinta and Ouray Ute, as an example of an ethnobotanical resource with traditional cultural significance. A large area of Purple sage has been found within the pipeline corridor near the southwestern park boundary. The NPS has initiated additional consultation with the Ute Indian Tribe. Since ethnographic resources exist within the area and impacts may be minor to moderate, this topic would be retained for further analysis.

Wilderness

The Wilderness Act of 1964 declares that Wilderness areas would be devoted to the "public purposes of recreation, scenic, scientific, educational, conservation and historical use". Director's Order-41 was developed to guide Service-wide efforts in meeting the letter and spirit of the 1964 Wilderness Act.

The National Park Service's 2006 *Management Policies* states that the NPS would manage Wilderness for use and enjoyment of the American people in such a manner as would leave them unimpaired for future use and enjoyment as Wilderness. Section 6 of the 2006 *Management Policies* states "All NPS lands would be evaluated for their eligibility for inclusion within the national wilderness preservation system. For those lands that possess wilderness characteristics, no action what would diminish their wilderness eligibility would be taken until after Congress and the President have taken final action. Wilderness considerations would be integrated into all planning documents to guide the preservation, management, and use of the park's wilderness area and ensure that wilderness is unimpaired for future use and enjoyment as wilderness."

Six units of Wilderness totaling 73,309 acres are recommended for designation as Wilderness in Arches National Park (NPS 1986). These units, except for roads and the visitor center area comprise nearly the entire park. According to the 1974 Wilderness Recommendation, the pipeline would not be excluded from wilderness designation but would have included in proposed legislation specific mention that pipeline use would continue and previously established pipeline maintenance practices would be allowed to continue. Any maintenance along the pipeline has the potential to greatly impact Wilderness character and values in the park. Therefore, wilderness would be retained for further analysis.

Natural Soundscape

In accordance with 2006 *Management Policies* and Director's Order-47 *Sound Preservation and Noise Management*, an important component of the National Park Service's mission is the preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among National Park Service units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

During construction, human-caused sounds would likely increase due to construction activities, equipment, vehicular traffic, and construction personnel. Noise generated by

construction activities would dominate during daylight hours, and may be at medium or lower levels for a majority of the time. Site specific areas may experience noise at higher levels during daylight hours. These human-generated sounds may have adverse impacts to the natural soundscape. Therefore, soundscapes would be retained for further analysis.

Visual Resources

The 2006 *Management Policies* states that scenic views and visual resources are considered highly valued associated characteristics. There are no regulations requiring special protection of these integral vistas, but NPS would strive to protect these park-related resources through cooperative means.

More than seven miles of the Williams Northwest Pipeline cuts through Arches National Park and is buried underground. In many locations the scar/road created from annual surveys and maintenance activities along the pipeline are obvious. Visitors, some unknowingly, have used the pipeline as a trail. The pipeline carsonite marker posts are also a visual intrusion among the natural desert landscape. Maintenance activities using heavy equipment, vehicles, and low level flights along the pipeline may have the potential to adversely affect the visual environment. Therefore, visual resources would be retained for further analysis.

Visitor Use and Experience

According to NPS 2006 *Management Policies*, the enjoyment of park resources and values by people is part of the fundamental purpose of all park units (NPS 2006). The National Park Service is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and would maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, the National Park Service would provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks. The National Park Service 2006 *Management Policies* also state that scenic views and visual resources are considered highly valued associated characteristics that the National Park Service should strive to protect (NPS 2006). Also in accordance with NPS 2006 *Management Policies*, policy states that the National Park Service and its concessionaires, contractors, and cooperators would seek to provide a safe and healthful environment for visitors as well as employees.

Arches National Park averages 800,000 visitors annually and in 2008, the park received 928,795 visitors. Since Arches National Park is a highly visited park and the visual impacts from pipeline employees and the roads/scar developed along the pipeline corridor from vehicles and maintenance equipment and low level flights have the potential to impact the visitor's experience. In several locations along the pipeline, visitors use the corridor as a "trail" in the backcountry. Also, the low-risk hazards of potential leaks or pipeline rupture from un-maintained sections of pipeline have the potential for significant impacts to the safety of park visitors and staff. Therefore, visitor use and experience would be retained for further analysis.

Park Operations

Although the Williams Northwest Pipeline is operated and maintained by the Williams Company, park operations would be affected by any proposed maintenance along the pipeline. Under either alternative, park managers would need to go out to the pipeline and evaluate proposed activities and analyze those impacts on the environment. Some projects would require that park personnel would need to drop everything to evaluate the project and some projects would require that park personnel be present for the

duration of certain projects. Impacts to park operations may be adverse and may have short-to-long term effects. Therefore, park operations would be retained for further analysis.

Impact Topics Dismissed from Further Analysis

In this section of the EA/AEF, NPS provides a limited evaluation and explanation as to why some impact topics are not evaluated in more detail. Impact topics are dismissed from further evaluation in this EA if:

- they do not exist in the analysis area, or
- they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected, or
- through the application of mitigation measures, there would be minor or less effects (i.e. no measurable effects) from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic.

Due to there being no effect or no measurable effects, there would either be no contribution towards cumulative effects or the contribution would be low. For each issue or topic presented below, if the resource is found in the analysis area or the issue is applicable to the proposal, then a limited analysis of direct and indirect, and cumulative effects is presented. There is no impairment analysis included in the limited evaluations for the dismissed topics because the NPS's threshold for considering whether there could be an impairment is based on "major" effects.

Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific programs that provide special protection for air resources and air quality related values associated with National Park Service units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts (EPA 2009).

Arches National Park is designated as a Class I air quality area under the Clean Air Act. The law requires for Class I areas that ambient air quality must essentially remain unchanged and cannot sustain increases in air pollution above baseline levels. Construction activities such as hauling materials and operating heavy equipment would result in temporary increases of vehicle exhaust, emissions, and fugitive dust in the general project area. Any exhaust, emissions, and fugitive dust generated from construction activities would be temporary and localized and would likely dissipate quickly throughout the immediate area. Overall, the project could result in a negligible degradation of local air quality, and such effects would be temporary, lasting only as long as construction. The Class I air quality designation for the park would not be affected by the proposal. Further, because the Class I air quality would not be affected, there would be no unacceptable impacts; the proposed actions are consistent with §1.4.7.1 of NPS 2006 *Management Policies*. Because there would be negligible effects on air quality, and the proposed actions would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Wildlife

Other than the Endangered Species Act, there are also several other federal laws governing non-sensitive wildlife in general. The Lacey Act of 1900, 16 U.S.C. § 3371–3378, is a federal law that prohibits the transportation of illegally captured or prohibited animals across state lines. The Migratory Bird Treaty Act, 16 U.S.C. §703-707, prohibits any “take” of migratory birds. The definition of take includes the killing, possessing, or collecting of migratory birds. Migratory birds are listed in the Code of Federal Regulations, Part 50, §10.13. The NPS has developed policies and guidance on the topic of non-sensitive wildlife management. Section 4.4 of 2006 *Management Policies* addresses biological resource including general wildlife management. This policy states the NPS would maintain as part of the natural ecosystems of the parks all native plants and animals.

The terrestrial wildlife species found around the Williams Northwest Pipeline consists of mostly desert-adapted small mammals, birds and reptiles. There are a variety of bird species that are primarily concentrated in streamside vegetation. Avian species that may exist in or near the pipeline are mostly raptors and desert-dwelling birds. After a wildlife survey conducted by a SEUG wildlife biologist it was determined that any maintenance activities or sounds generated from construction would be temporary, lasting only as long as the construction activity is generating the sounds, and would have a negligible to minor adverse impact on wildlife. Raptors and their spatial and seasonal buffers would be included in the Threatened, Endangered and Species of Special Concern section and the mitigation measures section. Further, such negligible or minor impacts would not result in any unacceptable impacts. The effects are minor or less in degree and would not result in any unacceptable impacts. Therefore this topic is dismissed from further analysis in this document.

Cultural Landscapes

Cultural landscapes are settings humans have created in the natural world. They reveal the ties between the people and the land. These ties are based on the need to grow food, build settlements, recreate, and find suitable land to bury their dead. They range from prehistoric settlements to cattle ranches, from cemeteries to pilgrimage routes. They are the expressions of human manipulation and adaptation of the land. One cultural landscape inventory has been done and the Wolfe Ranch Historic District is within a cultural landscape, but this area is not near the pipeline and would not be impacted. After analyzing proposed actions of maintaining the pipeline, maintenance activities would not detract from the integrity of possible cultural landscapes along the pipeline. The pipeline has been maintained within the park since 1955 and the vegetative community within the pipeline corridor has been continually impacted. Any spatial arrangement, vegetation and visual resources that would impact the potential of a cultural landscape would be negligible and the impacts to cultural resources would not result in any unacceptable impacts. Therefore, this topic is dismissed from further analysis in this document.

Historic Structures

§106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Park Service’s Director’s Order-28 *Cultural Resource Management Guideline*; and National Park Service 2006 *Management Policies* require the consideration of impacts on historic structures that are listed on or eligible to be listed on the National Register of Historic Places. The National Register is the nation’s inventory of

historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with State Historic Preservation Officers regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

The term “historic structures” refers to both historic and prehistoric structures, which are defined as constructions that shelter any form of human habitation or activity. Because there are no historic structures in the project area, there would be no unacceptable impacts. Therefore, this topic is dismissed from further analysis in this document.

Museum Collections

According to Director’s Order 24, *Museum Collections*, the National Park Service requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections. Curatorial workload would be considered and should be included in the Williams Company project budget regarding cultural resource surveys/collections along the pipeline. Any artifacts that are collected along the pipeline from the archeological surveys and sites are part of the NPS but would not have greater than minor impact to the NPS museum staff and collections. Therefore, this topic is dismissed from further analysis in this document.

Energy Resources

NPS 2006 *Management Policies* state, “The National Park Service would conduct its activities in ways that use energy wisely and economically. Park resources and values would not be degraded to provide energy for NPS purposes. The Service would adhere to all federal policies governing energy and water efficiency, renewable resources, use of alternative fuels, and federal fleet goals as established in the Energy Policy Act of 1992.”

The Williams Northwest Pipeline does not supply natural gas to Arches National Park and the maintenance of this pipeline would be conducted by Williams’s personnel. The park does not have a say in how Williams’s facilities, vehicles, and equipment should be operated as to minimize the consumption of energy, water and non-renewable fuels. The park would not employ energy efficient methods in maintaining this pipeline nor is any facility construction proposed. The impacts to energy resources along the pipeline would be less than minor and there would be no unacceptable impacts. Therefore, this topic is dismissed from further analysis in this document.

Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture’s Natural Resources Conservation Service (NRCS), and is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the NRCS, the project area does not contain prime or unique farmlands (NRCS 2003). There would be negligible effects on prime and unique farmlands. Therefore, this topic is dismissed from further analysis in this document.

CHAPTER 2: ALTERNATIVES CONSIDERED

During June 2009 an interdisciplinary team of National Park Service employees met for the purpose of developing project alternatives. This meeting resulted in the definition of project objectives as described in the *Purpose and Need*, and a list of alternatives that could potentially meet these objectives. A total of four alternatives were originally identified for this project. Two alternatives were dismissed from further consideration for various reasons, as described later in this chapter. The no action alternative and the one action alternative are carried forward for further evaluation in this EA/AEF. A summary table comparing alternative components is presented at the end of this chapter.

Alternatives Carried Forward

Alternative A- No Action

The No Action Alternative is required under NEPA and establishes a baseline for comparing the present management direction and environmental consequences of the action alternative. Under the No Action Alternative the park would continue current management of the pipeline. A SUP would be issued without conducting a thorough environmental analysis on park resources along the entire pipeline. This alternative would only evaluate environmental impacts to resources as each individual project or maintenance activity arises along the pipeline. A separate NEPA document would be initiated for each proposed task. Under DO-12, the only natural gas pipeline maintenance activities that are covered under a Categorical Exclusion (CE) involve:

“Routine maintenance and repairs to non-historic structures, facilities, utilities, grounds, and trails”.

In addition to meeting this criterion, the proposed maintenance activities must also have no measurable impacts to qualify as a CE. Measurable impacts are those that the interdisciplinary team determines to be greater than minor by the analysis process described in DO-12. For effects to be minor, a relatively small number of resources would be affected. Minor impacts typically require considerable scientific effort to measure, are limited in size, are much localized in area, and have barely perceptible consequences.

Any proposed activities that are not covered under a CE or under another existing NEPA document would require preparation of additional NEPA documents, such as an Environmental Assessment (EA) or Environmental Impact Statement (EIS). This alternative would slow down or possibly stop necessary maintenance activities from occurring in a timely manner. No maintenance activity that is the subject of an ongoing NEPA analysis should be taken until the NEPA process is complete.

Emergencies requiring immediate action are exempt from this EA/AEF, regardless of whether the actions have the potential for significant impact. In the event of an emergency, immediate action would be taken to prevent or reduce either the risks to public health or safety or serious resource losses. After the emergency maintenance has been performed, any additional maintenance would require compliance with NEPA and NHPA prior to work commencing.

The following pipeline activities have occurred annually or in the past. Under Alternative A, each activity would require separate NEPA/NHPA compliance to be complete prior to the non-emergency activity occurring within Arches National Park:

Survey Work along Pipeline:*Leak Detection Survey*

This survey is conducted during the driest time of year and consists of one individual walking the pipeline with a laser gas detector to determine if leaks are present in the pipeline. If a leak is detected it is considered to be an emergency and requires immediate repair. Upon notifying park personnel, the work would begin immediately. Leak repair requires vehicle access and some or all of the following equipment: 2 large tracked excavators, 1 side boom used to remove and replace the pipe, 2 welding trucks, 2 air compressors/sandblasters, 3 vehicles capable of transporting safely approximately 12 individuals, 1 tool trailer and 2 bulldozers, if crossing Salt Wash Canyon.

Close Interval Survey

This survey is conducted when the soils are wet, most likely during springtime. Two individuals walk the pipeline right of way with equipment designed to detect the loss of a low voltage current sent through the pipeline wall. If loss of current is detected a project would be created to excavate and recoat the pipeline. For equipment requirements please refer to recoating activities noted in Alternative B.

Low Level Flight Survey

This survey is conducted typically during the third week in May. A helicopter is flown approximately forty feet above the pipeline corridor. The purpose is to look for erosion, exposed pipe, slides, leaks, encroachments, and any other activity along the right of way that could possibly cause damage to the pipeline. Upon completion of the flight, a plan of action is created to correct any noted problems.

Run Internal Inspection Tool (PIG)

Every 5-7 years Williams is required by the DOT to run a PIG. This only requires tracking the tool within the pipe through the park. Location detection would be set up at the intersections of existing roads and the pipeline. A surveying crew consisting of two individuals and one vehicle would be required.

Erosion Control Efforts:

Erosion is detected by walking or during a low level flight survey. Corrective action is required within a couple of weeks to avoid pipeline exposure. If the pipeline is exposed the corrective action is required within a week of discovery. The work is accomplished by hand-shoveling or installing flow control devices in the wash or stream that consist of: gabion baskets, bendway weirs, upstream flow control device, etc. The proposed equipment required includes some or all of the following: shovels, 1 backhoe or small track excavator, 1 vehicle capable of safely transporting approximately four individuals and the required equipment and materials.

Anomaly Investigation:

As required in the past, if an anomaly is detected during a PIG run, the extent of the damage and the scope of work must be reported to the Park Superintendent as soon as practical. The required response time for anomaly investigations are categorized as such: Emergency digs (wall loss of 70% or greater) to be completed within five days, Immediate Digs (wall loss of 50-69%) to be completed within 12 months after discovered, Normal Investigation (wall loss of 25-49%) to be completed within eighteen months after discovered. Follow-up investigations can be required after the inspection

tool has been verified through initial investigation; these anomalies are usually completed the following year, unless deemed otherwise. Under the regulations of the DOT, Williams is required to complete these investigations as noted. The pipeline can be repaired by replacement, a weld on repair sleeve, or a composite sleeve, depending on the severity of the anomaly. All of these require excavation and some or all of the following equipment: 2 large tracked excavators, 1 side boom used to remove and replace the pipe, 2 welding trucks, 2 air compressors/sandblasters, 3 vehicles capable of transporting safely approximately 12 individuals, 1 tool trailer, 2 bulldozers to aid in moving other vehicles on steep slopes. Sometimes the first crews into the anomaly site walk in from the nearest pipeline access point and dig by hand to locate the anomaly and assess the extent of pipeline damage, but this isn't practical if the pipeline is deeply buried at the anomaly location.

Alternative B –Proposed

Issue a SUP and evaluate the environmental impacts on park resources from anticipated pipeline maintenance. This alternative would analyze the impacts to park resources from proposed activities and would establish mitigation measures that would be followed by Williams to reduce the intensity of effects on park resources. This alternative would have all formal environmental compliance completed prior to a maintenance activity being conducted. Restoration plans would also be established prior to any proposed maintenance. The Vegetation Monitoring Plan found in Appendix B would be used to ensure restoration efforts would be successful. As long as the Williams Northwest Pipeline is located within Arches National Park, Williams has an obligation to ensure all restoration efforts and erosion control structures are efficiently maintained.

This alternative would include a broad analysis of potential impacts of various maintenance activities on environmental resources. These various maintenance activities are carried out to maintain the integrity and safety of the pipeline and the public. Some of these activities are completed on an annual basis, with other activities completed as required. Most of the work is required by the Office of Pipeline Safety and audited under the DOT and Office of Pipeline Safety. Activities that are consistent with those evaluated in this EA/AEF would document compliance with NEPA through this EA/AEF using a memo to file. Maintenance activities having associated potential impacts that have not been considered in this EA/AEF would require additional compliance with NEPA. Through using this process and through collaboration with NEPA Coordinators, resource managers would be able to confirm that Williams proposed maintenance activities meet the necessary NPS and NEPA environmental compliance requirements for resource protection.

The below noted maintenance work is an estimate of activities to be completed for approximately the next ten years. These are subject to change and are not all inclusive.

Survey Work along Pipeline:

Leak Detection Survey

This survey conducted during the driest time of year and consists of one individual walking the pipeline with a laser gas detector to determine if leaks are present in the pipeline. If a leak is detected it is considered to be an emergency and requires immediate repair. Upon notifying park personnel, the work would begin immediately. Leak repair would require vehicle access and some or all of the following equipment: 2 large tracked excavators, 1 side boom used to remove and replace the pipe, 2 welding trucks, 2 air compressors/sandblasters, 3 vehicles capable of transporting safely

approximately 12 individuals, 1 tool trailer, and 2 bulldozers, if crossing Salt Wash Canyon.

Close Interval Survey

This survey is conducted when the soils are wet, most likely during springtime. Two individuals walk the pipeline right of way with equipment designed to detect the loss of a low voltage current sent through the pipeline wall. If loss of current is detected a project would be created to excavate and recoat the pipeline. Recoating may require excavation with the following equipment: 1 large tracked excavator, 1 air compressors/sandblaster, 2 vehicles capable of transporting safely approximately 8 individuals, 1 tool trailer and 2 bulldozers, if crossing Salt Wash Canyon.

Low Level Flight Survey

This survey is conducted typically during the third week in May. A helicopter is flown approximately forty feet above the pipeline corridor. The purpose is to look for erosion, exposed pipe, slides, leaks, encroachments, and any other activity along the right of way that could possibly cause damage to the pipeline. Upon completion of the flight, a plan of action is created to correct any noted problems.

Run Internal Inspection Tool (PIG)

Every 5-7 years Williams is required by the DOT to run a PIG. This only requires tracking the tool within the pipe through the park. Location detection would be set up at the intersections of existing roads and the pipeline. A surveying crew consisting of two individuals and one vehicle would be required. This tool detects defects (anomalies) in the pipeline wall and provides the location of such.

Erosion Control Efforts:

Erosion is detected by walking or during a low level flight survey. Corrective action is required within a couple of weeks to avoid pipeline exposure. If the pipeline is exposed the corrective action is required within a week of discovery. The work is accomplished by hand-shoveling or installing flow control devices in the wash or stream that consist of: gabion baskets, bendway weirs, upstream flow control device, etc. The proposed equipment required includes some or all of the following: shovels, 1 backhoe or small track excavator, 1 vehicle capable of safely transporting approximately four individuals and the required equipment and materials.

Anomaly Investigations:

If an anomaly is detected during a PIG run, the extent of the detected damage and required response time would be required to be reported to the Park Superintendent or her next-in-command in a timely manner defined in the SUP. The scope of work would also be reported as soon as practical. The required response time for anomaly investigations are categorized as such: Emergency digs (wall loss of 70% or greater) to be completed within five days, Immediate Digs (wall loss of 50-69%) to be completed within 12 months after discovered, Normal Investigation (wall loss of 25-49%) to be completed within eighteen months after discovered. Follow-up investigations can be required after the inspection tool has been verified through initial investigation; these anomalies are usually completed the following year, unless deemed otherwise. Under the regulations of the DOT, Williams is required to complete these investigations as noted. The pipeline can be repaired by replacement, a weld on repair sleeve, or a composite sleeve, depending on the severity of the anomaly. All of these repairs require excavation and some or all of the following equipment: 2 large tracked excavators, 1 side boom used to remove and replace the pipe, 2 welding trucks, 2 air compressors/sandblasters, 3 vehicles capable of transporting safely approximately 12

individuals, 1 tool trailer and 2 bulldozers to aid in moving other vehicles on steep slopes. Sometimes the first crews into the anomaly site walk in from the nearest pipeline access point and dig by hand to locate the anomaly and assess the extent of pipeline damage, but this isn't practical if the pipeline is deeply buried at the anomaly location

Recalibration Anomaly Investigation:

Upon completion of anomaly repairs, the inspection tools' calibration is compared to the actual data collected during the repairs. The information is then reevaluated for possible errors or missed anomalies. If new anomalies are discovered they are repaired as follows: Emergency digs (wall loss of 70% or greater) to be completed within five days, Immediate Digs (wall loss of 51-70%) to be completed within the calendar year, Normal Investigation (wall loss of 71% or less) to be completed within eighteen months after discovered. The pipeline can be repaired by replacement, a weld on repair sleeve, or a composite sleeve, depending on the severity of the anomaly. All of these require excavation and some or all of the following equipment: 2 large tracked excavators, 1 side boom used to remove and replace the pipe, 2 welding trucks, 2 air compressors/sandblasters, 3 vehicles capable of transporting safely approximately 12 individuals, 1 tool trailer and 2 bulldozers to aid in moving other vehicles on steep slopes.

Recoating Sections of Pipeline:***Recoating in Salt Valley Wash***

Recoating of the pipeline may be required in Salt Valley Wash and various smaller nearby dry washes. The potential work to be completed in Salt Valley Wash is at the point where the dirt road crosses the pipeline. During the maintenance operation the Salt Valley Wash road would be required to be closed, due to safety concerns. The area would require excavation and recoating. Upon complete of the excavation, a concrete protection pad would be poured to protect the pipeline from traffic and any further erosion. The equipment proposed is as follows: 1 large tracked excavators, 1 large front end loader, concrete trucks, 1 air compressors/sandblasters, 3 vehicles capable of transporting safely approximately 12 individuals, and 1 tool trailer.

Recoating in Various Dry Washes

Recoating may be required in dry washes between various mileposts, due to age and possible erosion damage. This may require excavations using some or all of the following equipment: 1 large tracked excavator, 1 air compressors/sandblaster, 2 vehicles capable of transporting safely approximately 8 individuals, and 1 tool trailer.

Replace Underground Conduit from Cathodic Generator:

The underground conduit and wire from the generator site may need to be replaced due to age. This would require shallow excavation with the following equipment: 1 backhoe and 1 vehicle to transport personnel and equipment.

Potential Access Routes to Anticipated Maintenance Areas:

Access routes along the pipeline or near the pipeline would be evaluated by the NPS prior to maintenance being conducted.

The extent of the damage and the scope of work must be reported to the Park Superintendent as defined in the SUP. The equipment proposed to be used above is based on the worst case scenario. The minimum tools to accomplish the task must be presented in the scope of work as well.

In the event of an emergency, immediate action would be taken to prevent or reduce either the risks to public health or safety or serious resource losses. Emergencies requiring immediate action are exempt from this EA/AEF, regardless of whether the actions have the potential for significant impact. After the emergency maintenance has been performed, any additional maintenance would require compliance with NEPA and NHPA prior to work commencing.

Alternatives Considered and Dismissed

A number of alternatives were developed based on the results of internal and external scoping. Alternatives are different ways to meet the purpose and objectives, while resolving needs or issues. The following section discusses those alternatives considered but eliminated from further study. This discussion also includes an explanation of why these alternatives did not warrant additional analysis. These alternatives and issues were eliminated from detailed study because they did not meet the criteria below.

- (a) technical or economic infeasibility.
- (b) inability to meet project objectives or resolve need.
- (c) duplication with other, less environmentally damaging or less expensive alternatives.
- (d) conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement.
- (e) too great an environmental impact.

These alternatives were considered, but were eliminated from detailed study:

Alternative C- Do not Issue a Special Use Permit to the Williams Northwest Pipeline Company.

This alternative was eliminated from detailed study because not issuing a SUP to maintain the Williams Northwest Pipeline would not be feasible at this time. If the pipeline is not maintained, this alternative would have a conflict with park policy to provide for visitor and staff safety. Not maintaining the pipeline would cause significant safety issues and too great an environmental impact within the park. If a section of pipeline were to rupture or leak, visitors and park employees could be placed in harms way and resource impacts would be directly adverse and major.

Alternative D- Reroute the Pipeline around Arches National Park.

Although this alternative is the NPS's preferred alternative, this alternative was eliminated from detailed study because the various pipeline companies have relied on the permit to maintain the structure for fifty-four years in Arches National Park. According to the Williams Company it is also financially infeasible to move the pipeline out of the park at this time. A table top estimate to reroute the pipeline outside of the park boundaries would require 44 miles of pipeline to be rerouted and would cost an estimated \$131million.

Mitigation Measures Common to Both Alternatives

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects and are common to both alternatives.

General

- All pipeline workers would be at pre-work meetings that would include a briefing of sensitive resources and work restrictions within the park. At least one NPS staff member would be at the initial meeting to explain relevant aspects of NPS work stipulations. A biological monitor contracted by Williams and approved by the NPS, would be at each day's pre-work meeting and would ensure that any new workers are apprised of park regulations and expectations, and would also brief any visiting inspectors of NPS regulations.
- Only the minimum equipment necessary would be allowed for each repair project. This would be assessed based on the nature of each repair project and access to the site(s).
- Before any equipment is driven to a repair site, anomaly/repair site locations would be verified using walk-in crews with shovels. Exceptions would only be made if a sincere attempt at hand-digging fails (due to, for example, segments of pipe unusually deep or placed in a cut through solid rock). No vehicles of any kind would leave designated park roads before either: 1) the anomaly has been located, or 2) the NPS has agreed to an exemption following a failed hand-digging attempt.
- Access routes to project sites would be analyzed and approved prior to heavy equipment and vehicles being brought in to the work site.
- Vehicles and tools must be cleaned thoroughly before entering the park to avoid the possibility of bringing exotic plant seed or material into the park.
- Vehicles parked along the park main road or gravel roads must be parked in a wide place with good visibility or within a pullout without enlarging the pullout and tires must remain on the roadway. Tires would not be placed on plants or undisturbed soils. Flagging or cones should be placed so that oncoming traffic is warned of the parked vehicles.
- Larger vehicles, including heavy equipment and tool transports, must be mounted on tracks if they must leave designated park roads to traverse pipeline access routes within the park. Rubber tracked vehicles should be used where long runs over slickrock are necessary. Heavy equipment must remain at the site of the project during the period of time necessary to do repair work. It must not be driven out at night and back the next day. Tool-transport vehicle trips must be kept to a minimum; tool needs should be carefully planned to avoid extra trips.
- Smaller UTVs, with low-pressure tires may be used in some instances. If the worksite is 0.25 mile or less from a road, they may not be used. If between 0.25 and 1 to 1.5 miles from a road, workers must walk to site but one UTV may be driven in on the first day of a project and driven out on the last day, and used if needed for emergency transport. If distances are greater than 1.0 to 1.5 miles from a road (depending on terrain and steepness), UTVs may be used to transport work crews and inspectors. Trips using UTVs or tool transports should be kept to a minimum. UTVs must be driven slowly and carefully, so that no additional plants or undisturbed soils are run over after the first trip in. If these guidelines are not followed or if the number of trips is causing unacceptable damage to resources, personnel would be required to walk to the worksite.
- No ATVs are allowed per memo (A7619 IMDE-OSH) from the Regional Director of the Intermountain Region.

- Oil spill kits must be available for immediate use in the event of a ruptured line or spills from other sources.
- A portable backcountry toilet (type used by river runners) may be made available at the worksite and a privacy screen may be erected. A commercial type port-a-potty may only be used if parked on an existing park road pullout or parking area, and approved by the NPS.
- Open trenches left overnight must be barricaded so that safety of visitors and wildlife in the area is maximized.
- During operations one crew member would be tasked with watching for hikers in the area. If seen, the hiker(s) would be advised of a safe route around the work zone. Industry standard and company safety measures must be adhered to.
- All garbage from any pipeline project would be hauled out as the equipment leaves the worksite on the last day.

Geological and Paleontological Resources

- A contract paleontologist approved by the NPS must conduct a spot inspection prior to pipeline work to identify any potential fossiliferous bedrock (if any is present) within the proposed workspace for a dig site and the access route along pipeline corridor to dig site. This would be conducted when crossing higher-potential areas for fossils.
- A contract paleontologist approved by the NPS must also be onsite for the digging work to inspect any dirt moved for paleontological resources identified in the Paleontological Resources Analysis letter written by Erathem-Vanir Geological PLLC dated January 13, 2009. Any significant paleontologic material found must be set aside in a safe place, documented in writing, and the park Superintendent notified of the uncovered material. Williams is responsible for the cost of paleontological services.
- If any fossils of significance are discovered at any time, the NPS would be notified immediately. A letter of findings would be submitted to the NPS upon completion of the project.
- Measures would be taken to minimize marring slickrock with tracked vehicles or other heavy equipment.

Soils and Vegetation

- A contract restoration specialist and an biological monitor would be hired by Williams and approved by the NPS. They must consult with the NPS Resource Management Division regarding the plant salvage and re-vegetation plan at dig sites and along access paths. Depending on the scope of work proposed the NPS would use adaptive management techniques to decide if and when plants would be salvaged and/or if herbaceous native seeds would be used where appropriate.
- The environmental monitor must be familiar with the plants of the Arches National Park area (high desert, Colorado Plateau) and must accompany vehicles being driven in or out of the anomaly site to assist the driver in avoiding trees, shrubs, plants and soil crusts wherever possible. This monitor must be onsite throughout all of the pipeline work to ensure worker compliance with stipulations, and assist with restoration work.

- The contract restoration specialist would accompany the crews and instruct/help with salvaging small shrubs and plants that can't be missed when driving equipment in and before digging up the pipeline. A restoration company crew member must be present while driving equipment in the first day of the project and before any digging begins as well as on the last day(s) of the project when salvaged plants are replanted.
- If work site is within 1 to 1.5 miles of a road, workers must access site on foot. Only heavy equipment and tool transports would be allowed off road, unless pre-work meetings with NPS staff identify an acceptable UTV route.
- Only tracked vehicles or tracked trailers are allowed on the pipeline access route within the park except for UTV's with low pressure tires in some instances as described in the General section above.
- Soil conditions must be frozen or dry, not muddy when vehicles are driven in. If soil conditions become muddy to a degree that park resources or the access route would be impacted during the project, then work must shut down. Work may resume when conditions dry out.
- Equipment and transport vehicles would be kept to a minimum and would proceed so as to keep plant damage to a minimum, as described in the General section above.
- Vehicles would minimize running over plants in general, as described earlier. Shrubs may be straddled by the allowed high clearance vehicles.
- Wherever tracks or tires displace soil or sand, whether on a steep hill or elsewhere, progress would be slow and deliberately monitored so that heavy equipment or other responsible equipment can be stopped quickly when soil is being churned up, and salvaging can occur before more progress is made.
- On steep slopes, if equipment starts impacting soils, herbaceous plants including grasses may be salvaged from the vehicle route ahead of the vehicles for restoration purposes. This decision would be made by the NPS personnel or restoration specialist on site.
- To salvage topsoil: separate the top 3-8 inches of soil from underlying soils, then replace on top of surface when worksite is rehabilitated.
- To salvage soil crusts: Separate the top inch or two of soil from underlying soils, remove in sheets as large as possible, and store right-side up on cardboard or something similar and out of harm's way until work is complete. At work's completion, replace crusts right-side-up with their tops at the level of surrounding soils. The replaced crusts should be scattered through the disturbed area to facilitate soil crust regrowth throughout the area.
- As the NPS Resource Management Division learns more about plant salvaging success among various shrub species from 2009 pipeline repair and restoration efforts, certain shrub species would be selected for salvage. Any of these species in the path of tracks or tires would be salvaged, set aside and replanted during the restoration phase.
- Some shrubs and trees would be flagged by NPS staff or restoration specialist and these are to be avoided by the vehicles.

- To salvage plants: With the heavy equipment, carefully excavate shrub with rootball intact, and move to a low-impact nearby location,. Protect the rootball with burlap or other suitable material (if necessary), and keep moist. Salvaged plants would be replanted as the equipment is removed from the site when work is complete. Water would be carried in on the equipment to water plants well one time after transplanting.
- Certain suitable plant species (herbaceous, grasses, shrubs and trees) would be tracked or rolled over when they cannot be avoided by the equipment or are not flagged for salvage, to keep roots intact. Many of these would grow from their bases, depending on other variables.
- When entering and leaving work sites, vehicles as well as walking workers must follow the same vehicle tracks during each trip to minimize the extent of impact on vegetation and soils. Pipeline workers would avoid stepping on or crushing soil crusts not within treads on access routes or within immediate work areas.
- Pipeline crews would minimize the extent of extra workspace used at project dig sites especially where slopes may cause erosional issues.
- On steep access ramps, appropriate soil stabilization matting may be used especially on steep access ramps to help stabilize soil on the slopes, if approved by NPS Resource Management staff. This decision would be based in part on assessment of success of matting used in 2009 repairs within Salt Wash Canyon.
- Tracks would be raked out as equipment leaves the work site, limiting raking to actual tracks only. Hand rakes would be used. Thin soils on slickrock would only be lightly raked by hand to remove vehicle tracks.
- Restoration must include follow-up monitoring for three years or until restoration goals are met and should include monitoring components before the area is disturbed as well as immediately following initial restoration work. Additional planting or seeding may be necessary after initial restoration efforts

Water Resources including Floodplains and Wetlands

- Vehicles and equipment would not be driven up or down stream or wash channels. The number of vehicles would also be minimized as described earlier.
- Care must be taken to avoid any rutting caused by vehicles or equipment.
- Measures must be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering water sources.
- A bridge must be used when crossing Salt Wash.
- Appropriate erosion and siltation controls must be maintained during construction, and all exposed soil or fill material must be permanently stabilized after equipment leaves the work site and access routes.
- Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preconstruction elevations.
- Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats or some other semi-permeable surface, or

comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland. If using straw bales, they should not contain any seed.

- Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable.

Threatened, Endangered and Species of Special Concern

- Prior to maintenance activities, areas that are potential habitat for listed wildlife species or species of concern would be resurveyed. If listed species are found in the vicinity of work sites, activities would be limited to ones that are unobtrusive or to times of the year when the listed species are not present or less affected by disturbance.
- Maintenance activities would maintain a spatial buffer of one mile from occupied Mexican spotted owl nesting sites, if found in the vicinity of work sites, and a seasonal buffer from March 1 through August 31 would be maintained to protect breeding and nesting owls.
- Maintenance activities would maintain a seasonal buffer from early May through mid September to protect nesting and fledgling Southwestern willow flycatchers, if occupied nests found within one quarter mile of work sites.
- Maintenance activities would maintain a spatial buffer of half a mile or ¼ mile if not in "line-of-site", if occupied raptor nesting sites are found in the vicinity of work sites. Seasonal buffers are species specific and would be maintained as well.

Cultural Resources

- A contract Archeologist who qualifies under the Secretary of the Interior's Standards must be onsite during all work periods and especially to observe any digging to inspect any dirt moved looking for archeological material that was not discovered during previous survey's. Archeological material that can provide occupational and/or temporal information (i.e. projectile points, ceramics, features, etc.) must be collected, their description and location documented with photographs and/or in writing, and the park Superintendent notified of the uncovered material. All maintenance activities would be halted until the materials can be analyzed and recovered. The state historic preservation officer and the Advisory Council on Historic Preservation, would be consulted as necessary, according to §36 CFR 800.13, *Post Review Discoveries*. If needed, formal §106 compliance would be conducted prior to resuming construction. The material, along with related data, would be given to the park archeologist at the completion of the project. Williams Company is responsible for the cost of archeological services.
- In the event that human remains are discovered during maintenance activities, all work on the project must stop and the park archeologist contacted immediately. As required by law, the coroner would be notified first. All provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.
- Pipeline workers would refrain from taking archaeological artifacts, rocks, plants or other natural or cultural objects.

- Vehicles and equipment should remain along the pipeline corridor and/or surveyed access routes driving in and out of project sites to diminish damage to archeological resources that are found outside of the pipeline corridor and in unsurveyed areas.
- If any anomalies are determined to be located within the Purple sage patch, an ethnobotanical resource, the Ute tribe would be consulted, as would SHPO.

Wilderness

- The Minimum Requirement Decision Guide would be used to determine whether the action is first necessary, then to determine the alternatives (equipment, tools, vehicles) for how to accomplish the action that would achieve both Wilderness and resource objectives.
- Vehicle tracks from UTVs and heavy equipment would be mitigated immediately after maintenance activities. Tracks would be raked out as equipment leaves the work site, as described in the Soils and Vegetation section.
- Revegetation efforts would use adaptive management techniques and monitoring coordinated with the NPS. Restoration may occur immediately as equipment leaves the work site and access routes, at a later time, or most likely, both.

Visitor Use and Experience

- Maintenance activities should be timed to coincide with low visitor use periods, typically November through March. These correspond roughly with the most favorable time for plant restoration work, except when frozen ground limits plant salvaging.
- Visitor access may be restricted from some areas during maintenance activities.
- The park would disseminate information on pipeline maintenance activities to the park staff and visiting public.

Visual Resources

- Revegetation efforts would use adaptive management techniques and monitoring coordinated with the NPS. Restoration may occur immediately as equipment leaves the work site and access routes, at a later time, or most likely, both.
- When entering and leaving work sites, vehicles as well as walking pipeline workers and inspectors must follow the same vehicle tracks during each trip. All persons on site would avoid stepping on or crushing undisturbed soil crusts on access routes or within work areas.
- Large accumulations of old lumps of pipeline coating, along with any other trash encountered along the pipeline and known to be less than 50 years old, would be either carried out by walkers or hauled out with equipment, but no extra vehicle trips would be used for this purpose.

Alternative Summaries

Table 1 summarizes the major components of Alternatives A and B and compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Alternative B meets each of the objectives identified for this project, while the Alternative A does not address all of the objectives.

Table 1: Alternatives Summary and Project Objectives

Meets Project Objectives?	Alternative A: No Action	Alternative B: Preferred
	Continue current management of pipeline. Issue a SUP and evaluate environmental impacts to resources before each maintenance activity that occurs along the pipeline.	Issue a SUP and evaluate environmental impacts on park resources from anticipated pipeline maintenance over the next five to ten years.
To facilitate the maintenance of Williams Northwest Pipeline facility that meets current safety standards and structural requirements.	Yes. Issuing a SUP would ensure that the Williams Northwest Pipeline would meet DOT standards for maintaining a natural gas pipeline.	Yes. Issuing a SUP would ensure that the Williams Northwest Pipeline would meet DOT standards for maintaining a natural gas pipeline.
Analyze the effects of past, present and future pipeline maintenance on park resources.	Yes and No. This alternative would only analyze the impacts of each individual maintenance activity when they are proposed. The DOT mandated inspection work along the pipeline that occurred in 2009 was considered emergency work by the park and environmental compliance was not formally completed. This alternative would require more time and energy to analyze impacts since each project is evaluated in a separate NEPA compliance document. Further, legal maximum time between anomaly discovery and repair may not allow time needed for NEPA document preparation.	Yes. This alternative would analyze the environmental impacts on park resources along the entire pipeline with regard to anticipated pipeline maintenance at one time. The development of this EA/AEF for issuing a SUP and analyzing anticipated maintenance activities is an opportunity to formally document the past work that occurred along the pipeline. This EA/AEF would describe how park resources were impacted by this past work and what mitigation measures worked. This alternative would be more economically feasible and would streamline the NEPA compliance process.
Establish mitigation measures for anticipated pipeline maintenance.	Yes. Mitigation measures would only be established for each individual maintenance project as they arise. This alternative may cause the maintenance activity to be held up until mitigation measures are in place prior to a project starting, or may force hurried and inferior mitigation requirements due to legal time limits between anomaly discovery and repair.	Yes. In anticipating what maintenance activities may occur along the pipeline in the next five to ten years, the park can develop mitigation measures prior to any maintenance being done on the pipeline. The work that occurred in February/March 2009 presented an initial opportunity to develop mitigation measures. Mitigation measures included in the SUP would provide better assurance that adverse impacts on park resources would be minimized.

Table 2 summarizes the anticipated environmental impacts for Alternatives A and B. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

Table 2: Environmental Impact Summary by Alternative

Impact Topic	Alternative A: No Action	Alternative B: Preferred Alternative
Geological Resources	Geological features may be impacted by heavy equipment. Ground- disturbance may have direct adverse, site-specific, moderate, long term impacts to geological resources. Additional maintenance activities along the pipeline would have direct, adverse, negligible to moderate, site-specific, short and long-term impacts.	Geological features may be impacted by heavy equipment. Ground- disturbance may have direct adverse, site-specific, moderate, long term impacts to geological resources. Additional maintenance activities along the pipeline would have direct, adverse, negligible to moderate, site-specific, short and long-term impacts.
Paleontological Resources	Paleontological resources may be impacted by heavy equipment. Ground- disturbance may have direct adverse, site-specific, moderate, long term impacts to geological resources. Additional maintenance activities along the pipeline would have direct, adverse, negligible to moderate, site-specific, short and long-term impacts.	Paleontological resources may be impacted by heavy equipment. Ground- disturbance may have direct adverse, site-specific, moderate, long term impacts to geological resources. Additional maintenance activities along the pipeline would have direct, adverse, negligible to moderate, site-specific, short and long-term impacts.
Soil	Using heavy equipment and doing ground disturbing work may have direct adverse, minor to moderate, site-specific and localized, short and long term impacts to soil resources.	Proposed maintenance actions would have direct, beneficial and adverse, negligible to moderate, site-specific and localized, short and long-term, impacts to soils along the access routes and at the worksites. Implementing the Vegetation Monitoring Plan would have beneficial impacts to soil resources.
Biological Soil Crusts	Biological soil crusts would have minor to moderate, site-specific and localized, long-term impacts from maintenance activities. Breaking the fiber connections destabilizes the underlying soil making it more susceptible to both wind and water erosion. Impacts would be adverse,	Proposed maintenance actions would have direct, beneficial and adverse, negligible to moderate, site-specific and localized, short and long-term, impacts to biological soil crusts along the access routes and to the worksites. Implementing the Vegetation Monitoring Plan would have beneficial impacts to biological soil crusts.
Native Vegetation	Using heavy equipment would crush vegetation in accessing work sites and would remove vegetation from work sites and would cause direct, adverse, minor to moderate, site-specific, short and long-term impacts.	There would be adverse and beneficial effects to native vegetation. Use of heavy equipment may have a direct adverse, minor to moderate impacts to native vegetation. Although the adverse effects would be greater, there would be a beneficial effect for restoring vegetation communities by implementing the Vegetation Monitoring Plan.
Non-Native Species	Maintenance activities along the pipeline would potentially introduce and spread exotic species in the park and cause direct, adverse, site-specific, short and long-term, minor impacts.	Maintenance activities along the pipeline would potentially introduce and spread exotic species in the park and cause direct, adverse, site-specific, short and long-term, minor impacts. However, there would be a beneficial effect for restoring vegetation communities in the long term by implementing the Vegetation Monitoring

Impact Topic	Alternative A: No Action	Alternative B: Preferred Alternative
		Plan.
Water Resources	Ground disturbing activities may have a direct and indirect adverse, site-specific, long-term, and minor to moderate impacts to water resources and water quality. Heavy equipment leaking fluids can have an indirect impact on water quality.	Ground disturbing activities may have a direct adverse, site-specific, long-term, and minor to moderate impacts to water resources and water quality. Heavy equipment leaking fluids can have an indirect impact on water quality. The beneficial effect of promoting the reestablishment of native vegetation could help reduce erosion and sedimentation in surface waters along the pipeline.
Floodplains	Ground disturbing activities may impact native vegetation and reduce floodplain functions. Impacts would be direct, adverse, minor to moderate, site-specific, long-term impacts.	Ground disturbing activities may impact native vegetation and reduce floodplain functions. However, reestablishing native vegetation would improve and restore natural functions of a floodplain. The impacts under this alternative would be direct, beneficial and adverse, minor to moderate, site-specific, and long-term.
Wetlands	Ground disturbing activities may impact native vegetation and reduce wetland functions. Impacts would be direct, adverse, negligible to moderate, site-specific, short and long term.	Ground disturbing activities may impact native vegetation and reduce wetland functions. However reestablishing native vegetation would improve and restore natural functions of a wetland. Impacts would be direct, beneficial and adverse, negligible to moderate, site-specific, short and long-term.
Threatened, Endangered and Species of Special Concern	Heavy equipment and ground-disturbing activities could have site-specific adverse impacts on ground nesting birds or burrowing animals. Impacts would be direct and indirect, negligible to minor, adverse, site-specific, short-term impacts as spatial and seasonal buffers would be adhered to.	Impacts would be direct and indirect, beneficial and adverse, negligible to minor, site-specific, short-term, as spatial and seasonal buffers would be adhered to. Heavy equipment and ground-disturbing activities could have site-specific adverse impacts on ground nesting birds or burrowing animals. The beneficial effect of promoting the reestablishment of native vegetation could benefit habitat and forage opportunities for T& E species.
Archeological Resources	Use of heavy equipment and ground-disturbing techniques would have a direct, adverse, negligible to moderate, site-specific, short and long term impacts to archeological resources.	Use of heavy equipment and ground-disturbing techniques would have a direct, adverse, negligible to moderate, site-specific, short and long impacts to archeological resources.
Ethnographic Resources	Use of heavy equipment and ground-disturbing techniques would have a direct, adverse, negligible to moderate, site-specific, short and long term impacts to ethnographic resources, particularly Purple sage.	Use of heavy equipment and ground-disturbing techniques would have a direct, adverse, negligible to moderate, site-specific, short and long term impacts to ethnographic resources, particularly Purple sage.
Wilderness	Use of noise generating heavy equipment which be only selected be using the	Direct and indirect, beneficial and adverse, negligible to moderate, site-specific and

Impact Topic	Alternative A: No Action	Alternative B: Preferred Alternative
	minimum wilderness requirement analysis, would have an adverse effect on Wilderness experience. Visual intrusion of work sites (soil and vegetation disturbance) would have a direct and indirect, negligible to moderate, site-specific and localized, short- and long term impact to Wilderness experience.	localized, short and long-term, impacts are expected to occur. Use of noise generating heavy equipment which be only selected be using the minimum wilderness requirement analysis, would have an adverse effect on Wilderness experience. The beneficial effect of promoting the reestablishment of native vegetation could help reduce the visual impacts of maintenance activities near the Wilderness.
Natural Soundscapes	Mechanized and motorized equipment such as vehicles, heavy equipment and helicopters, would cause a certain level of noise when used within the park, thereby compromising the preservation of natural conditions (including the lack of manmade noises). Impacts would have adverse moderate, site-specific and localized, short and long-term impacts.	Mechanized and motorized equipment such as vehicles, heavy equipment and helicopters, would cause a certain level of noise when used within the park, thereby compromising the preservation of natural conditions (including the lack of manmade noises). Impacts would have adverse moderate, site-specific and localized, short and long-term impacts.
Visual Resources	Direct, adverse, negligible to moderate, site-specific and localized, long-term impacts would occur to visual resources. Moderate visual effects would occur in areas where large areas of vegetation have been physically removed by heavy equipment.	Visual resources would be impacted directly and indirectly and have beneficial and adverse, negligible to moderate, site-specific and localized, short to long-term impacts. Moderate visual effects would occur in areas where large areas of vegetation have been physically removed by heavy equipment. A Vegetation Monitoring Plan would be a beneficial impact and ensure a higher success rate of impacted vegetation and would reduce the impacts to visual resources.
Visitor Use and Experience	The visual and audio intrusion of heavy equipment, vehicles and helicopters would have direct and indirect, adverse, negligible to minor, site-specific and localized impacts to park visitors. However, these impacts would be relatively infrequent and short-term.	The visual and audio intrusion of heavy equipment, vehicles and helicopters would have direct and indirect, adverse, negligible to minor, site-specific and localized impacts to park visitors. However, these impacts would be relatively infrequent and short-term.
Park Operations	Direct, adverse, negligible to moderate, site-specific and localized, short and long-term impacts. Moderate impacts to park operations would likely occur in areas where large areas of vegetation and soils have been physically removed by heavy equipment and would require resource staff to survey worksites for various resources and to be present during pipeline operations.	Under this alternative, the majority of resources have been analyzed prior to any work being done and impacts would be less than alternative A. Impacts would be direct, adverse, negligible to minor, site-specific and localized, short and long-term impacts. Mitigation measures would ensure a biological monitor contracted by Williams and approved by the NPS, would be at each day's pre-work meeting and during all maintenance activities.

Identification of the Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that “the environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA’s §101:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life’s amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Any maintenance along the pipeline has the capability to tarnish the natural landscape in Arches National Park and to impact the park’s natural and cultural resources. However, the issuance of a SUP to maintain the pipeline is a necessity. Maintenance of the pipeline ensures the integrity of the pipeline and the safety of the public. Out of the two alternatives, Alternative B is the environmentally preferred alternative because it better addresses the evaluation factors by first fulfilling the responsibilities of this generation to ensure that proposed maintenance activities are in compliance with the National Environmental Protection Act. This alternative also assures for all generations this pipeline would be maintained to keep the public safe and to try and keep the park’s surroundings aesthetically and culturally pleasing if the proposed mitigations are adhered to. Alternative B, with the proposed mitigation, also tries to preserve important historic, cultural and natural aspects of our natural heritage.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the purpose and need for the project, the project objectives, and is the environmentally preferred alternative, Alternative B is also recommended as the National Park Service preferred alternative. For the remainder of the document, Alternative B would be referred to as the *preferred* alternative.

CHAPTER 3- AFFECTED ENVIRONMENT

This chapter describes existing conditions, including resources and values that potentially could be affected by the alternatives presented in this document. The impacts of the 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), Resource Management Plan (RMP 1996), and other park plans and studies. A summary of the resources associated along the 7.2 miles of the Williams Northwest natural gas pipeline are as follows:

Geological Resources

Arches National Park lies atop an underground salt bed called the Paradox Formation, which is indirectly responsible for the arches, spires, balanced rocks, fins and eroded monoliths common throughout the park. Thousands of feet thick in places, the Paradox Formation was deposited 300 million years ago when the area became an inland sea that was connected, cut off from, and reconnected to the sea tens of times. Whenever the sea was cut off, the water left behind eventually evaporated, leaving salt deposits. The salt layers are interspersed with sediments brought in by floods and winds in between seawater incursions. The whole formation was deposited over millions of years, and was eventually compacted and cemented into rock layers more than one mile thick, making up the Paradox Formation.

Roughly 75 million years of nearshore lime and later sand deposition followed, which resulted in several rock formations being deposited on top of the Paradox. Because salt under pressure is unstable, the salt bed below Arches National Park began to flow under the weight of the overlying sandstones. This flow continued for the next 200 million years. The salt generally flowed toward areas of less pressure, often forming elongated domes along old faultlines. This movement caused the surface rock to buckle and shift, folding some sections upward into domes. The adjacent areas dropped and formed valleys as the salt beneath them thinned.

As the subsurface movement of salt shaped the surface, and later the whole region rose due to unrelated regional tectonic forces, erosion stripped away the younger rock layers. Water seeped into cracks and joints, and eventually down to the salt layers. Salt melts when wetted, so the old domes collapsed and became today's valleys, leaving the old valleys perched adjacent to them. Vertical cracks formed parallel to the valleys and domes as the layers stretched during folding; these would later contribute to the development of features including the Fiery Furnace in Arches National Park. Collapse of the domes was accompanied by renewed movement on some of the old underlying faults; movement was especially significant on the Moab Fault at the park's entrance, where there is 2500 feet of displacement. Over the last few million years and today, water continues seeping into cracks and erosion continues. Freezing and thawing breaks sand grains loose and widens the cracks, eventually leaving free-standing fins in some places and causing differential erosion of less-cemented sandstone resulting in the park's world-famous arches.

The pipeline traverses and is buried in the jumble of rock formations in the middle of the Salt Valley collapsed anticline in the southwest part of the pipeline's passage through the park. The pipeline passes through the Wingate, Kayenta and Navajo Formations on both

flanks of Salt Valley. To the northeast, the pipeline crosses the near horizontal layers of the Carmel Formation (aka Dewey Bridge), Entrada Sandstone (aka Slickrock Member), Moab Tongue and Tidwell Member of the Morrison Formation. The following formations may be impacted from maintenance activities along the pipeline based on current GIS geological mapping and are organized from oldest to youngest rocks in geological time. Descriptions of each geological stratum are derived from Doelling (2000) and Graham (2004).

Paradox Formation (Pennsylvanian). This formation consists of sediments deposited in a closed ocean basin between 300 million and 250 million years ago. Layers of salts and gypsum precipitated between layers of shale, siltstone, and limestone, during episodes when evaporation exceeded runoff entering the basin. The most visible outcrops of this formation within Arches National Park are the gypsum hills that occupy the southern part of Salt Valley near Salt Valley road.

Little or none of the *Permian Cutler Formation*, or the *Triassic Moenkopi and Chinle Formations* outcrop along the route of the pipeline.

Wingate Sandstone (Jurassic). The Wingate forms a red-brown, vertical massive cliff that is 250-450 feet thick and stained with desert varnish that abruptly overlies the Chinle's red slope. Desert varnish is one of the more common desert coatings and forms a lustrous, shiny, and smooth surface coating on rock surfaces of all sizes from mere pebbles to massive cliffs. The gray- orange to gray- orange- pink and moderate orange- pink to pale- red- brown sandstone of the Wingate is mostly composed of quartz grains. In addition to quartz, the sandstone also contains some feldspar, traces of chert, and accessory minerals. The moderately to well- sorted, sub-angular to rounded quartz grains often have surfaces that appeared pitted, or frosted. Frosted grains are often the result of grains colliding with each other during eolian (wind) transport. The sandstone is cemented by calcium carbonate and silica that has precipitated between grains and is commonly stained with iron oxides. Red, dark- brown and black stains of desert varnish commonly cover the reddish-brown weathering exposures. Up close, flat beds and high-angle cross-bedding can be seen on the cliff surface (Doelling, 2000). Fossils are rarely found in the Wingate Sandstone.

Kayenta Formation (Jurassic). This formation represents streambed and floodplain sediments deposited between 180 and 190 million years ago. Formation is composed chiefly of lavender-grey, white and dark brown sandstone. This formation which is 200 to 300 feet thick in outcrop, forms thick, step-like ledges between the more massive Navajo and Wingate sandstones that overlie and underlie it, respectively. Kayenta sandstone has a denser matrix between the grains of sand, so it resists erosion. Once the Kayenta erodes away, the underlying Wingate Sandstone crumbles quickly.

Navajo Sandstone (Jurassic). Navajo Sandstone is between 250 and 550 feet thick and can be distinguished by its white to light pink color, meter-scale cross-bedding, and distinctive rounded weathering. This formation originated as sand dunes deposited between 173 and 180 million years ago. Navajo Sandstone forms the broad bench between the Great Wall and the Colorado River. Navajo Sandstone is characterized as "petrified dunes" in Arches National Park interpretive materials, because exposures often erode into landscapes of humps and potholes reminiscent of the original dunes. Most of the surface is un-vegetated, with vegetation restricted to soil filling the potholes or areas where sheets of wind-deposited sand have collected. The sand sheet communities are similar to those described for the Quaternary Deposits - Eolian Sands. Because of its

widespread occurrence, unique appearance, and dramatic outcrops, the Navajo Sandstone is one of the most famous rock formations in the world.

Carmel Formation (formerly called Dewey Bridge Member of Entrada) (Jurassic). This formation has distinctive lower and upper subunits in the park. The lower part fills low areas in the Navajo Sandstone, and planar or flatbedded sandstones cover the surface of the high-angled crossbedded Navajo. The lower unit weathers to the same color as that of the Navajo Sandstone. The upper unit is a red-brown, muddy-looking, mostly fine-grained, silty sandstone that forms a slope or recess between the lower unit and the overlying cliff-forming Entrada Sandstone (Doelling 2000). The thickness of the lower unit varies from 15 to 85 feet and the upper unit varies from 60 to 157 feet.

Entrada Sandstone (formerly called Slickrock Member of the Entrada) (Jurassic). This unit is the dune sandstone that forms most of the features that characterize the park's spectacular scenery. Deposited between 150 and 160 million years ago, the reddish Entrada Sandstone is exposed as arches throughout the park, including the Windows, Delicate Arch, Landscape Arch, Skyline Arch, and Double O Arch. In addition, it forms the vertical cliffs of The Courthouse Towers and The Great Wall, and the fins of the Fiery Furnace. Much of the Entrada Sandstone is unvegetated because it is vertical and/or actively eroding, but level to rolling surfaces catch sand, soil, and moisture in potholes and joints to support a shrub-rich wooded community very similar to that of the Kayenta and Navajo formations. The sensitive Canyonlands biscuitroot grows almost exclusively in the joints between fins of Entrada Sandstone.

Moab Tongue (formerly called Curtis Formation or Moab Tongue Member of Entrada) (Jurassic). This unit originated as sand dunes about 150 million years ago. The Moab Tongue consists of 60 to 120 feet of light yellow gray, fine to medium grained resistant and massive sandstone. This sandstone forms the highest areas on both sides of the Salt Valley anticline, including much of the pipeline's length from a few kilometers northeast of the main park road northeast to the rim of Salt Wash Canyon.. Moab Tongue exposures tend to be unvegetated except where sand, soil and moisture collect in potholes and joints. Almost all of the park's hanging gardens, seeps and springs occur at the contact between the Moab Tongue and the Entrada Sandstone, or in the lower part of the Moab Tongue.

Tidwell Member of the Morrison Formation (and Summerville Formation) (Jurassic). Because the Middle Jurassic Summerville Formation is only 6 to 20 feet thick in the park, it has been mapped as one unit with the Tidwell Member of the Upper Jurassic Morrison Formation on the geologic map. Thus, in Arches National Park, the lower part of this thin redbed marker unit correlates with the Summerville Formation while the upper and dominant part of the marker is the Tidwell member of the Morrison Formation (Doelling, 2000). Although mapped as one unit, the Summerville and Tidwell are easily divisible by field geologists who have worked with the two units. For the most part, the Tidwell consists of red, maroon, lavender, or light- gray weathering siltstone, but discontinuous beds of light-gray limestone are interspersed throughout the siltstone. The limestone beds are more common at the base and top of the unit. White chert concretions (localized nodules that are harder than the enclosing rock), some as much as 5.4 feet in diameter, may be found immediately above the lowermost limestone bed of the Tidwell Member in Arches (Doelling, 2000). The Tidwell is exposed along the pipeline route as islands in the Moab Tongue, from the rim of Salt Wash Canyon toward the southwest for approximately three miles. (Doelling, 1985, 2000).

Salt Wash Member of the Morrison Formation (Jurassic). This Member contains six or seven thick, vertically stacked, sandstone lenses. The sandstone lenses form ledges that range from 2 to 20 ft thick, although most are 2 to 4 ft thick (Doelling, 2000). The fine-to coarse grained, moderately to poorly sorted quartz sandstone is crossbedded and calcareous. Fragments of petrified wood and dinosaur bones have been found in the Salt Wash Member. Large pieces of sandstone litter the base of the outcrop. As the softer siltstones between the lenses of sandstone erode, the more resistant sandstone becomes unstable and unsupported, and eventually falls onto the slopes of siltstones. The Arches geologic map shows that the pipeline only traverses this unit across an extremely short fault slice in Salt Valley, though small outcrops of the member are mapped very near the pipeline in the islands of Tidwell Member noted above (Doelling, 1985, 2000). Total thickness of the Salt Wash Member ranges from 130 to 300 ft thick in the park, and averages about 180 ft (Doelling, 2000).

Alluvial deposits (Quaternary). These sheets of water-deposited sands and gravels are scattered throughout the lowlands at Arches National Park. The sediments filling Salt Valley were primarily deposited by surface runoff from adjacent slopes, and then redistributed by intermittent streams on the valley floors. In the canyons of the Colorado River, Courthouse Wash, and Salt Wash, alluvial terraces of varied ages and elevations fill the spaces between the active channel and the canyon wall. The vegetation growing on alluvial deposits varies depending on the coarseness of the alluvium, the availability of surface or groundwater, and the frequency of disturbance by flooding.

Gravel Deposits (Quaternary). The larger, mappable areas of gravel deposits are of mostly alluvial origin. Terraces in the middle of Salt Valley were laid down in an ancient stream that no longer flows in the valley. On these terraces are cobbles eroded from the Book Cliffs many miles to the north. The terrace alluvial deposits in Salt Valley are generally less than 15 feet thick.

Sand deposits (Quaternary). The unconsolidated sand deposits are mostly of eolian (wind) origin but are interbedded or mixed with various amounts of alluvial, eluvial, and colluvial sand (Doelling, 1985). Eluvial sand forms as the rock disintegrates in place while colluvium consists of a combination of alluvial sediments and angular fragments of the original rocks.

Paleontological Resources

Little formal research has focused specifically on the paleontological resources within Arches National Park. The first mention of the vertebrate paleontological resources of the areas was by McKnight (1940) who briefly describes the trackways of tridactyl, bipedal animal in the top of the Moab Member of the Curtis Formation. Within the same strata, and not too geographically distant, Lockley (1991) reported the presence of potentially millions of theropod tracks named the Moab Dinosaur Megatracksite that extend from the town of Moab north to Crescent Junction and can be found within Arches.

Cooperative paleontology projects include the Morrison Extinct Ecosystem Project (early-mid 1990s), a joint National Park Service and United States Geological Survey project (Turner and Peterson, 1999). In a collaborative effort to protect and manage the fossil resources at Arches National Park, a formal survey of paleontology of the park was initiated in 1995. In 2000, with the support of the staff at Arches, the Geological Resources Division, and the Geological Society of America, field and literature surveys

were conducted in order to construct a reasonably complete record of the resources known within and adjacent to the park boundaries (Santucci 2000).

Geological units of Jurassic age that occur along the existing pipeline are shown in Figure 4 as a modified stratigraphic diagram. This information was gathered by Erathem-Vanir Geological (EVG) in 2004 for the Analysis of Management Situation (AMS) for paleontology for the BLM Moab Field Office in 2004. It included published information as well as the results of a locality search conducted by Martha Hayden at the Utah Geological Survey. EVG updated the published information for this analysis and provides a Probable Fossil Yield Classification (PFYC) for these units, provided in Figure 3.

	Units		Thickness	PFYC
JURASSIC	Morrison Formation	Brushy Basin Member (The pipeline does not cross this unit.)	300-400 ft	5
		Salt Wash Member	130-300 ft	3
		Tidwell Member	40-100 ft	3
	Entrada Sandstone	Moab Tongue Member (Moab Tongue Sandstone/Curtis Formation)	60-120 ft	3
		Slick Rock Member (Entrada Sandstone)	200-500 ft	3
		Dewy Bridge Member (Carmel Formation)	40-235 ft	2
	NAVAJO SANDSTONE		250-550 ft	3
	KAYENTA FORMATION		200-300 ft	5
	WINGATE SANDSTONE		250-450 ft	2

Figure 3: Geologic units of Jurassic age underlying the Williams Northwest Pipeline in Arches National Park

The PFYC uses a ranking of 1 through 5, with Class 5 assigned to units with a high potential for fossils. Within the pipeline area, Class 3 and Class 5 geologic formations account for approximately 50 percent of the total acreage. The classifications are described below.

Class 1. Igneous and metamorphic geologic units, or units with highly disturbed preservational environments that are not likely to contain recognizable fossil remains. Management concern is negligible for Class 1 resources and mitigation requirements are rare.

Class 2. Sedimentary geologic units that are not likely to contain vertebrate fossils or significant non-vertebrate fossils. Management concern is low for Class 2 resources and mitigation requirements are not likely.

Class 3. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, or units of unknown fossil potential. Management concern may extend across the entire range of management. Ground-disturbing activities require sufficient assessment to determine whether significant resources occur in the area of the proposed action.

Class 4. Class 4 units are Class 5 units with a lowered risk of human-caused adverse impacts or lowered risk of natural degradation. Ground-disturbing activities require assessment to determine whether significant resources occur in the area of the proposed action and whether those actions would impact the resource. Mitigation may include full monitoring of significant localities.

Class 5. Highly fossiliferous geologic units that regularly produce vertebrate fossils or significant non-vertebrate fossils and that are at risk of natural degradation or human-caused adverse impacts. Class 5 areas receive the highest level of management focus. Mitigation of ground-disturbing actions is required and may be intense. Areas of special interest may be designated and intensely managed.

According to the 2005 Paleontological Survey in Arches National Park by Swanson et al (2005), the majority of the fossils and tracks found in the park have been found south of the pipeline by several miles. However, the summary below would describe the fossils found within the park within the various rock formations.

Within Wingate Sandstone no fossils have been reported within the park, however it is known to yield tracks on parting surfaces. The Kayenta Formation has produced abundant trace fossils including theropod tracks and invertebrate burrows that can be found within the park. The Navajo Sandstone was formerly thought to be devoid of fossils but recent discoveries of vertical burrows, fossilized conifer stumps and theropod, prosauropod, and tritylodont tracks within the oases deposits prove otherwise. However, only invertebrate traces have been found associated with these playa deposits within the park. No fossils have been reported within the Carmel Formation which includes the Dewey Bridge Member within the park.

The Entrada Formation was first widely thought to be devoid of vertebrate fossils, however trace fossils have been found. Ekdale and Piccard (1985) describe invertebrate ichnofossils from this formation. Also two types of vertebrate tracks are reported. Regarding the Slick Rock Sandstone Member of the Entrada Formation, no fossils reported within the park.

Many tracks are found in the park at the top of the Moab Tongue Member of the Curtis Formation. As mentioned previously, the Moab Tongue Member hosts the oldest known megatracksite that weaves in and out of the park boundary. Made by a theropod, *Allosaurus*-like trackmaker, the tracks are found right at the contact of the Moab

Member and the overlying finer-grained sediments of the Summerville. Other sites within the Moab Tongue Member display a variety of small tridactyl tracks and burrows ranging from 3-7 cm in diameter. Other sites documented within the Moab Tongue Member are two distinct tridactyl traces.

Within the Summerville Formation dinosaur footprints have been reported by Lockley (1991). The Morrison Formation yields the majority of the dinosaur material found in local rock shops but within the Tidwell Member no fossils have been reported in the park. In the Salt Wash Member, petrified wood and dinosaur bone have been found. There are also limb cavities found within this member, indicating where fossils used to be. The Brushy Basin Member contains many petrified wood and bone fragments. The remains of a sauropod skeleton have been found and removed illegally from near Wolfe Ranch.

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.

A recent soil survey was organized, coordinated and completed in 2009 by the Natural Resources Conservation Service (NCRS) in conjunction with the Northern Colorado Plateau Network (NCPN) Inventory and Monitoring Program (I&M). This project described and mapped existing soil classifications on 129,868 acres within the park and its surroundings, and provides this information in written, tabular, digital, and spatial formats useful to park resource managers, the NCPN I&M Program, and others. Most of the information below is extracted from this map produced from a soil survey conducted in Arches (NCRS 2009). The pipeline crosses 12 of the 24 soil complexes employed in the soil survey project for Arches. The Lost Spring Canyon area added to Arches in 1998 was not mapped during this recent soil survey. Data from the 1981 Grand County survey (NCRS 1981) would be included for analysis of the Lost Spring area.

Five soils complexes are most dominant along the pipeline with several other soil complexes intermixed. The Arches-Rock outcrop complex soils are found on hillslopes, cuestas, sandsheets and ledges and are characterized by 2 to 15 percent slopes. The Arches soil component makes up 50 percent of the map unit and consists of eolian sands derived from sandstone. It is 4 to 20 inches in depth. This soil is excessively drained and contains 1 to 2 percent organic matter. The Rock outcrop component is a miscellaneous area which means this component has little or no soil and consequently supports little or no vegetation without major reclamation. The Rock outcrop is synonymous with Entrada and Moab Tongue Sandstones. Predominant vegetation found in this soil complex is Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), along with blackbrush (*Coleogyne ramosissima*).

The Milok-Mido strongly calcareous complex is found on sand sheets and dunes. The Milok component makes up 70 percent of the map unit and is characterized by 2 to 6 percent slopes. The parent material consists of slope alluvium derived from sandstone and/or eolian sand derived from sandstone and has a depth greater than 60 inches. This soil is well drained and contains 1 percent of organic matter. The Mido, strongly calcareous component, makes up 25 percent of the map unit and is characterized by 5

to 15 percent slopes. The parent material consists of eolian sands derived from sandstone and has a depth greater than 60 inches. This soil is excessively drained and contains 1 percent organic matter. Predominant vegetation found in this soil complex is four-wing saltbush (*Atriplex canescens*).

The Arches-Rizno-Rock outcrop complex is found on ledges on cuestas, hillslopes on cuestas, and mesas and is characterized by 2 to 15 percent slopes. The Arches component makes up 35 percent of the map unit and consists of eolian sands. It is 4 to 10 inches in depth. Arches soil is excessively drained and contains 1 percent organic matter. The Rizno component makes up 30 percent of the map unit and consists of slope alluvium derived from sandstone and is 4 to 10 inches in depth. Rizno soil is well drained and contains 1 percent of organic matter. The Rock outcrop component is a miscellaneous area and is synonymous with the Kayenta Formation. Predominant vegetation found in this soil complex is Utah juniper and Colorado pinyon.

Mido, strongly calcareous-Mido complex is found on shrub-coppice dunes on sand sheets and on interdunes and is characterized by 2 to 15 percent slopes. The Mido component makes up 15 percent of the map unit and consists of eolian sands derived from sandstone and has a depth greater than 60 inches. Mido soil is excessively drained and contains 1 percent of organic matter. The Mido, strongly calcareous component makes up 80 percent of the map unit and is characterized by 2 to 8 percent slopes. The parent material consists of eolian sands derived from sandstone and has a depth greater than 60 inches. This soil is excessively drained and contains 1 percent of organic matter. Predominant vegetation found in this soil complex is blackbrush.

The Retsabal complex is a very fine sandy loam found on hills and hillslopes and is characterized by 2 to 15 percent slopes. The parent material consists of eolian deposits derived from sandstone and/or residuum weathered from rock gypsum and is 4 to 20 inches in depth. This soil is well drained and contains 1 percent organic matter. Predominant vegetation found in this soil complex is Mormon tea (*Ephedra viridis*).

Myton family-Rock outcrop complex unit is found on the sides of deep canyons. This unit is about 40 percent Myton family soils and 25 percent Rock outcrop and is characterized by 50 to 70 percent slopes. The parent material consists of colluvium and residuum derived from sandstone and is 20 to 60 inches or more in depth. Soils in this unit are well drained and contain less than 1 percent organic matter. Predominant vegetation found in this soil complex is blackbrush.

Toddler-Ravola-Glenton families association unit is found on floodplains, along drainageways, and on valley flats and is characterized by 0 to 3 percent slopes. This unit is 25 percent Toddler family soils, 25 percent Ravola family soils and 20 percent Glenton family soils. The parent material consists of alluvium derived from shale and sandstone and is 60 inches or more in depth. Soils in this unit are moderately saline to strongly saline, well drained and contain less than 1 percent organic matter. Predominant vegetation found in this soil complex is saltbrush (*Atriplex spp.*) and greasewood (*Sarcobatus vermiculatus*).

Generally the soils along the pipeline are derived from localized 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 to red color and soil depth varies greatly. Overall, the majority of these soils along the pipeline are very susceptible to damage from water and visitors. Once soil crusts are disturbed, they are also susceptible to wind.

Biological Soil Crusts

Biological soil crusts cover much of Arches National Park and are present in some areas along the pipeline. 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 region. The soil crusts consist of a variety of organisms, including cyanobacteria, lichens, algae, mosses and fungi, which form an intricate web of filaments and ground surface cover 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 visitors 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 one to seven years, with small areas such as one footprint recovering much more quickly than larger disturbed areas. 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. Disturbance of mature soil crusts should be avoided whenever possible, especially crusts with large relief and crusts with colorful lichens (all lichens except black *Collema* species). The colorful lichens are generally indicators of the oldest, most developed soil crusts, and are very slow to recover, if they recover at all.

Native Vegetation

Inventory, research and monitoring efforts involving the vegetation of Arches National Park are numerous. Those efforts most relevant to the pipeline right-of-way include a recent Arches National Park Vegetation Mapping Project that was organized, coordinated and completed between 2003 and 2009 by the Northern Colorado Plateau Network (NCPN) Inventory and Monitoring (I&M) Program, with the assistance of several cooperators. This project described and mapped existing vegetation on 52,556 ha (129,868 acres) within the park and its surroundings, and provides this information in written, tabular, digital, and spatial formats useful to park resource managers, the NCPN I&M Program, and others. Most of the information below is extracted from this map and its accompanying report (Coles and others, 2009). For the northeastern part of the park, the information is supplemented by an unpublished field survey performed prior to the pipeline repair work of early 2009 (Moran, 2008).

The pipeline crosses 15 of the 34 primary vegetation map units employed in the vegetation mapping project for Arches.

Two map units are somewhat more common than the others along the pipeline. Most common are the Blackbrush Shrublands, scattered along the entire length of the pipeline

in the park. Blackbrush (*Coleogyne ramosissima*) is clearly the dominant shrub in this distinctive unit, with occasional green Mormon tea (*Ephedra viridis*), Torrey joint-fir (*Ephedra torreyana*) and prickly pear cactus (*Opuntia polyacantha*). Grasses and herbaceous species are sparse in these shrublands except on sandier soils and in wetter years. The Moab Tongue Slickrock Woodland is widespread in the uplands on both sides of Salt Wash Canyon, and restricted to the northeast half of the pipeline's length within the park. This unit represents the parallel-fissured Moab Tongue (Curtis Formation) slickrock and the vegetation growing in its joints and linear potholes. Dominant plants are usually-stunted Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), along with blackbrush, cliffrose (*Purshia stansburiana/mexicana*), and shinnery oak (*Quercus havardii/welshii*), but single-leaf ash (*Fraxinus anomala*), skunkbush (*Rhus trilobata*), Utah serviceberry (*Amelanchier utahensis*), and green Mormon tea are also found.

Five vegetation map units are each traversed by the pipeline multiple times, in medium to small patches. The pipeline crosses four medium to small-sized patches of Shale Barrens Desert Scrub, defined by red or gray clays in either badland-like topography or valley-edge slopes. Vegetation is usually very sparse and is dominated by shadscale (*Atriplex confertifolia*), blackbrush, and Torrey joint-fir, with patchy galleta grass (*Hilaria jamesii*). Mormon Tea-Mixed Grass Shrublands are found in two medium-sized patches, northeast of the park road and toward the southwest end of the pipeline within Salt Valley. Grasses include Indian ricegrass (*Stipa hymenoides*), needle-and-thread grass (*Stipa comata*) and galleta grass. Small patches of Sand Dune Woodlands are found on ridgetops along the pipeline near its southwestern exit from the park and northeast of the main park road crossing. This map unit is a mosaic of sparse pinyon-juniper woodlands and shrublands that thrive on active or stabilized sand dunes. Trees are most commonly in the swales between dunes, and Mormon tea, shinnery oak, blackbrush and sometimes cliffrose or sand sagebrush (*Artemisia filifolia*) grow on the dunes. Sand-loving herbaceous species here include Indian ricegrass, globemallow (*Sphaeralcea* spp.), and sand verbena (*Abronia fragrans*). In the northeastern half of the pipeline's run through Salt Valley, it crosses a few small patches of Sandstone Ledges Woodlands, where exposed sandstone is intermixed with deep soils. This unit is dominated by pinyon, juniper, and mixed other shrubs, including blackbrush, cliffrose, mountain mahogany (*Cercocarpus montanus* and *Cercocarpus intricatus*) and a few other less common species. Finally, the pipeline crosses four tiny patches of Sandsheet Shrublands, three of these in the vicinity of the park road and one very near the park's southwest boundary. This unit is characterized by low, stabilized sand dunes or sheets of deep sand and a vegetative mosaic of sand sagebrush with some blackbrush, or a mix of blackbrush with green Mormon tea or shinnery oak, sometimes with scattered Utah juniper. The unit that is very near the park's southwest boundary also contains purple sage (*Poliomintha incana*). Herbaceous plants can be common and commonly include Indian ricegrass, globemallow, and Indian plantain (*Plantago patagonica*).

Three other map units are represented by just one medium to large patch each along the pipeline in Arches National Park. The pipeline crosses approximately 800 meters of Greasewood Flats in the bottom of Salt Wash Canyon, on an alkaline alluvial terrace northeast of the drainage. Greasewood (*Sarcobatus vermiculatus*) and its common smaller associate Torrey's seepweed (*Suaeda nigra/torreyana/moquinii*) dominate, with scattered four-wing saltbush (*Atriplex canescens*) and big sagebrush (*Artemisia tridentata*), the big sagebrush becoming denser along the western edge nearest the wash. Pinyon-Juniper Blackbrush Woodlands dominate the first 600 meters southwest of

the pipeline crossing of the main park road. The three named species are found here on ledgy sedimentary layers mostly covered with shallow to moderately deep soils, and accompanied by green Mormon tea, single-leaf ash, and herbaceous species including little twistflower (*Streptanthella longirostris*). Adjacent to the western pipeline crossing of the Salt Valley Road, there is a 250-meter wide patch of Gypsum Badlands Sparse Vegetation. This rare map class consists of distinctive Paradox Formation soft gypsum deposits stabilized by well developed biological soil crusts with exceptional lichen diversity and cover. Plants include sparse Torrey joint-fir and scattered galleta grass, four-wing saltbush, and prickly pear.

The pipeline contacts two very thin strips of one critical vegetation community, mapped as the Tributary Woodland Complex. This map unit can be varied, but where the pipeline crosses it at Salt Wash the vegetation consists of a stand of cottonwood trees (*Populus fremontii*) rooted mostly on the southwest side of the wash where there is a small floodplain near wash level. The trees have a sparse understory of a few shrubs and perennial and annual herbaceous species and grasses, including spreading rabbitbrush (*Chrysothamnus linifolius*), linearleaf or Wyoming paintbrush (*Castilleja linariifolia*), scarlet gilia (*Ipomopsis aggregata*), curly gumweed (*Grindelia squarrosa*), Canada wildrye (*Elymus canadensis*), bluegrass (*Poa sp.*), and non-native sweetclover (*Melilotus sp.*). On the northeast side of the wash there is a two- to four-meter bank with a couple mature tamarisk (*Tamarix chinensis*) and an adjacent low bench dominated by big sagebrush. This map unit is also mapped adjacent to the pipeline where it crosses Clover Canyon Wash, but the riparian trees and large shrubs are somewhat northwest of the crossing. A few semi-riparian shrubs including rubber rabbitbrush (*Chrysothamnus nauseosus*), herbaceous perennials including field wormwood (*Artemisia campestris*), and grasses grow at the actual pipeline crossing here.

Four other map units are only present along the pipeline in one or two very small strips or patches each. One of these is Talus Sparse Vegetation Complex, on the steep southwest slopes of Salt Wash Canyon and Salt Valley Canyon. Though vegetation is sparse on these talus slopes, it is notably diverse. Northeast of the main park road, there is a thin strip of Entrada Fin/Swale Woodland Mosaic, characterized by variable niches and thus a diversity of species in a small area, with intervening exposed sandstone. The last two units are on the steep slopes adjacent to the northeast park boundary. One is Entrada Sandstone, really a non-vegetated rock unit rather than a vegetation unit, and the other, just downslope, is Pinyon-Juniper Intermittently Flooded Woodlands. At this location, the latter is flooded because it hugs the base of the large sandstone outcrops, and collects rainwater runoff and seeps from these. A moderate cover of several large shrub species characterizes this map unit. Disturbance from pipeline construction and access on the steep slope has largely eliminated this community over the width of the pipeline corridor.

A three-year restoration effort in the 1950s following pipeline construction included planting thousands of native trees and shrubs, along with native grass seed, within the almost three-mile pipeline stretch that included roughly one-half mile southwest of the main park road and 2.5 miles northeast of the road. (Arches was a smaller national monument at the time.) Those efforts, combined with natural restoration processes, have resulted in our current state. Currently within many of the mapped units, the vegetation inside the existing pipeline corridor has recovered so that it is similar in size, density and composition to the vegetation immediately outside, although usually with somewhat lower plant density and more bare ground or younger soil crusts within the corridor. But there are numerous exceptions, including the west slope of Salt Valley,

where a scar exists that is visible from across the valley, several other sites along the pipeline route where original construction involved drilling through or blasting solid rock, and in certain more sensitive soils or communities that have not or would not recover as easily or quickly. In the greasewood flats on the northeast side of Salt Wash, there is one rather large hardpan area with very high pH and salinity values, straddling the pipeline. The steep slopes on both sides of Salt Wash show long-term disturbance from the blasting required to lay the pipe and later access it.

In order to access and repair the anomalies that were discovered in 2008, it was necessary to move heavy equipment and support vehicles back and forth across the landscape on or near the pipeline corridor. As a result, the early 2009 repair activities involved the disturbance of established vegetation and soils along the access routes. Additionally, there were larger disturbances at the actual anomaly sites, which were excavated in order to conduct pipeline repairs. To mitigate these impacts, native shrubs (mainly blackbrush) and some grasses, forbs, and soil crusts were salvaged and replanted at the anomaly sites and along access routes. Priority was placed on salvaging blackbrush shrubs, and grasses and forbs in specified areas, based on agreements between Williams and the National Park Service. Restoration work and monitoring is ongoing for this pipeline repair project, and the repair sites and the access routes to those sites have obviously not fully recovered. Several other repairs have been made to the pipeline through the years since its installation in the 1950s, and these sites are in varying states of natural restoration.

Non-Native Species

Arches National Park has about 53 exotic plants. In 2000, Schelz and Budelier compiled a list of exotic plants in the Southeast Utah Group, including Arches National Park. In the summers of 2003, 2004 and 2004, Utah State University conducted a three-year project to inventory and map invasive non-native plants for the National Park Service, Northern Colorado Plateau Network (NCPN). This report and an updated exotic plant species list are maintained on the NCPN website: <http://science.nature.nps.gov>.

Information on non-native species along the pipeline's length in the park is primarily from Moran's unpublished field survey (2008) for the northeastern half of the pipeline in the park, and later field notes from her survey of the southwestern half of the pipeline's length (2009). These are referenced relative to their occurrence in the vegetation map units discussed in the previous section (Coles and others, 2009). As stated in that section, five vegetation map units are each traversed by the pipeline multiple times, in medium to small patches.

In the Greasewood Flats map unit in Salt Wash Canyon, the understory consists of scattered native herbaceous species as well as weedy species including Russian thistle (*Salsola tragus*), cheatgrass (*Bromus tectorum*), annual wheatgrass (*Erimopyrum triticeu*) and halogeten (*Halogeten glomeratus*). Within the riparian zone of Salt Wash, Tamarisk (*Tamarix ramosissima*), Russian knapweed (*Centaurea repens*) and sweetclover (*Melilotus sp.*), can also be found. This stretch in Salt Wash Canyon probably has more non-native species than anywhere else along the pipeline.

In the Blackbrush Shrublands map unit in Salt Valley, non-native species including Russian thistle (*Salsola tragus*) and crested wheatgrass (*Agropyron cristatum*) are present. Russian thistle is thicker along the pipeline here than in immediately adjacent areas, probably due to the species' affinity for disturbed areas. Crested wheatgrass is not known from any other location within the park. This is probable evidence that pipeline

surveys and /or ground disturbing pipeline maintenance were the conduit of this invasion.

Water Resources

Salt Wash, Courthouse Wash, and a few of their tributaries are the only streams with perennial reaches located in Arches National Park. Stretches of Salt Wash and most of Courthouse Wash dry up seasonally, at least in some years, though perennial reaches and pools persist even in dry years in the summertime. Flows measured monthly from July 2004 to November 2006 at Salt Wash near Wolfe Ranch ranged from 0.03 to 2.05 cfs; measurements in November and December of 2009 were .25 cfs and .45cfs. Monthly flows measured during the same period near a defunct USGS gaging station in Lower Courthouse Wash ranged from 0 to 1.07 cfs. Flows in Upper Courthouse Wash, just downstream of a wash-bottom spring at the park boundary, have been measured almost every month since May 2001. The flow range through October 2009 has been 0.002 to 0.047 cfs (unpublished SEUG data). Flood flows in both washes can be hundreds or thousands of cfs for periods of an hour or a day. Both Salt and Courthouse have headwaters outside the park. Arches and SEUG personnel have identified these streams, along with Freshwater Spring, Sleepy Hollow Spring, Sevenmile Canyon springs, Salt Valley Wash, Salt Spring, Willow Spring, and Lost Spring as significant and natural water bodies within the park. Several other springs and many seeps on canyon walls provide valuable wildlife habitat and water sources for wildlife and human use. Most of the springs and seeps in the park emanate from the contact of the Entrada Sandstone and the overlying Moab Tongue (Curtis) Sandstone, or from the lower layers of the Moab Tongue just above this contact.

Seven water sources are monitored in the long-term water quality program for Arches National Park: Lower Courthouse Wash, Freshwater Spring, Sleepy Hollow, Willow Spring, Salt Wash near Wolfe Ranch, Lost Spring, and Upper Courthouse Wash. Flow is monitored during water quality sampling, and flow alone is measured at two additional springs in Sevenmile Canyon.

The pipeline is buried under six water courses, including upper Salt Wash in the northeast corner of the park and upper Courthouse Wash about one mile upstream of the park. At times, erosion of sediment from flash flood events has exposed the pipeline within Salt Wash, requiring William's personnel to repair the erosional issues by building rock check dams out of nearby or trucked-in rock. This check dam is built to prevent sediment from washing down Salt Wash and assist in building up sedimentation over the pipeline.

There are no water quality monitoring sites right along the pipeline, but there are two downstream on Courthouse Wash, and one downstream on Salt Wash. One of the Courthouse sites is right at the park boundary, a mile or less downstream of the pipeline crossing. The wash is dry except during heavy rains at the pipeline crossing but there's a spring in the wash bottom at the park boundary. The other water quality monitoring site on Courthouse Wash is several miles downstream, near highway 191. The water quality site in Salt Wash is by Wolfe Ranch, several miles downstream of the pipeline's crossing of upper Salt Wash.

Any maintenance activities within Salt Wash are covered under the terms of an Army Corps of Engineers Nationwide Permit 3 as long as there is no alteration of streambed or

banks. This permit does not apply to ephemeral drainages (non-jurisdictional) or work that does not alter a jurisdictional drainages bed elevations.

Floodplains

A large number of canyons on the Colorado Plateau do not carry perennial water, but instead are ephemeral in nature. Some of these channels lead to the Colorado River that flows along Arches National Park's southeastern boundary, and were formed by fluvial processes. During storm events, these channels can carry large amounts of water and debris. Remembering the destructive power of flash floods is important when considering development in associated floodplains. In addition, floods can carry a tremendous amount of sediment contributing to a water quality problem, albeit a naturally induced one. Certain activities within the park may exacerbate sedimentation problems; these include visitor use, trampling and removal of vegetation, use of 4-wheel drive vehicles and heavy equipment.

Salt Wash is within an extreme flood regulatory floodplain as are most of the water courses that cross the pipeline. However an underground pipeline is innocuous to floodplain issues. If maintenance activities require digging sections of the pipeline within these floodplains, then the floodplain values may be impacted. These potential impacts would be discussed in the next chapter.

Wetlands

The National Park Service has adopted the definition of wetlands from Cowardin et al. (1979): "lands transitional between terrestrial and aquatic ecosystems where the water table is usually at or near the surface or the land is covered by shallow water," as indicated by vegetation, soil, and/or hydrologic characteristics. The Cowardin definition includes more habitat types than the wetland definition (33 CFR 328.3) and delineation manual used by the Army Corps of Engineers for identifying wetlands subject to Section 404 of the Clean Water Act. The 1987 Corps of Engineers Wetlands Delineation Manual requires that all three parameters (hydrophytic vegetation, hydric soil, wetland hydrology) be present for a habitat to be considered a wetland, whereas the Cowardin definition also includes sites where wetland hydrology exists, but vegetation or soils may be absent due to natural physical or chemical conditions (e.g., currents, wave action, high salinity). Examples of these additional Cowardin wetland types include streambeds, mudflats, and active shorelines.

Wetland/riparian areas occupy a small portion of the land area in the arid west (less than one percent), but have disproportionate ecological importance. For example, 50 to 80 percent of bird species are dependent on riparian habitats (Ohmart and Anderson 1982, Knopf et al. 1988). In Arches National Park, wetlands are estimated at less than 600 acres (0.8 percent) of the over 76,000-acre park. Perennial stream flow makes Salt Wash an important corridor for wetlands in the park. As stated previously, the pipeline crosses Salt Wash. Salt Wash is also a Water of the United States (WOUS) as it flows into the navigable waters of the Colorado River.

The pipeline does qualify as an exempted action according to the Wetlands Procedural Manual which requires several best management practices (mitigation measures) be followed for NPS actions that may have adverse impacts on wetlands. Any maintenance activities within Salt Wash are covered under the terms of an Army Corps of Engineers Nationwide Permit 3 as long as there is no alteration of streambed or banks. This permit

does not apply to ephemeral drainages (non-jurisdictional) or work that does not alter a jurisdictional drainages bed elevations.

Threatened, Endangered and Special Concern Species

According to page 45, Section 4.4.2.3 in *2006 Management Policies*, the NPS would survey for, protect, and strive to recover all species native to national park system units that are listed under the ESA. Director's Order-77: Natural Resource Management is currently being developed, until which time the former NPS-77 still applies. NPS-77 addresses the management of federally listed threatened, endangered, and candidate species, as well as species of special concern. It also addresses the management of species of concern identified by other groups, such as locally designated species within a national park. All of these species need to be considered in the NEPA process; however, only federally listed species need to be considered in the Section 7 consultation process.

The Endangered Species Act (ESA) of 1973, as amended, requires federal agencies to ensure that any action authorized, funded, or carried out does not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modifications of critical habitat. Section 7 of the ESA requires that a federal agency consult with the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service on any action that may affect threatened or endangered species or proposed species, or that may result in adverse modification of critical habitat to "...insure that any action authorized, funded or carried out by such agenc[ies]...is not likely to jeopardize the continued existence or destruction or adverse modification of habitat of such species which is...critical."

In addition to the ESA, the Migratory Bird Treaty Act (MBTA); 16 U.S.C 703-712 states it is unlawful to take, kill or possess migratory birds, their parts, nests or eggs. Take is defined as to pursue, hunt shoot, wound, kill, trap or collect. Take is defined (50 CFR 10.12) as to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect. The list of migratory birds protected by the MBTA includes raptors and is found in 50 CFR 10.13.

This and the subsequent Impact Analysis section for the preferred alternative of this EA/AEF contain information and analysis pertaining to the relevant federally listed and candidate species consistent with the National Park Service's obligations under the Endangered Species Act (ESA) of 1973, as amended. Collectively, these analyses serve as the Biological Assessment for these species. Table 3 summarizes information and determinations of effect for federally listed and candidate species under the preferred alternative, Alternative B. Additionally, because the NPS manages state listed and other species of management concern in a conservative manner similar to that required by the ESA, the white-tail prairie dog, burrowing owl, ferruginous hawk, the kit fox, and a few bat and raptor species are included in this section as well.

Federally Threatened and Endangered Species

California Condor- Historically the federally endangered, *Gymnogypus californianus*, habitat is along the Pacific Coast line from Baja to British Columbia but there is potential habitat within Arches. Condors do not fly over and forage in southeastern Utah and the likelihood of occurrence is very low. There has been one sighting in the park in 1997 of one condor as reported by Damian Fagan, a park ranger, biologist and avid birder. It was concluded that the condor was an experimental non-essential and probably came from

the Grand Canyon National Park reintroduction population in Arizona or the Hurricane Cliff population near Zion National Park in southwest Utah (Sloan 2008).

Mexican Spotted Owl-The federally threatened *Strix occidentalis lucida* nests in steep canyons with dense stands of large ponderosa pine or pinyon-juniper with Douglas-fir, and in mature to old-growth mixed-conifer forest with high canopy closure. Favored stands generally are multi-storied, with snags and downed logs. The owls nest in tree cavities or on cliff ledges. Arches National Park has potential habitat for Mexican spotted owl as determined by several polygons from the 1997 and 2000 Spotskey and Willey models for Mexican spotted owl habitat. The majority of potential habitat is along the Colorado River, mainly beyond park boundaries. Mexican spotted owl habitat is marginal along the pipeline corridor in Salt Wash, but does exist. The cliffs are somewhat low, roosting and nesting microsites are not abundant, and the overall habitat is not of good quality (Sloan 2010). Although no formal Mexican spotted owl survey has been documented, park resource management staff has surveyed much of the park for many years and none of the surveys have detected the presence of Mexican spotted owl (Sloan 2008).

Southwestern Willow Flycatcher- This federally endangered migratory bird, *Empidonax traillii extimus*, requires dense riparian, cottonwood-willow habitat (although it has adapted to tamarisk) that is associated with rivers, streams and wetlands for nesting and breeding. The USGS conducted a study on the southwestern willow flycatcher from 1999 to 2001. They surveyed the segment of the Colorado River, which is a part of Arches' southeastern boundary, from Canyonlands National Park boundary to Dewey Bridge (30 miles upstream from Arches). The survey determined that although many flycatchers were detected they appeared to use this portion of the Colorado River as a migratory stopover rather than as a breeding area (Johnson et al. 1999). The potential habitat of Salt Wash in Arches National Park has been surveyed in 2009 and assessed by the park wildlife biologist to be only migratory habitat. No breeding habitat exists in the pipeline corridor due to lack of dense willow and tamarisk thickets (Sloan 2009).

Black-Footed Ferret- The *Mustela nigripes*, a federally endangered mammal, natural habitat coincides with most species of prairie dogs (Brown et al. 2003). Prairie dog towns provide the primary source of food and needed cover. Prairie dogs prefer areas of short vegetation and bare ground. Sagebrush shrubs are the largest plants found near preferred habitat. Suitable habitat for prairie dogs and black-footed ferrets in Utah is found in the eastern portion of the state which includes Arches National Park. There is one white-tailed prairie dog colony found in Salt Valley two miles north of the pipeline. However, there are no reports of black-footed ferrets in the park (NPS 2009).

Jones Cycladenia- *Cycladenia humillis* var. *jonesii* is a federally threatened plant and has been found in Eriogonum-Ephedra, mixed desert shrub, and scattered pinyon-juniper communities, at elevations ranging from 4,000 to 6,800 feet. However, the only report of the plant in Arches is an unconfirmed report (Albee et al. 1988). The unconfirmed category indicates this species is included in the park species list based on weak (unconfirmed record) or no evidence, giving minimal indication of the species' occurrence in the park. This category is used as a means of maintaining a "watch list," that is, species that could possibly occur in the park and should not, at this point, be totally removed or absent from the park's species list. A designation of unconfirmed implies that there is no conclusive evidence that a species was ever in the park. This plant has not been found within the vicinity of the pipeline (NPS 2009).

State Listed Species and Other Species of Concern

NPS management policy requires the maintenance of all native plant and animal species and their habitats inside parks (NPS 2006:34). State listed “species of concern” may also occur within the project area. Lists of the following species were obtained from several sources including NatureServe Explorer (NatureServe 2009), State of Utah Division of Wildlife Resources (UDWR 2009), Partners in Flight species assessment database (RMBO 2010), and species lists for Arches National Park (NPS 2009). Wildlife surveys were conducted along the pipeline in January 2009 and in October 2009 by a SEUG wildlife biologist. Additionally, Arches National Park has monitored nesting raptors for years, and riparian bird monitoring occurs annually in the park.

The bald eagle (*Haliaeetus leucocephalus*) has been delisted but is still a state species of concern. The bald eagle uses the park primarily for winter forage near the Colorado River; very limited monitoring of them has been done within park boundaries. Ferruginous hawks (*Buteo regalis*) have been listed as probably present in Arches on the park species list but there is no confirmed nesting habitat within a mile of the pipeline from recent wildlife surveys (Sloan 2009).

Another listed bird is the Western burrowing owl (*Athene cunicularia hypugia*). Burrowing owls are known to occupy prairie dog burrows. The only prairie dog colony found in Arches is in Salt Valley two miles north of the pipeline. Burrowing owls are monitored as part of a burrowing owl monitoring program.

White-tailed prairie dogs (*Cynomys leucurus*) have been found in Arches in Salt Valley and were monitored for several years by a park ranger, as part of a burrowing owl monitoring program. Monitoring of the prairie dog continues today by various resource management staff. There is one white-tailed prairie dog colony that is found a mile from the pipeline.

There are a few sensitive bat species that are state listed; Big free-tailed bat (*Nyctinomops macrotis*), Spotted bat (*Euderma maculatum*), and Townsend’s big-eared bat (*Corynorhinus townsendii*). Big free-tailed bat is confirmed as present in Arches and there is substantial value habitat in Grand County (UDWR 2005), indicating species likely to forage over project area. There is no suitable roosting habitat but there is substantial and high value habitat for the Spotted bat in Grand County (UDWR 2005), indicating species likely to forage over project area. The spotted bat is listed as probably present in Arches on the park species list (NPS 2009). The Townsend’s big-eared bat has limited suitable habitat in the project area although species may forage over area. This bat is also listed as probably present in Arches (NPS 2009).

Kit fox (*Vulpes macrotis*), is not overly abundant in Utah but does occur in Grand County (NatureServe 2009). The species most often occurs in open prairie, plains, and desert habitats. There has been one unconfirmed report of a kit fox in Arches (NPS 2009). No tracks or dens found were found during the park wildlife surveys along the pipeline.

Raptors as a group are considered migratory birds according to the Utah Field Office Guidelines to Raptor Protection from Human and Land Use Disturbances. As such, federal and state protection is provided for raptors and their habitat through various legal mandates. Each raptor nest, its offspring, and supporting habitats are considered important to the long-term viability of raptor populations and are vulnerable to disturbance by many human activities. Human disturbances near nest sites have resulted in the abandonment of the nest; high nestling mortality due to overheating, chilling or

desiccation when young are left unattended; premature fledging; and ejection of eggs or young from the nest. Raptors which successfully nest during a disturbance may abandon the nesting territory the year following the disturbance (Fyfe and Olendorff 1976, Platt 1977, Ratcliffe 1980, White and Thurow 1985). Responses of nesting raptors to human disturbances are generally determined by the type, duration, magnitude, noise level, and timing of activity relative to nesting phenology (Suter and Jones 1981, Götmark 1992, Richardson and Miller 1997). Raptor tolerance levels to disturbance can be species-specific and buffer zones should be in place to minimize impacts to raptors. Buffer zones are defined as seasonal or spatial areas of inactivity in association with individual nests or nesting territories. Spatial buffers are defined as radii from known occupied and unoccupied nest sites. Seasonal buffers are restrictions on the times when human activities should be allowed to occur within the spatial buffers.

Raptors that have nested or currently nest near the pipeline and may be impacted by pipeline maintenance operations include the Coopers hawk (*Accipiter cooperii*), Red-tailed hawk (*Buteo jamaicensis*), Great Horned owl (*Bubo virginianus*), American kestrel (*Falco sparverius*) and Ferruginous hawk which is described above. Spatial and seasonal buffers for these raptors are outlined in the Mitigation section in Chapter 2.

Table 3: Summary of Federal and State Species of Concern found in Grand County, Utah and their likelihood of occurrence within the project area. October 2009.

Common Name	Scientific Name	Status	Likelihood of occurrence	Determination of Effect for Alternative B
Birds				
American white pelican	<i>Pelecanus erythrorhynchos</i>	S	None. No suitable aquatic habitat.	No effect
Bald eagle	<i>Haliaeetus leucocephalus</i>	S	Low. May fly over project area, but no open water within 2.5 miles of pipeline.	Would not contribute to listing
Burrowing owl	<i>Athene cunicularia</i>	S	Low. Foraging/hunting habitat, but no prairie dog burrows or nesting habitat along the pipeline.	Would not contribute to listing
California condor	<i>Gymnogyps californianus</i>	E	Very Low. Foraging/hunting habitat, but no nesting habitat; rarely in southeastern Utah. One sighting documented in the park in 1997.	May affect, not likely to adversely effect
Ferruginous hawk	<i>Buteo regalis</i>	S	Moderate. Foraging/hunting habitat present, but no nesting habitat along the pipeline; junipers and outcrops for nesting possible within a mile of pipeline.	Would not contribute to listing
Greater sage-grouse	<i>Centrocercus urophasianus</i>	S	None. No suitable sagebrush habitat.	No effect
Lewis's woodpecker	<i>Melanerpes lewis</i>	S	None. No suitable tree habitat.	No effect
Mexican spotted owl	<i>Strix occidentalis</i>	T	Moderate. Limited suitable canyon habitat, possibly in Salt Wash. Breeding season Feb. 15-Aug. 15. No nesting sites found along pipeline in Salt Wash during park surveys.	May affect, not likely to adversely effect
Northern goshawk	<i>Accipiter gentilis</i>	CA	None. No suitable forested habitat.	No effect
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E	Low. Only migratory habitat, possibly in Salt Wash. No suitable breeding habitat exists due to the lack of dense willow and tamarisk thickets along pipeline.	May affect, not likely to adversely effect
Three-toed woodpecker	<i>Picoides tridactylus</i>	S	None. No suitable tree habitat.	No effect
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C	None. No suitable forested wetland/riparian zone habitat.	No effect
Mammals				
Allen's big-eared bat	<i>Idionycteris phyllotis</i>	S	None. No suitable roosting habitat; out of distribution area (UDNR).	No effect
Big free-tailed bat	<i>Nyctinomops macrotis</i>	S	Moderate. Confirmed as present in Arches and substantial value habitat in Grand County (UDNR), indicating species likely to forage over project area.	Would not contribute to listing

Common Name	Scientific Name	Status	Likelihood of occurrence	Determination of Effect for Alternative B
Black-footed ferret	<i>Mustela nigripes</i>	E	None. Although a prairie dog colony is a mile from the project area there are no ferrets present in Arches.	No effect
Fringed myotis	<i>Myotis thysanodes</i>	S	None. No suitable habitat in Grand County (UDNR).	No effect
Gunnison's prairie-dog	<i>Cynomys gunnisoni</i>	S	None. No prairie dog colonies within project area; species not found in Grand Co. (UDNR).	Would not contribute to listing
Kit fox	<i>Vulpes macrotis</i>	S	Low. No tracks or dens found during surveys. Unconfirmed reports in Arches.	Would not contribute to listing
Spotted bat	<i>Euderma maculatum</i>	S	Moderate. No suitable roosting habitat; substantial and high value habitat in Grand Co. (UDNR), indicating species likely to forage over project area.	Would not contribute to listing
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	S	Low. Limited suitable habitat in project area (UDNR), although species may forage over area.	Would not contribute to listing
White-tailed prairie-dog	<i>Cynomys leucurus</i>	S	Low. No prairie dog colonies within project area, though one colony is found in Salt Valley two miles north of the pipeline.	Would not contribute to listing
Reptile				
Cornsnake	<i>Elaphe guttata</i>	S	None. No suitable riparian zone habitat.	No effect
Smooth greensnake	<i>Opheodrys vernalis</i>	S	None. No suitable riparian zone habitat.	No effect
Fish				
Bonytail	<i>Gila elegans</i>	E	None. Not known from Salt Wash drainage. Not found in intermittent waters.	No effect
Bluehead sucker	<i>Catostomus discobolus</i>	CA	None. Found in fast-moving high-gradient habitats in Colorado River system.	No effect
Flannelmouth sucker	<i>Catostomus latipinnis</i>	CA	None. Found in large slow-moving habitat of Colorado River system.	No effect
Colorado pikeminnow	<i>Ptychocheilus lucius</i>	E	None. Not known from Salt Wash drainage. Not found in intermittent waters.	No effect
Humpback chub	<i>Gila cypha</i>	E	None. Found in fast-moving whitewater environments, not known from Salt Wash.	No effect
Roundtail chub	<i>Gila robusta</i>	CA	None. Found in the strong currents of large rivers of Colorado River system.	No effect
Razorback sucker	<i>Xyrauchen texanus</i>	E	None. In Utah, only found in Green River and tributaries in northeast corner of state. Not found in intermittent waters.	No effect

Common Name	Scientific Name	Status	Likelihood of occurrence	Determination of Effect for Alternative B
Mollusks				
Eureka mountainsnail	<i>Oreohelix eurekaensis</i>	S	None. Found on north-facing cliffs in forested habitat at elevations from 7,200-8,100 feet.	No effect
Plants				
Peabody milkvetch	<i>Astragalus pubentissimus</i> var. <i>peabodianus</i>	S	None. Found on the Tavaputs Plateau and not in Arches.	No effect
Cisco milkvetch	<i>Astragalus sabulosus</i> var. <i>sabulosus</i>	S	None. Endemic to the Colorado River Valley in Grand County but known only from sites on Mancos Shale northeast of Arches.	No effect
Stagecoach milkvetch	<i>Astragalus sabulosus</i> var. <i>vehiculus</i>	S	None. Endemic to the head of Courthouse Wash in Grand County, us stream of Arches, elevation 4,500-4,800'.	No effect
Jones' cycladenia	<i>Cycladenia humilis</i> var. <i>jonesii</i>	T	None. Found on steep slopes of clay soils. Two known locations in Grand County, both outside Arches National Park and not in vicinity of project area.	No effect
Alcove bog-orchid	<i>Habenaria zothecina</i>	S	None. Found in Arches, but only in seeps, hanging gardens or on moist streambanks protected from flood events.	No effect
Canyonlands lomatium	<i>Lomatium latilobum</i>	S	None. Found primarily in Arches National Park, but only in or near sandstone fins, which are near but not in the project area.	No effect
Dolores rushpink	<i>Lygodesmia grandiflora</i> var. <i>dolorensis</i>	S	None. Found in desert shrub communities on reddish soils from 4,600 - 4,700' elevation, in Utah only in Grand Co. on BLM land; not known in the park.	No effect
Entrada rushpink	<i>Lygodesmia grandiflora</i> var. <i>entrada</i>	S	Very Low. Found in mixed desert shrub and juniper communities from 4,400 - 4,800' elevation, one record in Arches National Park, found mostly on BLM land west of Park.	Would not contribute to listing
Shultz stickleaf	<i>Menzelia shultziorum</i>	S	None. Found in shadscale, <i>Eriogonum</i> and <i>Ephedra</i> communities from 4,100 - 5,200' elevation, on BLM land; not known in Park.	No effect
Trotter's oreoxis	<i>Oreoxis trotteri</i>	S	None. Found in warm desert shrub and mixed juniper communities from 4,800 - 6,000' elevation. Not known in park.	No effect
Alcove rock-daisy	<i>Perityle specuicola</i>	S	None. Found in desert shrub and hanging garden communities from 3,700 - 4,200' elevation. Known from east side of Colorado River	No effect

Common Name	Scientific Name	Status	Likelihood of occurrence	Determination of Effect for Alternative B
			near park, but not from within park.	
Jane's globemallow	<i>Sphaeralcea janeae</i>	S	None. Found in warm and salt desert shrub communities on the White Rim and Organ Rock members of the Cutler Formation and Cutler Undivided from 4,000 - 4,600' elevation; Utah Rare Plants does not include Grand County within the species range and it is not known in Arches.	No effect
Psoralea globemallow	<i>Sphaeralcea psoraloides</i>	S	None. Found in various limestone formations from 4,000 - 6,300' elevation; Utah Rare Plants does not include Grand County within the species range, and it is not known in park.	No effect

References: Federal list as of September 2009 from US Fish and Wildlife Service; State of Utah list of sensitive species as of September 2009; List by County in Utah from October 2009; Plant list from the BLM Sensitive Plant Species List for Utah, August 2002; Plant descriptions from the Utah Rare Plant Guide, updated 12/11/08. NPS NCPN I&M species lists, updated online in Dec 2009.

Status: E - Federally Endangered; T - Federally Threatened; C - Federal Candidate Species; CA - Conservation Agreement Species; S - State of Utah Species of Concern

Archeological resources

The National Park Service, as a steward of many of America's most important cultural resources, is charged to preserve archeological resources, ethnographic resources and historical structures for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources. The National Park Service would protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with §106 and §110 of the National Historic Preservation Act as well as the policies and principles contained in the 2006 *Management Policies* and the appropriate Director's Orders.

In addition to the National Historic Preservation Act and the National Park Service 2006 *Management Policies*, the National Park Service's Director's Order-28B *Archeology* affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the National Park System. As one of the principal stewards of America's heritage, the National Park Service is charged with the preservation of the commemorative, educational, scientific, and traditional cultural values of archeological resources for the benefit and enjoyment of present and future generations. Archeological resources are nonrenewable and irreplaceable, so it is important that all management decisions and activities throughout the National Park System reflect a commitment to the conservation of archeological resources as elements of our national heritage.

In 1974, an archeological survey of the northeastern portion of Arches National Park was conducted by Michael S. Berry and representatives of the Antiquities Section, Division of State History, State of Utah (Berry 1975). At that time, fifty-nine sites had been recorded in the park as a result of previous surveys (Hunt 1953; Pierson n.d.). Thirty additional sites were discovered during the Berry investigation. During this investigation, four sites were determined to be located near or over the buried pipeline east of the main park road. These four sites are quarry sites that are generally coextensive with isolated outcrops of the Summerville Formation, which contains large concretionary masses of chert. The majority of the lithic debris found at the quarries is large discarded flakes produced in the initial stages of manufacture. However, a few bifaces and unifaces were recovered, and one Type VIII projectile point was collected from a site that the pipeline crosses.

An archeological survey was conducted in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (PL 91-852), the National Environmental Policy of 1969 (PL 91-852), the Archaeological Resources Protection Act of 1979 (PL 96-95), and Executive Order 11593. The cultural resources work conducted for this project included a literature search of existing sites and previous surveys and projects in the current project area, and a Class III pedestrian survey of the Area of Potential Impact (APE) performed by Woods Canyon Archaeological Consultants (Shanks and Fetterman 2010). The Class III pedestrian survey was conducted between November 9, 2009 and November 18, 2009. A total of 87.27 acres were surveyed for the project.

The pedestrian survey resulted in the identification of a total of 16 cultural sites in the project area, including 14 new sites and two previously recorded sites. Of these sites, ten were recommended as National Register ineligible, two were unevaluated, and four were recommended as National Register eligible. In addition, 22 isolated finds were located (Shanks and Fetterman 2010).

In regards to maintenance of the pipeline and the Williams Northwest Gas Pipeline SUP, no further work is recommended on 12 of the 16 sites located. These sites either have no potential for significant buried deposits or the portion of the site in the 50 foot area on either side of the pipeline is not likely to contain intact buried deposits due to previous pipeline disturbance.

Testing and/or monitoring is recommended within the 50 foot pipeline corridor and in areas required for extra workspace for three of the sites. At one site, no further work is recommended within the 50 foot pipeline corridor but if extra workspace is needed to the north of the pipeline, testing and/or monitoring is recommended.

Ethnographic Resources

Certain contemporary Native American and other communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of park resources with which they are traditionally associated. The NPS plans and executes programs in ways that safeguard cultural and natural resources, while reflecting informed concern for the contemporary peoples and cultures traditionally associated with those resources.

In consultation with the Ute Indian Tribe, Arches National Park has identified Purple sage (*Poliomintha incana*) as an example of an ethnobotanical resource with traditional cultural significance. Purple sage has edible and medicinal uses for this tribe. A recent survey in December 2009, conducted by the park planner and vegetation biotech, and mapped by the Cultural Resource Program Manager and park GIS specialist discovered 2.4 acres of Purple sage within and near the pipeline corridor. 1.38 acres of the ethnobotanical resource was determined to be within the pipeline corridor itself. A letter dated January 13, 2010 was sent to the Ute Indian Tribe to inform them of the discovery and assure them that this area is not slated for any kind of routine maintenance by the Williams Pipeline Company, and that the likelihood of any purple sage being impacted by emergency maintenance would be extremely low. The Ute Indian Tribe responded by telephone on February 9, 2010 with a request for an on-site visit, and this would be accomplished in the spring of 2010.

Wilderness

A variety of uses, management actions, and even facilities are permitted in Wilderness areas under the Wilderness Act and NPS policies. The Wilderness Act declares that “a wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.”

A method designed to assist wilderness managers in making appropriate decisions in wilderness is the Minimum Requirements Decision Guide (MRDG). Use of the MRDG requires familiarity with the difference between wilderness and other public lands as defined by the Wilderness Act. The MRDG is a process to identify, analyze, and select management actions that are the minimum necessary for wilderness administration (minimum requirement analysis). It applies this direction from the Wilderness Act and incorporates a two-step process. Step 1 determines whether administrative action is necessary. If action is found to be necessary, then Step 2 provides guidance for determining the minimum activity. Step 2 has been referred to as determining the minimum tool but could include any type of activity, method, or equipment. Any maintenance activity has the potential to greatly impact Wilderness character and values in the park outside of the pipeline right-of-way. An example of the MRDG can be found in Appendix A.

Six units of Wilderness totaling 62,987 acres are recommended for designation as Wilderness in Arches National Park (NPS 1986). These units, except for roads and the visitor center area comprise nearly the entire park. The pipeline crosses through recommended Wilderness areas in the park. The 1974 Wilderness Recommendation document requests that the gas pipeline not be excluded from wilderness designation solely for the reason it is an underground utility. Where the pipeline occurs, the areas may be included by making specific mention of the pipeline in proposed legislation indicating that this use would continue and previously established maintenance practices would be allowed to continue. The updated 1984 Wilderness recommendation letter, also request that any wilderness legislation make a special provision for the underground natural gas pipeline right-of-way and for the continuation of previously established maintenance practices which included using motorized vehicles along the 50 foot wide pipeline right-of-way.

Natural Soundscape

Natural sounds and natural soundscapes are considered valuable and important natural resources by the National Park Service (NPS 2006). NPS *Management Policies* reflect a strong direction to protect natural soundscapes in parks, stating: "The National Park Service would preserve, to the greatest extent possible, the natural soundscapes of parks" (NPS 2006). Section 8.2.3 of the NPS Management Policies state: "The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a Soundscape would be measured and evaluated" (NPS 2006).

Director Order 47 refers to the total ambient acoustic environment associated with a given environment (sonic environment) in an area such as a national park. It also refers to the total ambient sound level for the park. In a national park setting, this soundscape is usually composed of both natural ambient sounds and a variety of human-made sounds.

Acoustic data collection began in Arches National Park in 2000 and continued intermittently through 2007. The objectives of the study were to determine natural ambient (L_{nat}) and existing ambient (L_{50}) sound levels in the primary land cover types in units of the Southeast Utah Group (SEUG), and to determine the primary sources of sounds (natural and non-natural) in those locations. Park units of SEUG include: Arches National Park; Canyonlands National Park; Hovenweep National Monument; and Natural Bridges National Monument. *Natural Ambient Sound Level* (L_{nat}) is the level of all natural

sounds in a given area (i.e., wind, streams, wildlife, etc.), excluding mechanical, electrical, and other human-caused sounds. *Existing Ambient Sound Level (L_{50})* is the sound level of all sounds in a given area, including all natural sounds as well as all mechanical, electrical and other human-caused sounds. The L_{50} (median) sound level is, by definition, exceeded 50 percent of the time.

The primary sources of non-natural sounds in the park are vehicles, aircraft, park operations, and park visitors. At a measurement location near the Salt Valley Road in the park, non-natural sounds were audible 44.9% of the time (annual average, 25% summer and 64.8% winter). Natural sounds in summer (wind, insects, birds, etc.) often mask distance non-natural sounds, thus non-natural sounds are often less audible in summer. The primary sources of non-natural sounds were vehicles and aircraft (Ambrose and Florian 2008). Vehicle sounds are most noticeable at locations with a concentration of park visitors and heavy vehicle traffic, although vehicles sounds from distance highways outside the park are often audible. The existing acoustic environment changes dramatically throughout the year in proportion to the level of visitor use and seasonal changes of natural sounds. As a result, noise levels are generally lower during the winter than during the busy summer months.

Table 4: Percent time different sound sources audible at ARCH002 measurement location (Salt Valley Road), summer (June 2002) and winter (January 2003).

Audible Sound Sources	Summer Average % Time Audible	Winter Average % Time Audible*	Annual Average % Time Audible
No Sound Audible	9.1	20.8	15.0
Aircraft, Jet	16.2	20.1	18.2
Aircraft, Propeller	4.7	6	5.4
Aircraft, Helicopter	0	0	0.0
Vehicle	2.6	32.7	17.7
Motor Sounds	1.5	7	4.3
Wind	50	23.3	36.7
Water (rain, river, etc.)	0.2	0	0.1
Thunder	0.3	0	0.2
Bird	0.7	1.3	1.0
Insect	35	0.1	17.6
Animal (unknown type)	0.1	0	0.1
Total Aircraft	20.9	25.9	23.4
Total Road Vehicles	2.6	32.7	17.7
Total Non-natural	25	64.8	44.9
Total Natural	76	24.7	50.4

*Note: Natural sound levels are less during the winter. This enables non-natural sounds to sound louder.

The NPS monitored sound at ten sites in Arches, from 2001 to 2007. Sound levels in the backcountry areas were generally very low, often less than 20 dBA. Absent non-natural sounds, sound levels were often near or below the lower limit measurement capability (noise floor) of the sound level meters. For comparison, 20 dBA is the typical sound level in a recording studio, 30 dBA is a soft whisper at five feet, and 40 dBA is the typical sound level in a library. A 6 dB increase in sound level represents a doubling of sound

level. As perceived by humans, an increase of 10 dBA is perceived as about “twice as loud” as the lower level.

Currently a Soundscape Management Plan is being developed in attempt to manage soundscapes appropriate for all park resources that could be influenced by the presence of non-natural sounds. The soundscape indicators listed below would be used to monitor and manage soundscapes in Arches National Park as proposed in the Soundscape Management Plan. Both natural ambient sound levels and the number of non-natural sound events vary by hour (and generally on a daily and seasonal pattern). As a result, these indicators would be assessed on an hourly average basis rather than on a daily average basis.

- Percent Time Audible
- Noise Free Interval
- Maximum Sound Level

Percent Time Audible

The Percent Time Audible (%TA) is the percent of time that human-caused sounds can be heard by a person with normal (unimpaired) hearing. The %TA metric is especially meaningful in that it takes into account many factors, including natural ambient sound level, the sound level of non-natural events, and the ability of a human with normal hearing to hear a given event. The %TA metric uses one-third octave band level data (20 Hz to 20,000 Hz, the general hearing range of humans), and as a result provides much more information than a simple, single dBA metric. 25% Time audible means human-caused sounds are audible 25% of the hour. Time audible or “audibility” is one of the ways NPS measures or characterizes the acoustic environment in national park units.

Noise Free Interval

Noise Free Interval (NFI) is the length of time (continuous) during which only natural sounds are audible or there is silence. This metric is useful in conjunction with %TA because %TA alone can be misleading. For example, 25% TA may appear to be a reasonable goal in some areas; however, such a goal could result in periods of 3 minutes of silence and 1 minute of motor noise, continuously. Such a situation would not be conducive to experiences of solitude; hence the use of both metrics is appropriate. In order to provide opportunities to experience remoteness and solitude, periods of 30 minutes or more of natural sounds only or silence are appropriate.

Maximum Sound Level

The maximum sound level is a metric useful for insuring non-natural events do not exceed pre-determined levels. Maximum allowable sound levels have been established for many sound sources by NPS and EPA and many state and local governments. Regulations have been established for vehicles, motorcycles, boats, and over-snow vehicles. For all other sound sources, the NPS 36 CFR § 2.12 (Audio disturbances) applies. 36 CFR § 2.12 stipulate that the following are prohibited: “Operating motorized equipment or machinery such as an electric generating plant, motor vehicle, motorized toy, or other audio device such as a radio, television set, tape deck or musical instrument in a manner: (1) That exceeds a noise level of 60 decibels measured on the A-weighted scale at 50 feet or, if below that level, nevertheless, (2) makes noise which is unreasonable, considering the nature and purpose of the actors conduct location time of day or night, purpose for which the area was established, impact on park users, and other factors that should govern the conduct of a reasonably prudent person under the circumstances.”

For backcountry and wilderness areas, no specific standards exist other than as suggested in Section (2) above, “noise which is unreasonable, considering the nature and purpose of the actors conduct location time of day or night, purpose for which the area was established.” For backcountry or wilderness areas of parks managed to provide opportunities for remoteness and solitude, no specific maximum sound level standards exist. The Soundscape Management Plan attempts to establish maximum sound levels in such areas that provide for such opportunities for park visitors and also to protect wildlife species.

Noises from proposed maintenance activities would come from the equipment being used and could vary relative to the particular operation in progress. See Table 5 for decibel levels observed from 50 feet from various types of construction equipment (Canter, 1996).

Table 5: Construction-equipment noise ranges

Equipment	Decibels (dBA) at 50 ft
Pneumatic wrenches	84-89
Jackhammers and Rock Drills	82-96
Saws	74-81
Generator	73-82
Compressor	76-88
Front-end Loader	73-82
Backhoe	72-93
Tractors	77-94
Trucks	82-92

Source: US. Environmental Protection Agency.

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. The primary scenic attractions at the park are the arches. Water and ice, extreme temperatures, variably cemented sandstone layers, 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. 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.

Over seven miles of the Williams Northwest pipeline cuts through Arches National Park. Although the pipeline is buried at least three feet underground, in many locations the scar/road created from original blasting and from annual surveys and maintenance activities along the pipeline can be obvious. Visitors, some unknowingly and some after finding the “pipeline trail” online, have hiked the trail along the northeast half of the pipeline in the park. This trail was presumably created by workers surveying the pipeline. The pipeline carsonite marker posts are also a visual intrusion among the natural desert landscape. Maintenance activities using heavy equipment and vehicles along the pipeline would have the potential to adversely affect the visual environment.

Visitor Use and Experience

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), access to the backcountry and nature study. 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 day-hiking experiences.

According to the National Park Service Public Use statistics and park staff, Arches National Park averages 800,000 visitors annually but in 2009, the park received 996,312 visitors. The park’s “season” for visitation is from March through September. Recreation visits peak in the months of May, June and September. Some days may have up to 3,000-4,000 visitors visiting the park visitor center according to park visitation records. Arches National Park is typically considered a drive-through park where most visitors stay less than half a day, although some stay longer for extended hiking or camping. For reporting purposes, the park estimates the average visitor stay at 3 hours. A small portion of visitors camp in the 53-unit campground and are assumed to stay an additional 24 hours for each night that they camp (NPS 1989).

Over the past couple of decades, the park’s fame has increased as more and more people visit the park. The rapidly increasing level of visitor use is affecting both the park’s resources and visitor experiences. In the summer of 1992, the Visitor Experience and Resource Protection (VERP) Program began in Arches National Park as a test pilot program for the National Park Service system. A central component of the program was to conduct a two phase visitor-oriented social science research program that was designed and implemented as part of a cooperative agreement between the NPS (Arches National Park, Denver Service Center), the Cooperative Park Studies Unit (CPSU) at the University of Minnesota and the School of Natural Resources at the University of Vermont. The phase I portion was designed to learn about a variety of human-use aspects of visitation at Arches National Park and to begin to identify potential indicators of a quality visitor experience. Phase II was conducted during the months of July through October, 1993, to rate the importance of selected indicator variables identified in phase I and assist in establishing standards of desired conditions of each of these indicators. The final results were, generally speaking, that visitors reported that they benefited from (1) enjoying nature and learning; i.e., viewing scenery, learning about nature, experiencing

new and different things, and learning more about things in the park, (2) escaping daily routines and (3) to get exercise (Lime et al 1994).

A natural gas pipeline buried three feet under the soil surface in a national park may not seem not to be an issue to visitor use and their experiences, however, Arches National Park is a highly visited park and the visual impacts from pipeline employees and the roads/scar developed along the right-of-way from vehicles and maintenance equipment have the potential to impact the visitor's experience. In several locations along the pipeline, especially northeast of the main park road, visitors use the corridor as a "trail" in the backcountry. Also, the hazards of potential gas leaks or ruptures from unmaintained sections of pipeline have the potential for significant impacts to the safety of park visitors and staff.

Park Operations

The Southeast Utah Group (SEUG) is comprised of four park units (Arches National Park, Canyonlands National Park, Hovenweep National Monument and Natural Bridges National Monument) and provides administrative support for these parks. The SEUG employs the two division chiefs that would be most impacted by pipeline maintenance: the Resource Management Division and Visitor and Resource Protection Division. SEUG also employs the chiefs of the Maintenance Division and Interpretive Division, which are less commonly involved in pipeline issues.

The Resource Management Division is responsible for the management and protection of natural and cultural resources. It is tasked with the responsibility to understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the park and to maintain the natural condition of resources that would occur in the absence of human control over the landscape. Natural resources, processes, systems, and values found in Arches National Park include physical resources such as water, air, soils and biological soil crusts, topographic features, geologic features, paleontological resources, and natural soundscapes and clear skies, both during the day and at night; physical processes such as weather, erosion, and wildland fire; biological resources such as native plants, animals, and communities; biological processes such as photosynthesis, succession, and evolution; ecosystems; and highly valued associated characteristics such as scenic views. The Resource Management Division is also responsible for cultural resources including archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections. The cultural resource management program involves: research to identify, evaluate, document, register, and establish basic information about cultural resources and traditionally associated peoples; planning to ensure that management processes for making decisions and setting priorities integrate information about cultural resources and provide for consultation and collaboration with outside entities; and stewardship to ensure that cultural resources are preserved and protected, receive appropriate treatments (including maintenance) to achieve desired conditions, and are made available for public understanding and enjoyment.

The Visitor and Resource Protection Division is responsible for protecting the natural and cultural resources of the park, as well as providing for the enjoyment and safety of park visitors. Programs managed include law enforcement, fee collection management, wildland fire activities, emergency medical services/search and rescue coordination and execution, concessions and special use management and continued efforts in resource education.

The Maintenance Division is occasionally impacted by pipeline issues that interact with park infrastructure, such as a 2010 planned parking lot expansion near the pipeline, or Williams' planned potential paving of the Salt Valley unpaved road in a short stretch where the pipeline crosses under the road. The Interpretive Division becomes involved in educating visitors during major pipeline repairs.

No monetary costs or additional personnel would be required by Arches National Park to maintain the pipeline, as Williams would be covering all costs to conduct surveys and perform pipeline maintenance. However, any proposed project would require consultation, especially with Resource Management and/or Visitor and Resource Protection personnel, and time away from their park project workloads.

CHAPTER 4- ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the affected environment (existing condition or baseline information) and potential environmental consequences, or impacts that would occur as a result of implementing the proposed project. Topics analyzed in this chapter include geological resources, paleontological resources, soil, native vegetation, non-native species, water resources, floodplains, wetlands, threatened, endangered and species of special concern, archeological resources, ethnographic resources, wilderness, visual resources, visitor use and experience, and park operations. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource in the *Affected Environment* chapter.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
 - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
 - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
 - *Direct*: An effect that is caused by an action and occurs in the same time and place.
 - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, and still reasonably foreseeable.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this EA/AEF.
- **Context** describes the area or location in which the impact would occur. Are the effects site-specific (work-site), local (community-wide), regional, or even broader?
- **Duration** describes the length of time an effect would occur, either short-term or long-term. Because definitions of duration vary by resource topic, duration definitions are provided separately for each impact topic analyzed in this EA/AEF.

Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Arches National Park and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the park's boundaries but has the potential to be regional for certain impact topics. The temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future:

- **Oil and Gas Exploration:** Oil and gas exploration and development has been ongoing and is widespread on BLM land in southeastern Utah. Mining and exploration is allowed in the Potash region of BLM land, adjacent to the northern and western boundaries of Arches National Park.
- **Agricultural Practices:** Grazing of livestock, farming and irrigation within park boundaries in the past. Today, these practices still occur on neighboring lands.
- **Atlas Mine Tailings Site:** The US Department of Energy (DOE) is in the process of relocating contaminated uranium-ore surface material to a disposal site 30 miles north of Moab, UT via railroad line along HWY 191 just west of the park.
- **Williams Northwest Pipeline:** The maintenance of the pipeline has been ongoing since the pipeline was installed in the 1950's. The effects of this repeated maintenance activities impact the park's natural and cultural resources.
- **Transportation Implementation Plan and Environmental Assessment 2006:** This plan addresses plans to enlarge the Sand Dune Arch parking area which is near a section of pipeline near the main park road.
- **Exotic Plant Management Plan 2009:** The SEUG Exotic Plant Management Plan is a plan to treat and eradicate exotic plants within Arches National Park with judicious use of mechanical, cultural, chemical and biological control techniques. The plan also addresses active or passive restoration of native plant communities.
- **Draft Revegetation Monitoring Plan 2009:** This plan details monitoring methods to track the effectiveness of mitigation work related to the repair of two anomaly sites (22250 and 26520) along the Northwest Pipeline within Arches National Park, which occurred in February 2009.
- **Recreation:** Recreation within the park occurs potentially year-round and includes hiking, sightseeing, and backcountry camping. An average of 900,000 visitors visit Arches National Park a year.

Impairment

NPS 2006 *Management Policies* require analysis of potential effects to determine whether or not actions would impair park resources (NPS 2006). The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, 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 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. 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. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

1. necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. key to the natural or cultural integrity of the park; or
3. identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

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. A determination on impairment is made in the *Conclusion* section for each of the resource topics except for visitor use and park operations.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service applies a standard that offers greater assurance that impairment would not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with
 - * park programs or activities, or

- * an appropriate use, or
- * the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.
- * NPS concessionaire or contractor operations or services.

In accordance with NPS 2006 *Management Policies*, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impact could occur to the resources and values of Arches National Park, the impacts of proposed actions in this EA/AEF were evaluated based on the above criteria. A determination on unacceptable impacts is made in the *Conclusion* section for each of the resource topics carried forward in this chapter.

Impacts to Cultural Resources and §106 of the National Historic Preservation Act

In this EA/AEF, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the National Historic Preservation Act (36 CFR §800, *Protection of Historic Properties*), impacts to historic structures were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected National Register eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion on the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR §800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order 12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effects remain adverse.

A §106 summary is included in the impact analysis sections under the preferred alternative. The §106 summary is intended to meet the requirements of §106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Geological Resources

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to geology were derived from available surveys and park staff's past observations of the effects on geology from visitor use and construction activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Operations would not cause discernible alteration to geological resources. Impacts would not be measurable or of any perceptible consequence.
- Minor:** Changes to character of geological features and processes are detectable but small, localized and of little consequence. Operations would cause localized or limited alteration to geological resources. Any mitigation needed to offset adverse effects would be standard, uncomplicated and effective.
- Moderate:** Changes may be evident over large portion of geological features and processes. Operations would cause alterations to geological resources. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.
- Major:** Impacts to geological resources could be substantial and over a wide area. Alterations to geological resources would have a lasting effect and reclamation could not successfully be achieved. Extensive mitigation measures would be needed to offset any adverse effects, and their success could not be guaranteed.
- Duration:** Short-term refers to a transitory effect, one that largely disappears over a period of days or months. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have geological resources evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible impacts* to geological resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels or by installing flow control devices in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the

sedimentation covering the pipeline. These measures would have *direct, adverse, minor, site-specific, short-term* impacts to geological resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing activities such as digging may physically impact geological resources. Equipment could potentially impact unknown geological resources in un-surveyed areas. Ground-disturbing equipment, such as track excavators, backhoes, and front-end loaders as well as sandblasting equipment may have measurable or perceptible effect on geological resources. Impacts to the bedrock, using this equipment that would dig or perform other ground disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Cumulative Effects

Past land practices (prior to each park's establishment), such as ranching and farming, may have disturbed, damaged, or destroyed some geologic features and processes and associated resources. Road and trail maintenance and construction activities could adversely affect remaining geological resources. Consultation with resource management staff, to evaluate and mitigate potential impacts usually occurs during the planning phase of these types of projects. Visitor use could cause loss or damage to geological resources, particularly from the collection of rocks from the backcountry. This alternative when combined with other impacts would result in minor additive adverse effects on geological resources. Currently, unknown or undocumented sites could be affected by maintenance activities, but in the event such sites are discovered, activities would stop until resource staff could evaluate these resources.

Conclusion

Disturbance to geological resources may be direct and site-specific. In laying the pipeline in the 1950's, several locations where bedrock, typically Entrada Sandstone, was located along the path of the pipeline, the bedrock was blasted to allow the pipeline to be laid right in the bedrock and then buried. If maintenance is required to these sections of pipeline, which are currently surrounded by bedrock, the potential impacts to geological resources would be moderate.

Mitigation measures would be taken to minimize marring slickrock with tracked vehicles or other heavy equipment along the pipeline. The only way to access and repair sections of pipeline located within bedrock, is to cut into the bedrock around the pipeline. The cuts may be long and wide if sections of pipeline require recoating. The impacts of current management of the pipeline on the geological resources would therefore be *directly adverse, negligible to moderate, site specific, short and long-term*. This alternative would not result in impairment to geological resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible impacts* to geological resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels or by installing flow control devices in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These measures would have *direct adverse, minor, site-specific, short-term impacts* to geological resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation may physically impact geological resources and heavy equipment could potentially impact unknown geological resources in unsurveyed areas. Ground-disturbing equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment may have measurable or perceptible effect on geological resources. Impacts to the bedrock, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer, traverse sections of bedrock may seem as a logical choice to lessen impact to soils and biological soil crusts, however, the metal tracks on a track excavator have the potential to cut into the bedrock and make tracks that could have a *directly adverse, moderate, site-specific, long-term impact*. The UTV's used to transport personnel would have direct adverse, site-specific short-term minor impacts to geological resources. The tires from the UTV's could leave rubber marks on bedrock in steep sections of the pipeline corridor or on additional access routes.

Recalibration of the 2009 Anomaly Investigation and Repair: This activity would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact geological resources and equipment could potentially impact unknown geological resources in unsurveyed areas. Ground-disturbing equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment may have measurable or perceptible effect on geological resources. Impacts to the bedrock, using this equipment that would dig or perform other ground disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. This activity would be *directly adverse, moderate, site-specific, and short-term*.

Restoration Activities:

Restoration activities, such as replanting, would have *negligible impacts* to geological resources.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

In considering the impacts of anticipated maintenance needs, the appropriate mitigation measures would be in place prior to any maintenance activity along the pipeline. Sensitive geological resources would be known prior to maintenance along the pipeline and potentially avoided. Surface-disturbing activities would be avoided in areas of known geological resources without first consulting resource staff.

In using heavy equipment, care would be taken to minimize marring slickrock with tracked vehicles. Cutting into the bedrock would be minimal around sections of pipeline requiring maintenance. However, the potential for maintenance on 30-40 feet sections of pipeline could be directly adverse, moderate, site-specific, and long-term.

In locating routes for heavy equipment to take to anomaly sites, it was determined after the emergency work in February, using the pipeline corridor and an old road was less of an impact to geological resources given that both these areas have been previously disturbed. The only way to access and repair sections of pipeline located within bedrock, would be to cut into the bedrock around the pipeline. The cuts may be long and wide around sections of pipeline requiring recoating.

This alternative would not inhibit the achievement of the desired condition to have natural and geological processes, such as erosion, functioning in as natural condition as possible. The impacts of the preferred alternative on geological resources would therefore be *directly adverse, negligible to moderate, site-specific, short and long-term*. This alternative would not result in impairment to geological resources.

Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Paleontological Resources

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to paleontological resources were derived from available surveys and park staff's past observations of the effects on paleontological resources from visitor use, and construction activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Operations would not cause discernible alteration to paleontological resources. Impacts would not be measurable or of any perceptible consequence.
- Minor:** Changes to character of fossil-bearing strata are detectable but small, localized and of little consequence. Operations would cause localized or limited alteration to paleontological resources. Any mitigation needed to offset adverse effects would be standard, uncomplicated and effective.
- Moderate:** Changes may be evident over large portion of the fossil-bearing strata. Operations would cause alterations to paleontological resources. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.
- Major:** Impacts to paleontological resources could be substantial and over a wide area. Alterations to paleontological resources would have a lasting effect and reclamation could not successfully be achieved.

Extensive mitigation measures would be needed to offset any adverse effects, and their success could not be guaranteed.

Duration: Short-term refers to a transitory effect, one that largely disappears over a period of days or months. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have paleontological resources evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to paleontological resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels or by installing flow control devices in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. Paleontological resources are not usually found in washes. These erosion control measures would have *negligible impacts* to paleontological resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Anomaly investigations may physically impact paleontological resources and equipment could potentially impact unknown paleontological resources in unsurveyed areas. The main risk is the use of vehicles and heavy equipment during maintenance activities that could damage fragile fossils. These types of activities would not be performed in areas suspected or known to contain resources of paleontological value and only after the work area has been surveyed by a paleontologist in consultation with resource managers. The impacts of current maintenance activities to paleontological resources would therefore be *directly adverse, minor, site-specific, and short-term* if mitigation measures are adhered to. In the absence of mitigation, impacts could be *directly adverse, moderate, site-specific and long-term*.

Cumulative Effects

Past land practices (prior to each park's establishment), such as ranching and farming, may have disturbed, damaged, or destroyed some paleontological sites and associated resources. Road and trail maintenance and construction activities could adversely affect remaining paleontological resources. Consultation with resource management staff, to evaluate and mitigate potential impacts occurs during the planning phase of these types of projects. Visitor use could cause loss or damage to paleontological resources, particularly from the collection of fossils from the backcountry. Wildfire could uncover some resources that would otherwise be unknown. Under this alternative, Arches National Park would avoid surface-disturbing activities in areas of known paleontological resources without first consulting resource staff. Currently unknown or undocumented sites could be affected by maintenance activities, but in the event such sites are discovered, activities would stop until a paleontologist could evaluate these resources. This

alternative when combined with other impacts would result in overall minor additive adverse impacts to paleontological resources.

Conclusion

Disturbance to paleontological resources may be adverse and site-specific, within the worksite. Current management and maintenance activities along the pipeline may inhibit the achievement of the desired condition to have paleontological resources, such as fossil bearing strata, functioning in as natural condition as possible. If paleontological resources are found, mitigation measures, for example, would be implemented to prevent changes to fossil bearing strata from maintenance activities along the pipeline. The impacts of current management of the pipeline on the paleontological resources would therefore be *directly adverse, negligible to moderate, site-specific, short and long-term*. This alternative would not result in impairment to paleontological resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to paleontological resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels or by installing flow control devices in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These measures would have *directly adverse, minor, site-specific, short-term* impacts to paleontological resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation may physically impact paleontological resources and heavy equipment could potentially impact unknown paleontological resources in surveyed areas. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment may have measurable or perceptible effect on paleontological resources. Impacts to the bedrock, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer, traverse sections of bedrock may seem as a logical choice to lessen impact to soils and biological soil crusts, however, the metal tracks on a track excavator have the potential to cut into the bedrock and make tracks that could have a *directly adverse, moderate, site-specific, long-term* impact. The UTV's used to transport personnel would have direct adverse, site-specific short-term minor impacts to paleontological resources. The tires from the UTV's could leave rubber marks on bedrock in steep sections of the pipeline corridor or on additional access routes.

Recalibration of the 2009 Anomaly Investigation and Repair: These activities would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact paleontological resources and equipment could potentially impact unknown paleontological resources in surveyed areas. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment may have measurable or perceptible effect on paleontological resources. Impacts to the bedrock, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The rock formations exposed in this proposed area is primarily the Entrada Formation and the Moab Tongue Member of the Curtis Formation. Both formations have been known to contain fossils. In addition, the Moab Tongue contains several species of dinosaur tracks. This activity would be *directly adverse, moderate, site-specific, and short-term*.

Restoration Activities:

Restoration activities, such as replanting, would have *negligible impacts* to paleontological resources.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

In considering the impacts of anticipated maintenance needs, the appropriate mitigation measures would be in place prior to any maintenance activity along the pipeline. Sensitive paleontological resources would be known prior to maintenance along the pipeline and potentially avoided. Surface-disturbing activities would be avoided in areas of known paleontological resources without first consulting resource staff.

In using heavy equipment, care would be taken to minimize marring slickrock with tracked vehicles. Cutting into the bedrock would be minimal around sections of pipeline requiring maintenance. However, the potential for maintenance on to 30-40 feet sections of pipeline could be directly adverse, site-specific, long-term and moderate.

In locating routes for heavy equipment to take to anomaly sites, it was determined after the emergency work in February, using the pipeline corridor and an old road was less of an impact to paleontological resources given that both these areas have been previously disturbed. The only way to access and repair sections of pipeline located within bedrock, would be to cut into the bedrock around the pipeline. Recoating sections of pipe would require longer cuts into the bedrock.

The impacts of Alternative B on paleontological resources would therefore be *directly adverse, negligible to moderate, site-specific, short and long-term*. This alternative would not result in impairment to paleontological resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006

Soils

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to soils were derived from available soils information (NRCS 2003), US Geologic Survey soil scientists, and from park staff's past observations of the effects on soils from visitor use and construction activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Any effects to soils (loss of soil surface roughness, increase in compaction or erosion) would be below or at the lower levels of detection. Any effects to soils would be slight and short term. Impacted area would be very small (e.g., footprints), site-specific, and no mitigation measures would be necessary.
- Minor:** The effects to soils (loss of soil surface roughness, increase in compaction or erosion) would be detectable. Effects would be slight (e.g., the impact of one pass of a vehicle), the area affected would be small (e.g., 20' of vehicle tracks), and the damage site-specific. Impacts would be short-term. If mitigation were needed to offset adverse impacts, it would be simple to implement and likely successful.
- Moderate:** The effects to soils (loss of soil surface roughness, increase in compaction or erosion) would be readily apparent and detectable, likely long-term, and would result in a change to the soil character over a relatively localized area (up to 0.5 acre). Mitigation measures would probably be necessary to offset adverse impacts and would likely succeed.
- Major:** The effects to soils (loss of soil surface roughness, increase in compaction or erosion) would be readily apparent and detectable, long-term, and would substantially change the character of the soil surface over a large area (>0.5 acre). Mitigation measures to offset adverse impacts would be needed, extensive, and their success could not be guaranteed.
- Duration:** Short-term refers to a period of less than 5 years. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have soils evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have minor to moderate impacts to soil resources. Intrusion into the park by pipeline personnel conducting surveys along the pipeline may cause short-to long term, direct impacts to soil en route to the pipeline. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. The repeated foot traffic would prevent soil crusts from forming and potentially cause trails to develop. The effects to soil would be detectable in some areas. The impacts of foot traffic on

soil resources would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Erosion Control Effects: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These erosion control measures would have *directly adverse, minor to moderate, site-specific and localized, short and long-term* impacts to soil resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact soil resources. Ground-disturbing equipment such as, tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on fragile soil resources. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. Impacts to the soil surface, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Cumulative Effects:

A number of potential events affect soils, including visitors traveling off established trails and park road/trail maintenance, winds and water. Soils in all areas of the park are highly erodible and susceptible to extreme damage to biological soil crusts. Soil microbiota and mycorrhizal fungi can be disturbed by foot traffic in most areas of the park, causing erosion from loss of vegetative cover and compaction from the use of heavy equipment. Surface-disturbing activities such as digging could have minor, short-term, additive effects on regional soil loss through erosion until native vegetation reestablishes. Heavy equipment would compact soils. Soils may be lost due to wind scouring and water erosion on trails and roads where fragile soils are exposed but not hardened, resulting in entrenched road and trail sections. The pipeline corridor removes 130 acres of soil productivity from Arches National Park and with recent wind storms in addition to any maintenance activities along the pipeline, the loss of soil crusts and soils would also increase. This alternative when combined with other impacts would have moderate additive effects on local soils in the cumulative effects area.

Conclusion:

Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have direct site-specific impacts to soil. Under current management of the pipeline there are no mitigation measures in place to reduce the impacts to soils and biological soil crusts. Impacts to soils would be *directly adverse, negligible to moderate, site-specific and localized, short and long-term*. However, mitigations would most likely be developed for each individual project. This alternative would not result in impairment to soil. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to soil resources. Intrusion into the park by pipeline personnel conducting surveys along the pipeline may cause short to long-term, direct impacts to soil en route to the pipeline. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. The repeated foot traffic would prevent soil crusts from forming and potentially cause trails to develop. The effects to soil would be detectable in some areas. The impacts of foot traffic on soil resources would therefore be *directly adverse, negligible to minor, site-specific, and short and long-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These erosion control measures would have *directly adverse, minor to moderate, site-specific and localized, short and long-term, impacts* to soil resources.

Anomaly Investigations: Anomaly investigations may determine that recoating sections of pipeline would require surface-disturbing activities such as excavation. Excavation would physically impact soil resources. Use of heavy equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on fragile soil resources. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. Mitigation measures described in Chapter 2 would be followed. Impacts to the soil surface, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer to traverse sections of bedrock would lessen impact to soils and biological soil crusts and have a *directly adverse, site-specific, short-term, minor to moderate* impact. Using the UTV's to leave and return daily to worksites would have potential to cause the soil to powder due to the repeated trips over the park's sensitive soils as seen during the 2009 anomaly work. Mitigation measures described in Chapter 2 would be followed. Using UTV's and heavy equipment traversing over fragile soils to worksites would have a *directly adverse, moderate to major, localized, long-term* impact to soil resources. In areas where equipment would need to climb steep access routes, the damage would be greater. However, mitigation measures would be in place. Wherever tracks or tires displace soil or sand, whether on a steep hill or elsewhere, progress would be slow and deliberately monitored so that heavy

equipment or other responsible equipment can be stopped quickly when soil is being churned up, and salvaging can occur before more progress is made. On steep slopes, if equipment starts impacting soils, herbaceous plants including grasses must be salvaged from the vehicle route ahead of the vehicles for restoration purposes.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface disturbing activities such as digging may physically impact soil resources. Heavy equipment, such as tracked excavators, side boom, welding trucks and sandblasting equipment may have measurable or perceptible effect on soil resources. Mitigation measures would be in place. Impacts to the soil profiles, using this equipment that would dig or perform other ground disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The soil units exposed in this proposed area are primarily Myton Family-Rock outcrop and Toddler –Ravola-Glenton families association. Myton Family-Rock Outcrop is very steep and rocky and may require the use of a jackhammer to access the underground conduit. Toddler–Ravola-Glenton families association soils are found in floodplains and are susceptible to gully erosion and channeling in areas where runoff is concentrated. Replacing conduit would be *directly adverse, moderate, localized, and long-term*.

Restoration Activities: Restoration activities, such as replanting, may cause minor, temporary disturbance to soil. Effects could include compaction of soil and disturbance to upper soil profiles. The effects to soil may be detectable in some areas. However, these changes may be small and short-term, and the effects would be site-specific. The soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts may be difficult. The installation of jute matting would reduce soil erosion and facilitate revegetation efforts. Once native vegetation is established, the impacts to soil resources would be beneficial as soil erosion would be reduced and soil productivity increased. The impacts of restoration activities on soil resources would therefore be *adverse and beneficial, minor to moderate, site-specific and localized, and short to-long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Under the preferred alternative several mitigation measures would be in place prior to work commencing. Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have direct, adverse, moderate, localized, impacts to soil. Rehabilitating native plant communities may reduce the potential for soil erosion and sedimentation in disturbed areas, especially on steep slopes. The impacts to soil resources would be *directly, adverse, negligible to moderate, site-specific and localized, and short-to-long term*. This alternative would not result in impairment to soil. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Biological Soil Crusts

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to biological soil crusts were derived from US Geologic Survey soil scientists and park staff's past observations of the effects on biological soils from visitor use and construction activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Any effects to soil crusts would be below or at the lower levels of detection. Any effects to soil crusts would be slight and short term, with crust material crushed in place and not buried. Impacted area would be very small (e.g., footprints), site-specific, and no mitigation measures would be necessary.
- Minor:** The effects to soils would be detectable. Effects to less-developed (light cyanobacterial) crusts would be small, as crust material would be crushed in place but not buried. The area affected would be small (e.g., 20' of vehicle tracks) and site-specific. Impacts would be short-term. If mitigation were needed to offset adverse impacts, it would be simple to implement and likely successful.
- Moderate:** The effect on less developed or intermediate (light or dark cyanobacterial) soil crusts would be readily apparent and detectable, likely long-term, and would result in a change to the soil character over a relatively localized area (up to 0.5 acre). Mitigation measures would probably be necessary to offset adverse impacts and would likely succeed.
- Major:** The effect either on smaller (>0.2 acre) patches of mature soil crust (lichens/moss present) or larger (>0.5 acre) areas of less or intermediately developed crusts would be readily apparent and detectable, long-term, and would substantially change the character of the soil surface. Mitigation measures to offset adverse impacts would be needed, extensive, and their success could not be guaranteed.
- Duration:** Short-term refers to a period of less than 5 years. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have soils evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to biological soil crusts. Intrusion into the park by pipeline personnel conducting surveys along the pipeline may cause short-to long term, direct impacts to soil en route to the pipeline. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. The repeated foot traffic would prevent soil crusts from forming and potentially cause trails to develop.

The effects to biological soil crusts would be detectable in some areas. The impacts of foot traffic on biological soil crusts would therefore be *directly adverse, negligible to minor, site-specific, short and long-term*.

Erosion Control Effects: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These erosion control measures would have *directly adverse, minor to moderate, site-specific and localized, short and long-term* impacts to biological soil crusts.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact soil resources. Ground-disturbing equipment such as, tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on fragile biological soil crusts. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. Impacts to the soil surface, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Cumulative Effects:

A number of potential events affect biological soil crusts, including visitors traveling off established trails and park road/trail maintenance, winds and water. Soils in all areas of the park are highly erodible and susceptible to extreme damage to biological soil crusts. Soil microbiota and mycorrhizal fungi can be disturbed by foot traffic in most areas of the park, causing erosion from loss of vegetative cover and compaction from the use of heavy equipment. Surface-disturbing activities such as digging could have minor, short-term, additive effects on regional soil loss through erosion until native vegetation reestablishes. Heavy equipment would compact soils. Soils may be lost due to wind scouring and water erosion on trails and roads where fragile soils are exposed but not hardened, resulting in entrenched road and trail sections. The pipeline corridor removes 130 acres of soil productivity from Arches National Park and with recent wind storms in addition to any maintenance activities along the pipeline, the loss of soil crusts and soils would also increase. This alternative when combined with other impacts would have moderate additive effects on local soils in the cumulative effects area.

Conclusion:

Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have direct localized impacts to soil. Under current management of the pipeline there are no mitigation measures in place to reduce the impacts to biological soil crusts. Impacts to soils would be *directly adverse, negligible to moderate, site-specific and localized, short and long-term*. However, mitigations would most likely be developed for each individual project. This alternative would not result in impairment to soil. Implementation of this alternative would not result in

any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor biological soil crusts. Intrusion into the park by pipeline personnel conducting surveys along the pipeline may cause short to long-term, direct impacts to biological soil crusts en route to the pipeline. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. The repeated foot traffic would prevent soil crusts from forming and potentially cause trails to develop. The effects to biological soil crusts would be detectable in some areas. The impacts of foot traffic on soil resources would therefore be *directly adverse, negligible to minor, site-specific, short and long-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These erosion control measures would have *directly adverse, minor to moderate, site-specific and localized, short-term and long-term impacts* to soil resources.

Anomaly Investigations: Anomaly investigations may determine that recoating sections of pipeline would require surface-disturbing activities such as excavation. Excavation would physically impact biological soil crusts. Use of heavy equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on fragile soil resources. Effects could include compaction of soil and disturbance to upper soil profiles. The loss of crust leads to greater erosion of soils by wind and water increasing the size of the already impacted area. Mitigation measures described in Chapter 2 would be followed. Impacts to the soil surface, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer to traverse sections of bedrock would lessen impact to biological soil crusts and have a *directly adverse, minor to moderate, site-specific and localized, short and long-term impact*. Using the UTV's to leave and return daily to worksites would have potential to cause the soil to powder due to the repeated trips over the park's sensitive soils as seen during the 2009 anomaly work. Mitigation measures described in Chapter 2 would be followed. Using UTV's and heavy equipment traversing over fragile biological soil crusts to worksites would have a *directly adverse, moderate, localized, long-term impact* to biological soil crusts. In areas where equipment would need to climb steep access routes, the damage would

be greater. However, mitigation measures would be in place. Wherever tracks or tires displace soil or sand, whether on a steep hill or elsewhere, progress would be slow and deliberately monitored so that heavy equipment or other responsible equipment can be stopped quickly when soil is being churned up, and salvaging can occur before more progress is made. On steep slopes, if equipment starts impacting soils, herbaceous plants including grasses must be salvaged from the vehicle route ahead of the vehicles for restoration purposes.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface disturbing activities such as digging may physically impact biological soil crusts. Heavy equipment, such as tracked excavators, side boom, welding trucks and sandblasting equipment may have measurable or perceptible effect on soil resources. Mitigation measures would be in place. Impacts to the soil profiles, using this equipment that would dig or perform other ground disturbing activity may be *directly adverse, moderate, localized, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The soil units exposed in this proposed area are primarily Myton Family-Rock outcrop and Toddler–Ravola-Glenton families association. Myton Family-Rock Outcrop is very steep and rocky and may require the use of a jackhammer to access the underground conduit. Toddler–Ravola-Glenton families association soils are found in floodplains and are susceptible to gully erosion and channeling in areas where runoff is concentrated. Replacing conduit would be *directly adverse, moderate, localized, and long-term*.

Restoration Activities: Restoration activities, such as replanting, may cause minor, temporary disturbance to biological soil crusts. Effects could include compaction of soil and disturbance to upper soil profiles. The effects to soil may be detectable in some areas. However, these changes may be small and short-term, and the effects would be site-specific. The soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts may be difficult. The installation of jute matting would reduce soil erosion and facilitate revegetation efforts. Once native vegetation is established, the impacts to soil resources would be beneficial as soil erosion would be reduced and soil productivity increased. The impacts of restoration activities on soil resources would therefore be *adverse and beneficial, minor to moderate, site-specific and localized, and short to long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Under the preferred alternative several mitigation measures would be in place prior to work commencing. Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have direct, adverse, moderate, localized, impacts to biological soil crusts. Rehabilitating native plant communities may reduce the potential for soil erosion and sedimentation in disturbed areas, especially on steep slopes. The impacts to soil resources would be *directly, adverse, negligible to moderate, site-specific and localized, and short-to-long term*. This

alternative would not result in impairment to biological soil crusts. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Native Vegetation

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to native vegetation were derived from the available scientific data and literature and park staff's past observations of the effects on native vegetation from visitor use and construction/maintenance activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** No native vegetation populations would be affected but some individual native plants could be affected as a result of the alternative. The effects would be short-term, and on a small scale (site-specific).
- Minor:** The alternative would affect some individual native plants and a relatively minor portion of that species' population (site-specific). Impacts would be short-term. Mitigation to offset adverse impacts could be required and would be effective.
- Moderate:** The alternative would affect individual native plants and a sizeable segment of the species' population long-term and over a relatively large area (site-specific or localized). Mitigation to offset adverse impacts could be extensive, but would likely be successful.
- Major:** The alternative would have a considerable long-term effect on native plant populations over a relatively large localized or regional area. Mitigation measures to offset the adverse impacts would be required, extensive, and success would not be guaranteed.
- Duration:** Short-term refers to a period of less than 10 years. Long-term refers to a period of longer than 10 years.

Impacts of Alternative A (No Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have native vegetation communities evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to native vegetation. Intrusion into the park by pipeline personnel conducting foot surveys may cause short-term, direct impacts to native vegetation. Individual plants may be trampled resulting in reduced vigor or death depending on the stature and structure of the plant and the amount and duration of pressure applied. These impacts would be adverse, short-term, and negligible to minor to individual plants. Infrequent impacts to individual plants generally do not affect plant populations, plant communities, or ecological processes. The impacts of survey work would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may

occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *directly adverse, minor, site-specific, short-term* impacts to native vegetation communities.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on vegetation especially on individual plants. Impacts to the native vegetation, using this equipment that would dig or perform other ground-disturbing activity would be *directly adverse, moderate, site-specific, and long-term*.

Cumulative Effects:

Increasing recreation and road traffic in the vicinity of and through the park continues to spread exotic species and potentially impact native plant communities. Wildland fire, while not common, also has the ability to impact vegetation. Surface disturbances associated with road and trail maintenance projects could lead to the establishment of exotic plants. Farming and grazing by livestock on lands adjacent to the park create adjoining disturbed areas that contribute to the establishment of new exotic plant infestations. The pipeline corridor removes 130 acres of native vegetation from Arches National Park, and with any maintenance activities along the pipeline, the loss of native vegetation may increase. This alternative when combined with other impacts would have minor additive effects on native vegetation in the cumulative effects area.

Conclusion:

Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have *directly, adverse, negligible to moderate, site-specific, short and long-term*, impacts to native vegetation. Under current management of the pipeline there are no mitigation measures in place to reduce the impacts to native vegetation. However, mitigations would most likely be developed for each individual project. This alternative would not result in impairment to native vegetation. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to native vegetation. Intrusion into parks by personnel conducting foot surveys may cause short-term, direct impacts to native vegetation. Individual plants may be trampled resulting in reduced vigor or death depending on the stature and structure of the plant and the amount and duration of pressure applied. These impacts would be adverse, short-term, and negligible to minor to individual plants. Infrequent impacts to individual plants generally do not affect plant populations,

plant communities, or ecological processes. The impacts of survey work would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *direct, adverse, minor, site-specific, short-term, minor* impacts to native vegetation resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact native vegetation. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on vegetation especially on individual plants. Mitigation measures described in Chapter 2 would be followed. Impacts to the native vegetation, using this equipment that would dig or perform other ground-disturbing activity would be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer, traverse sections of bedrock would lessen impact to native vegetation and have a directly adverse, site-specific, short-term, minor impact. Using the UTV's to leave and return daily to worksites would have potential to crush native vegetation due to the repeated trips in and out of worksites, as seen during the 2009 anomaly work. Mitigation measures described in Chapter 2 would be followed. Using UTV's would have a *direct adverse, moderate, local, long-term* impact to native vegetation. The use of heavy equipment traversing over native vegetation to worksites would have a *direct adverse, moderate, local, and short-term* impact to native vegetation.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface disturbing activities such as digging may physically impact native vegetation. Heavy equipment, such as tracked excavators, side boom, welding trucks and sandblasting equipment may have measurable or perceptible effect on native vegetation. However, mitigation measures would be in place to salvage native plants within worksites and replant them after work has been completed. Impacts to native vegetation, using this equipment that would dig or perform other ground-disturbing activity may be *directly adverse, minor, site-specific, and short-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The vegetative communities along this section of pipeline are Greasewood Flats and Entrada Sandstone. Entrada Sandstone is primarily unvegetated and would have negligible impacts to native vegetation. However, the Greasewood Flats unit is the predominate unit along this section of pipeline and native plants would be impacted. Replacing conduit would be *directly adverse, minor, site-specific, and short-term* to native vegetation.

Restoration Activities: Restoration activities, such as salvaging and replanting, may cause minor to moderate, temporary impacts to native vegetation. Effects could include damage to transplanted plants, reduced vigor and even death. The effects to native vegetation may be detectable in some areas. However, these changes may be small, short-term, and the effects would be site-specific. The soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts may be difficult. The installation of jute matting would facilitate revegetation efforts. Once native vegetation is established the impacts to native vegetation would be beneficial as they become reestablished. The impacts of restoration activities on native vegetation would therefore be *directly adverse and beneficial, minor to moderate, site-specific, and short to-long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Under the preferred alternative several mitigation measures would be in place prior to work commencing and a Vegetation Monitoring Plan would ensure a higher success rate of impacted native vegetation. Salvaging native plants on site and having a native plant seed source available would reduce the impacts of pipeline maintenance. Survey work, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have adverse, site-specific, short-term, minor impacts to native vegetation. Rehabilitating native plant communities would be beneficial and may reduce the potential for soil erosion and sedimentation in disturbed areas, especially on steep slopes. The impacts to native vegetation would be *directly beneficial and adverse, negligible to moderate, site-specific, and short-to-long term*. This alternative would not result in impairment to native vegetation. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Non-Native Species

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to non-native species were derived from the available scientific data and literature and park staff's past observations of the effects on non-native species from visitor use and construction/maintenance activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Operations would not create an opportunity for establishment of non-native species and would not introduce non-native seed into the environment.
- Minor:** Operations would introduce non-native species and cause limited alteration to native vegetation composition, abundance, and diversity. Non-natives could become established but likely would not spread beyond project area. Mitigation measures, if needed, would be simple and successful.
- Moderate:** Operations would introduce non-native species to cause alterations to native vegetation composition, abundance, and diversity. Non-natives

would likely become established and could spread beyond project area impacting native plants. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.

Major: Operations would introduce non native species to cause substantial alteration to native vegetation composition, abundance, and diversity. The spread of non-natives through the park would be so extensive it would alter the ecology of the park. Extensive mitigation measures would be needed to offset adverse effects, and their success would not be guaranteed.

Duration: Short-term refers to a period of less than 10 years. Long-term refers to a period of longer than 10 years.

Impacts of Alternative A (No Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have non-native species evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to non-native species. Intrusion into the park by pipeline personnel conducting foot surveys may cause the spread of non-native seed via their shoes or vehicles. These impacts would be *directly, adverse, negligible to minor, and short-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation but are a source of non-native seed and these erosion control measures would have *direct adverse, minor, site-specific, long-term impacts* of non-native species that may become established but only within the project area.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation and soil disturbance would promote the introduction and/or spread of non-native plant species. Any maintenance equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment would have the potential to introduce and/or spread non-native plant seed which may have a measurable or perceptible effect on native vegetation compositions. Impacts using maintenance equipment that would dig or perform other ground-disturbing activities would have *direct adverse, minor, site-specific, long-term impacts* of non-native species that may cause limited alteration to native vegetation composition, abundance, and diversity.

Cumulative Effects:

Increasing recreation and road traffic in the vicinity of and through the park continues to spread exotic species and potentially impact native plant communities. Surface disturbances associated with road and trail maintenance projects could lead to the establishment of non-native plants. Farming and grazing by livestock on lands

adjacent to the park creates adjoining disturbed areas that contribute to the establishment of non-native plant infestations. Even wildland fire is a conduit to provide a desirable site for non-native species to flourish after an area has been burned. The pipeline corridor provides 130 acres of disturbed land in Arches National Park and with continued maintenance activities along the pipeline; the spread on non-native vegetation may increase. This alternative when combined with other impacts would result in minor to moderate additive effects on native vegetation in the cumulative effects area.

Conclusion:

Although survey work would have negligible to minor impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have *direct, adverse, negligible to minor, site-specific, short and long-term* impacts to the introduction and/or spread of non-native species. Under current management of the pipeline the only mitigation measure in place to reduce the impacts of the spread of non-native species is to ensure all outside vehicles and equipment are washed prior to entering the park. Additional mitigations would most likely be developed for each individual project. This alternative would not result in impairment to park resources by the spread of non-native species. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to non-native species. Intrusion into the park by pipeline personnel conducting foot surveys may cause the spread on non-native seed via their shoes or vehicles. These impacts would be *directly adverse, negligible to minor, and short-term*.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation but are a source of non-native seed and these erosion control measures would have *direct adverse, minor, site-specific, long-term* impacts of non-native species that may become established but only within the project area.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation and soil disturbance would promote the introduction and/or spread of non-native plant species. Any maintenance equipment, such as tracked excavators, side boom, welding trucks as well as sandblasting equipment would have the potential to introduce and/or spread non-native plant seed which may have a measurable or

perceptible effect on native vegetation compositions. Impacts using maintenance equipment that would dig or perform other ground-disturbing activities would have *direct adverse, minor, site-specific, long-term* impacts of non-native species that may cause limited alteration to native vegetation composition, abundance, and diversity.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer, traverse sections of bedrock may lessen the spread non-native vegetation and have a *directly adverse, minor, local, short-term impact*. Using the UTV's to leave and return daily to worksites would have the potential to spread non-native vegetation along the pipeline due to repeated trips in and out of worksites. Mitigation measures described in Chapter 2 would be followed. Using UTV's and also heavy equipment along access routes would have *direct adverse, minor, local, short and long-term* impacts that may cause non-natives to become established and spread beyond the project area.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact native vegetation by introducing non-native species. Heavy equipment, such as tracked excavators, side boom, welding trucks and sandblasting equipment may spread non-native species in the park. However, mitigation measures would be in place such as cleaning all vehicles and heavy equipment prior to entering the park. Using this equipment may spread non-native species and impacts may be *directly adverse, minor, site-specific, and short-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The vegetative communities along this section of pipeline are Greasewood Flats and Entrada Sandstone. Entrada Sandstone is primarily unvegetated and would have negligible impacts to the spread of non-native vegetation. However, the Greasewood Flats unit is the predominate unit along this section of pipeline and several non-native plants species are found within this stretch of Salt Wash canyon. The spread of non-native species while replacing conduit may be *directly adverse, minor, site-specific, and short-term*.

Restoration Activities: Restoration activities, such as salvaging and replanting with native vegetation, may have beneficial, minor to moderate, long-term impacts to reduce the spread of non-native species. However, the soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts with native vegetation may be difficult. Some non-native species thrive in these soil conditions such as Tamarisk. The installation of jute matting would facilitate the revegetation efforts of native vegetation. Once native vegetation is established the introduction and spread of non-native species would be reduced. The impacts of restoration activities to reduce non-native species would therefore be *direct, adverse and beneficial, minor, site-specific and local, and short to-long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Under the preferred alternative several mitigation measures would be in place prior to work commencing and a Vegetation Monitoring Plan would ensure a higher success rate of ensuring that non-native species would not be introduced or spread. Salvaging native plants on site and having a native plant seed source available would enhance revegetative efforts and reduce the spread or introduction of non-native species. Survey work, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have adverse, site-specific, short-term, minor impacts to spreading non-native species as evidence is found in Salt Valley with the only known establishment of crested wheatgrass in the park. Rehabilitating native plant communities would be beneficial and may reduce the potential for the spread of non-native species. The impacts to non-native species would be *directly beneficial and adverse, negligible to minor, site-specific and local, and short-to-long term*. This alternative would not result in impairment to non-native species. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Water Resources

Methodology and Intensity Thresholds

This analysis considers the environmental consequences of implementing the alternatives based on the potential to increase turbidity and chemical containments in the parks surface and subsurface waters. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Water quality changes, or changes would be either non-detectable or below water quality standards and would not affect local aquatic flora or fauna.
- Minor:** Water quality changes would be measurable. Although the changes would be small and likely short-term, water would remain below quality standards and effects would be site-specific or local. Local aquatic flora and fauna may be disturbed but operation would not cause loss of localized aquatic fauna. There may be some loss of individual aquatic fauna. No water quality or hydrology mitigation measures would be necessary.
- Moderate:** Changes in water quality or hydrology would be measurable and long-term, may exceed water quality standards, but would be relatively local. There may be a loss of localized aquatic flora and fauna species. Necessary water quality or hydrology mitigation measures would likely succeed.
- Major:** Changes in water quality or hydrology would be readily measurable, would have substantial consequences, and would be noticed on a regional scale. There would be widespread loss of aquatic flora and fauna species. Mitigation measures would be necessary and their success would not be guaranteed.
- Duration:** Short-term refers to recovery in less than several days. Long-term would refer to recovery, following treatment, requiring longer than several months.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have water resources evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to water resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed, due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. Impacts to water resources from erosion control measures may be *directly adverse, minor, site-specific, and long-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact water resources if worksites are located near or in perennial washes like Salt Wash. Ground disturbing equipment, using tracked excavators, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on water resources. There may be some temporary increase in water turbidity and suspended solids from surface disturbing activities. Heavy equipment leaking fluids can have an indirect impact on water quality. Impacts to water resources using equipment that would dig or perform other ground disturbing activity may be *directly and indirectly adverse, moderate, site-specific, and long-term*.

Cumulative Effects:

Reduced groundwater by potential development, oil and gas extraction, agricultural uses and other commercial uses threaten the park's washes, springs and seeps. Road developments in and around the park, roadbed failures, and erosion may increase sedimentation in surface waters adjacent to roads. Water sources frequently used by visitors have aquatic ecosystems with inputs of lotions, body oils and fluids which may affect the health of other visitors or wildlife. Though the water sources are small at Arches National Park, and unlikely to be attractive for swimming, the low qualities are more easily affected by contaminants. This alternative, when combined with other impacts, would result in overall negligible to minor additive adverse impacts to surface water quality.

Conclusion:

Although survey work would have negligible impacts, the use of heavy equipment conducting maintenance activities in or near water sources would have *direct and indirect adverse, negligible to moderate, site-specific, long-term*, impacts. Under current management of the pipeline there are no mitigation measures in place to reduce the impacts to water resources. However, mitigations would most likely be developed for each individual project. This alternative would not result in impairment to water resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to water resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. Impacts to water resources from erosion control measures may be *directly adverse, minor, site-specific, and long-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact water resources if worksites are located near or in perennial washes like Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on water resources. There may be some temporary increase in water turbidity and suspended solids from surface-disturbing activities. Heavy equipment leaking fluids can have an indirect impact on water quality and aquatic flora and fauna. Impacts to water resources using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator or bulldozer, traverse across perennial streams and washes would have an adverse, moderate, impact. A bridge would be required to cross Salt Wash. Using the UTV's to leave and return daily to worksites would have potential to cause impacts to water sources due to the repeated trips, especially if significant water is available in washes. Vehicles may have to cross intermittent drainages to access the pipeline. Stream crossings could increase localized sedimentation in standing or shallow flowing water at the crossing and damage aquatic flora. However, most drainages are dry during the summer months. Physical changes to water quality resulting from stream crossings would likely be below water quality standards and criteria, and would be within the range of natural variability. Impacts may be *directly adverse, moderate, site-specific, and short-term*.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact water resources. Excavation would physically impact water resources if worksites are located near or in perennial washes like Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on water resources. Minor mechanical

disturbance to native plants from digging or other ground-disturbing activity may result in indirect effects, such as increased sedimentation, to surface waters. Impacts may be measurable, but small, short-term and site-specific. There may be some temporary increase in water turbidity and suspended solids from surface-disturbing activities. Heavy equipment leaking fluids can have an indirect impact on water quality or aquatic flora and fauna. Impacts to water resources using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, long-term, and moderate*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. There are no water resources along this section of pipeline and impacts would be *negligible*.

Restoration Activities: Restoration activities, such as replanting, may cause negligible, temporary disturbance to water resources if found within the work site. Transplanting and reseeded would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation in surface waters along the pipeline. Changes in water quality (such as reduction of total suspended solids [TSS] in surface waters) may be measurable and long-term, but would be relatively site-specific. The impacts of restoration activities on water resources would therefore be *directly beneficial, moderate, site-specific, and long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Under the preferred alternative several mitigation measures would be in place prior to work commencing. Although survey work would have negligible impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have *direct beneficial and adverse, negligible to moderate, site-specific, short-and long-term impacts* to water resources. This alternative would not result in impairment to water resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Floodplains

Methodology and Intensity Thresholds

The park staff based the impact analysis and the conclusions for possible impacts to 100- and 500-year floodplains on the on-site inspection of known and potential 100- and 500-year floodplains within the park, review of existing literature and studies, information provided by experts in the NPS and other agencies, and park staff insights and professional judgment. Predictions about short- and long-term site impacts were based on previous studies of impacts to 100- and 500-year floodplains from similar projects and recent scientific data. The thresholds of change for the intensity of an impact are defined below:

Negligible: There would be very little change in the ability of a floodplain to convey floodwaters, or its values and functions. The proposed project would not contribute to flooding.

- Minor:** Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and site-specific, although the changes would be barely measurable. The proposed project would not contribute to flooding. No mitigation would be needed.
- Moderate:** Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and localized. The proposed project could contribute to flooding. The impacts could be mitigated by modification of proposed facilities in floodplains.
- Major:** Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and widespread locally and/or regionally. The proposed project would contribute to flooding. The impacts could not be mitigated by modification of proposed facilities in floodplains.
- Duration:** Short-term is usually less than 1 year; impacts would not be measurable or measurable only during the life of construction. Long-term is usually more than 1 year; impacts would be measurable during and after project construction.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have floodplains evaluated at each work site, if present. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to floodplains.

Erosion Control Efforts: In areas where the underground pipeline is exposed due to soil erosion, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. These maintenance efforts may not contribute to the ability of floodplains to convey floodwaters. Impacts to floodplains from erosion control measures may be *directly adverse, minor, site-specific, and long-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact floodplains if worksites are located near or in floodplains like Salt Wash Canyon. Ground-disturbing equipment, such as tracked excavators, welding trucks and sandblasting equipment would have measurable or perceptible effect on floodplain values. Surface-disturbing activities within a floodplain may reduce floodplain functions. Impacts to floodplains using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Cumulative Effects

Previous impacts to floodplains are from past and present human disturbances. For example, grazing, recreation, motor vehicle use, water diversion and irrigation, homesteads, and park and county development activities, such as road building and maintenance have a tendency to impact floodplain functions. These disturbances vary considerably as to type, intensity, and duration before and after each park was established and continue today. This alternative when combined with other impacts would result in overall negligible to minor additive adverse effects on floodplains at the park.

Conclusion

Although survey work would have negligible impacts, the use of heavy equipment conducting maintenance activities in or near floodplains would have *directly adverse, minor to moderate, site-specific, and long-term impacts*. Under current management of the pipeline there are no mitigation measures in place to reduce the impacts to floodplain values. However, mitigations would most likely be developed for each individual project. A USACE 404 permit may be required if activities that involve dredging or filling of waters of the U.S. are proposed and would require additional compliance. This alternative would not result in impairment to floodplains. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to floodplains.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically void of vegetation. These maintenance efforts may not contribute to the ability of floodplains to convey floodwaters. Impacts to floodplains from erosion control measures may be *directly adverse, minor, site-specific, and long-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact floodplains if worksites are located near or in floodplains like in Salt Wash Canyon. Ground-disturbing equipment, such as tracked excavators, welding trucks and sandblasting equipment would have measurable or perceptible effect on floodplain values. Surface-disturbing activities within a floodplain may reduce floodplain functions. Impacts to floodplains using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across perennial streams and washes would have a *directly adverse, site-specific, long-term, moderate impact*. A bridge would be required to cross Salt Wash. Using the UTV's to leave and return daily to worksites would have potential to cause impacts to floodplains due to the repeated trips, especially if significant water is available in washes. Stream crossings could increase localized sedimentation in standing or shallow flowing water at the crossing. However, most drainages are dry during the summer months. Vehicles may have to cross floodplains to access the pipeline and churned up soils may impact floodplains during flash flood events. Physical changes to floodplains resulting from floodplain crossings would likely be measurable and local and access to work sites may promote flooding and be *adverse, moderate, site-specific, and long-term*.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact floodplains. Excavation would physically impact floodplains if worksites are located near or in floodplains like Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on floodplain values. Surface-disturbing activities within a floodplain may reduce floodplain functions. Impacts to floodplains using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. There are no floodplains along this section of pipeline and impacts would be *negligible*.

Restoration Activities: Restoration activities, such as replanting, may cause negligible, temporary disturbance to floodplain values, if found within the work site. Transplanting and reseeded would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation within the floodplains along the pipeline. The impacts of restoration activities on floodplain values would therefore be *directly beneficial, minor, site-specific, and long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Under the preferred alternative several mitigation measures would be in place prior to work commencing. Although survey work would have negligible impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have *directly beneficial and adverse, site-specific, long-term, negligible to moderate impacts* to floodplains. This alternative would not result in impairment to floodplains. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Wetlands

Methodology and Intensity Thresholds

This analysis focuses on the potential for actions to impact the natural and beneficial values of wetlands. Examples of wetland values and functions include: biotic functions (e.g. fish and wildlife habitat, floral and faunal productivity, native species and habitat diversity); and hydrologic functions (e.g. flood attenuations, stream-flow maintenance, groundwater recharge and discharge, water supply, erosion and sediment control). The potential impacts on wetlands were evaluated by comparing their locations and anticipated visitor uses and park staff's past observations of the effects on wetlands from recreation, motor vehicle use, water diversion and irrigation, and park and county development activities. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Operations would affect less than 0.1 acre* and would not alter wetland functions and values. Reclamation would not be necessary.
**(0.1 acre for negligible comes from the ACOE requirement for wetland compensation)*
- Minor:** Operations would alter 0.1 to .5 acres of wetlands or 0-50 linear feet along streams/rivers/springs; the change to wetlands functions and values in terms of area, composition, structure and nature of the change would be detectable but inconsequential. Wetland processes, functions and integrity would remain unaffected. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate:** Operations would alter .5 -1 acre of wetlands or 51-100 linear feet. Impacts to wetlands would be readily apparent, but would only temporarily affect the wetland's composition and structure. Wetland processes, function and integrity would also be temporarily affected. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- Major:** Operations would cause substantial (over 1 acre or >100 linear feet) alteration of wetland functions and values. Wetland processes, function and integrity would be altered to the point where the wetland area, structure and composition would permanently change. Extensive mitigation measures, if needed to offset adverse effects and their success would not be guaranteed.
- Duration:** Short-term refers to a period of less than 10 years. Long-term refers to a period longer than 10 years.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have wetlands evaluated at each work site, if present. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to wetlands.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels

using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. Impacts to wetlands from erosion control measures may be *directly adverse, minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact wetlands if worksites are located near or in wetlands along Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks, as well as sandblasting equipment may have a detectable effect on wetlands. Surface-disturbing activities within a wetland may reduce hydrologic functions but are likely to alter less than .5 to 1 acres of wetland. Impacts to wetlands using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Cumulative Effects

Previous impacts to wetlands are from past and present human disturbances. For example, grazing, recreation, motor vehicle use, water diversion and irrigation, homesteads, and park and county development activities, such as road building and maintenance have a tendency to impact wetland functions. Surface-disturbing activities may have short-term effects if conducted in wetlands. However, these effects would not likely be additive and would be temporary, lasting only until native vegetation reestablishes. These disturbances vary considerably as to type, intensity, and duration before and after each park was established and continue today. This alternative when combined with other impacts would result in overall negligible to minor additive adverse effects on wetlands in the cumulative effects area.

Conclusion

Although survey work would have negligible impacts, the use of heavy equipment conducting maintenance activities in or near wetlands would have *directly adverse, negligible to moderate, site-specific, and short and long-term impacts*. The pipeline does qualify as an exempted action according to the Wetlands Procedural Manual which requires several best management practices (mitigation measures) be followed for NPS actions that may have adverse impacts on wetlands. Any maintenance activities within Salt Wash are covered under the terms of an Army Corps of Engineers Nationwide Permit 3 as long as there is no alteration of stream bed or banks. This alternative would not result in impairment to wetlands. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to wetlands.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically void of vegetation. Impacts to wetlands from erosion control measures may be *directly adverse, minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact wetlands if worksites are located near or in wetlands along Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks, as well as sandblasting equipment may have a detectable effect on wetlands. Surface-disturbing activities within a wetland may reduce hydrologic functions but are likely to alter .5 to 1 acres of wetland. Impacts to wetlands using equipment that would dig or perform other ground disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across perennial streams and washes would have a *directly adverse, minor, site-specific, short-term impact*. A bridge would be required to cross Salt Wash. Using the UTV's to leave and return daily to worksites would have potential to cause impacts to wetlands due to the repeated trips, especially if significant water is available in wetland areas. Stream crossings could increase localized sedimentation in standing or shallow flowing water at the crossing. However, most drainages are dry during the summer months. Vehicles may have to cross wetlands to access the pipeline and tracked vegetation may impact wetland hydrologic functions. Physical changes to wetlands resulting from wetland crossings would likely be detectable and local and access to work sites may be *directly adverse, minor, site-specific, and short-term*.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact floodplains. Excavation would physically impact wetlands if worksites are located near or in wetlands in Salt Wash. Ground-disturbing equipment, using tracked excavators, welding trucks, as well as sandblasting equipment would have detectable effect on wetland hydrologic functions. Surface-disturbing activities within a wetland may reduce wetland functions. Impacts to wetlands using equipment that would dig or perform other ground-disturbing activity may be *directly adverse, moderate, site-specific, and long-term*.

Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. There are no wetlands along this section of pipeline and impacts would be *negligible*.

Restoration activities, such as replanting, may cause negligible, temporary disturbance to wetlands if found within the work site. Transplanting and reseedling would have a beneficial effect of promoting the reestablishment of native

vegetation, which could help reduce erosion and sedimentation within the wetlands along the pipeline. The impacts of restoration activities on wetlands would therefore be *directly beneficial, minor, site-specific, and long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Under the preferred alternative several mitigation measures would be in place prior to work commencing. Although survey work would have negligible impacts, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have *direct, adverse and beneficial, negligible to moderate, site-specific, short-and long-term* impacts to wetlands. This alternative would not result in impairment to wetlands. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Threatened, Endangered and Species of Concern

Methodology and Intensity Thresholds

Identification of state and federally listed species and designated critical habitats was accomplished through discussions with SEUG staff, informal consultation with Utah Field Office and reviewing the Utah Division of Wildlife natural heritage databases. A letter requesting a current list of federal threatened, endangered, and special concern species was sent to the U.S. Fish and Wildlife Service. The Utah Division of Wildlife Resources was also contacted to identify state threatened, endangered and special concern species.

- Negligible:** No federal or state listed species would be affected, or the alternative would affect an individual of a listed species or its critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population.
- Minor:** The alternative would affect an individual(s) of a listed species or its critical habitat, but the change would be small. The impact would be site-specific and short-term. Mitigation measures, if needed to offset adverse impacts, would be simple and successful.
- Moderate:** An individual or population of a listed species or its critical habitat would be noticeably affected. The effect could have some long-term consequence to the individual, population, or habitat. The impact could be site-specific or local in context. State species of concern could also be affected. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- Major:** An individual or population of a listed species or its critical habitat would be noticeably affected with a long-term, vital consequence to the individual, population, or habitat. The impact would be local or regional in context. Extensive mitigation measures would be needed to offset adverse effects, and their success would not be guaranteed.

Duration: Short-term refers to a period of 1-3 years. Long-term refers to a period longer than 3 years.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have threatened and endangered (T&E) species and species of special concern evaluated at each work site. If T&E species are found within a mile of a worksite conservation measures would be in place prior to any work commencing. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor would have *negligible* impacts to T&E species and species of special concern. Intrusion into the park by pipeline personnel conducting surveys may cause short-term, negligible harassment to T&E species and species of special concern. There may be some escape flight response from wildlife during these activities, but this would produce negligible short-term adverse impacts in the form of unnecessary energy expenditures. Overall effects would be slight and of little consequence to T&E populations. Low level flights with a helicopter may have a minor impact to T&E species but would be short in duration and site specific as the helicopter is only taking one pass along the pipeline. There would be no hovering along the pipeline. The impacts of pipeline personnel and helicopters conducting surveys to T&E species and species of special concern would therefore be infrequent, *indirectly adverse, negligible to minor, site-specific, and short-term*.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. However, if erosion control measures are required within Salt Wash, an area a mile from raptor nests, impacts to T&E species and species of special concern may be *indirectly adverse, negligible to minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact vegetation if worksites are located near Salt Wash. Ground-disturbing equipment; such as tracked excavators, welding trucks, as well as sandblasting equipment may have a detectable effect on T&E species and species of special concern. Ground-disturbing activities could have site-specific adverse impacts on ground nesting birds or burrowing animals or their food source. Management practices such as not conducting treatment during sensitive times (i.e. nesting) and using buffer zones would limit these effects to being short-term and of little consequence to the species population. The impacts of ground-disturbing activities on T&E species and species of special concern may be *directly adverse, minor, site-specific, and short-term*.

Cumulative Effects

The definition of cumulative effects under Section 7 of the ESA is “those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area of the Federal action subject to consultation.” However, because the action area for this analysis and decision is limited to the federal acreage of Arches National Park, there are no cumulative effects under the ESA definition. Therefore, the cumulative impacts analysis at the end of this section refers solely to the NEPA definition of cumulative impacts.

Mining of oil, gas and uranium, agricultural operations, increased visitation, urban development and new roads could affect T&E species and species of special concern abundance by reducing habitats or causing habitat fragmentation and may likely affect wildlife found inside and outside park boundaries. Air pollution from urban populations and development has produced additional minerals, such as lead and nitrogen, into the park’s streams and soils, which may affect wildlife. Some current resource management projects help to rehabilitate wildlife habitat and migration corridors, which helps offset the adverse impacts of foreseeable actions. Continuation of current pipeline management activities would also cause some escape flight response from T&E species. However, the cumulative effects from this response would likely be negligible because the activities that induce this response would be short-term and site-specific.

Arches National Park has one federally listed endangered species the southwestern willow flycatcher (*Empidonax traillii extimus*). However, the southwestern willow flycatcher is rare and probably only migratory through the park. The federally listed Mexican spotted owl (*Strix occidentalis*) is not known to occupy Arches but the park does have suitable habitat. The park also has a number of sensitive raptor and bat species but none are federally classified as threatened or endangered. This alternative is not expected to contribute to adverse cumulative impacts on these populations because a number of species-specific conservation measures would be implemented under this alternative to protect habitat of T&E and species of concern. As a result, this alternative is not expected to have additive adverse cumulative impacts on T&E species or species of concern.

Conclusion

A number of mitigation measures in Chapter 2 have been developed to mitigate potential impacts to T&E species and species of special concern. Although candidate species are not afforded any protection under the ESA, efforts would be made to avoid or minimize potential impacts to these species as well. The impacts of current management of the pipeline to T&E species and species of special concern would be *directly and indirectly adverse, negligible to minor, site-specific, and short-term*. This alternative would not result in impairment to T&E species and species of special concern. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under the preferred alternative, the pipeline has been surveyed for T&E species and species of special concern. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor would have negligible impacts to T&E species and species of special concern.

Intrusion into the park by pipeline personnel conducting surveys may cause short-term, negligible harassment to T&E species and species of special concern. There may be some escape flight response from wildlife during these activities, but this would produce negligible short-term adverse impacts in the form of unnecessary energy expenditures. Overall effects would be slight and of little consequence to T&E populations. Low level flights with a helicopter may have a minor impact to T&E species but would be short in duration and site specific as the helicopter is only taking one pass along the pipeline. There would be no hovering along the pipeline. The impacts of pipeline personnel and helicopters conducting surveys to T&E species and species of special concern would therefore be infrequent, *indirectly adverse, negligible to minor, site-specific, and short-term*.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. However, if erosion control measures are required within Salt Wash, an area a mile from raptor nests, impacts to T&E species and species of special concern may be *indirectly adverse, negligible to minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact vegetation if worksites are located near Salt Wash. Ground-disturbing equipment; using tracked excavators, welding trucks, as well as sandblasting equipment may have a detectable effect on T&E species and species of special concern. Ground-disturbing activities could have site-specific adverse impacts on ground nesting birds or burrowing animals or their food source. Management practices such as not conducting treatment during sensitive times (i.e. nesting) would limit these effects to being short-term and of little consequence to the species population. The impacts of ground-disturbing activities on T&E species and species of special concern may be *directly adverse, minor, site-specific, and short-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across the park would have a directly adverse, minor, site-specific, short-term impact to T&E species and species of special concern. The use of heavy equipment traversing over vegetation to worksites and using the UTV's to leave and return daily to worksites would have potential to crush vegetation due to the repeated trips in and out of worksites, as seen during the 2009 anomaly work. This reduction in potential forage for T&E species and species of special concern may have a minor, site-specific impact. The sounds generated from vehicles and heavy equipment moving across the landscape has the potential to have a minor impact on T&E species and species of special concern. Accessing the pipeline from the north entrance of Salt Valley Road with heavy equipment would not be allowed due to impacting the blacked-tailed prairie dog colony located right along the road near Klondike Bluffs area. Access routes would have a *direct and indirect, adverse, minor, site-specific, short-term*, impact to T&E species and species of special concern.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may impact T&E species and species of special concern. Ground-disturbing equipment; using tracked excavators, welding trucks, as well as sandblasting equipment may have a detectable effect on T&E species and species of special concern. Ground-disturbing activities could have site-specific adverse impacts on ground nesting birds or burrowing animals or their food source. Management practices such as not conducting treatment during sensitive times (i.e. nesting) would limit these effects to being short-term and of little consequence to the species population. The impacts of ground-disturbing activities on T&E species and species of special concern may be *directly and indirectly adverse, minor, site-specific, and short-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The wildlife habitat along this section of pipeline is degraded and is in recovery from repeated access along this route and from previous maintenance work. The bottom of this section of pipeline is also impacted with non-native species. Replacing conduit would be *indirectly adverse, minor, site-specific, and short-term* to T&E species and species of special concern.

Restoration activities: Restoration activities, such as salvaging and replanting, could have a beneficial effect of promoting the reestablishment of native vegetation and potential wildlife habitat in the park for T&E species and species of special concern. Promoting healthy native plant communities would restore and improve quality habitat for all wildlife, including T&E species. The soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts may be difficult. The installation of jute matting would facilitate revegetation efforts. Any minor and short-term adverse impacts would be outweighed by the long-term benefits of habitat restoration. These beneficial effects would be detectable in some areas over the long-term, and may benefit some listed species using these areas. The impacts of restoration activities on T&E species and species of special concern would therefore be *indirectly beneficial, minor, site-specific, and long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

There would be *direct and indirect, adverse, negligible to minor, site specific, short-term* impacts to threatened and endangered species and other raptors and sensitive species. Although there is potential nesting habitat, no nests have been found within a mile of the pipeline for the Mexican spotted owl, ferruginous hawk, and southwestern willow flycatcher. Regarding the burrowing owl, bald eagle and California condor, the likelihood of occurrence along the pipeline is low or very low. Potential foraging/ hunting habitat may be present but no nesting habitat is available for these T&E and/or species of special concern and impacts would likely be negligible. Regarding state species of concern: big free-tailed bat, kit fox, spotted bat and Townsend's big-eared bat, these species are all nocturnal and since pipeline maintenance would not be conducted at night impacts to these species would also be negligible.

Maintenance activities that occur in close proximity to roosting Mexican spotted owls may alter normal behavior, resulting in missed foraging opportunities or failed/abandoned nests. The conservation measures should adequately reduce any adverse impacts to Mexican spotted owls and their potential habitat. Although there is potential habitat, no Mexican spotted owls are known to roost within Arches National Park. Therefore, it is the determination that the preferred alternative *may affect but is not likely to adversely affect* the Mexican spotted owl.

Maintenance activities in close proximity to nesting southwest willow flycatchers may alter normal behavior, resulting in missed foraging opportunities or failed/abandoned nests. The conservation measures should adequately reduce any adverse impacts to southwest willow flycatchers and their potential habitat. No southwest willow flycatchers are known to nest within a mile of the pipeline in Arches National Park. They are known to be migratory birds along the Colorado River. Therefore, it is the determination that the preferred alternative *may affect but is not likely to adversely affect* the southwest willow flycatcher.

There are no direct or indirect impacts to the California condor. No birds are known to nest within the park and are rarely found in southeastern Utah. Therefore, it is the determination that the preferred alternative would have *no effect* to the California condor.

Maintenance activities in close proximity to nesting ferruginous hawks, red-tailed hawks, cooper hawks and the American kestrel may alter normal behavior, resulting in missed foraging opportunities or failed/abandoned nests. The conservation measures should adequately reduce any adverse impacts to raptors and their potential habitat. No raptors are known to currently nest within a mile of the pipeline in Arches National Park. Therefore, it is the determination that the preferred alternative *would not contribute to listing* of the raptors.

The Bald eagle may fly over the project areas but there is no open water within the park. Therefore, it is the determination that the preferred alternative *would not contribute to listing* the Bald eagle.

Burrowing owls are typically found in prairie dog towns and are present in the northern part of Arches National Park. However, there are no prairie dog towns along the pipeline or nesting habitat. Therefore, it is the determination that the preferred alternative *would not contribute to listing* the burrowing owl.

Since pipeline maintenance would not be conducted at night, the preferred alternative *would not contribute to listing* the big free-tailed bat, kit fox, spotted bat, and Townsend's big-eared bat.

A number of conservation measures in Chapter 2 have been developed to mitigate potential impacts to T&E species and species of special concern. Although candidate species are not afforded any protection under the ESA, efforts would be made to avoid or minimize potential impacts to these species as well. The impacts of the preferred alternative to T&E species and species of special concern would be *directly and indirectly beneficial and adverse, negligible to minor, site-specific, and short-term*. This alternative would not result in impairment to T&E species and species of special concern. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Archeological Resources

Methodology and Intensity Thresholds

In order for an archeological resource to be eligible for the National Register of Historic Places it must meet one or more of the following criteria of significance: A) associated with events that have made a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, archeological resources must possess integrity of location, design, setting, materials, workmanship, feeling, association (National Register Bulletin, Guidelines for Evaluating and Registering Archeological Properties). For purposes of analyzing impacts to archeological resources either listed or eligible to be listed on the National Register, the thresholds of change for intensity of an impact are defined below:

- Negligible:** Impacts to archeological resources either beneficial or adverse are at the lowest levels of detection, barely perceptible and not measurable.
- Minor:** *Adverse:* disturbance of a site(s) results in little, if any, loss of significance or integrity and the National Register eligibility of the site(s) is unaffected.
Beneficial: maintenance/preservation of a site(s).
- Moderate:** *Adverse:* disturbance of a site(s) does not diminish the significance or integrity of the sites to the extent that its National Register eligibility is jeopardized.
Beneficial: stabilization of the site(s).
- Major:** *Adverse:* disturbance of a site(s) diminishes the significance and integrity of the sites to the extent that it is no longer eligible to be listed on the National Register.
Beneficial: stabilization of the site(s).
- Duration:** Short-term refers to a transitory effect, one that largely disappears over a period of days or months. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No Action)

Under Alternative A (no action), management and maintenance of the pipeline is done on a case-by-case basis. Each individual project would have archeological resources evaluated at each work site. The following actions occur annually or have occurred in the past:

Survey Work: Survey work consists of pipeline personnel walking the pipeline corridor, or conducting low level flights with a helicopter. Intrusion into the park by pipeline personnel conducting surveys along the pipeline may cause short-term, direct impacts to archeological resources en route to the pipeline and along the pipeline itself. Effects could include disturbance of surface remains and features. The effects to archeological resources would be detectable in some areas. The

impacts of foot traffic on archeological resources would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would include recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor, or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These areas are already heavily disturbed by natural events. The impacts of erosion control measures on archeological resources would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment such as tracked excavators, side boom, welding trucks, and sandblasting equipment would have measurable or perceptible effects on fragile archeological resources. The use of heavy equipment for digging or to perform other ground disturbing activities would result in *directly adverse, moderate, site-specific, and long-term* impacts to archeological resources.

Cumulative Impacts:

Long-term, major and adverse impacts occurred to archeological resources when the pipeline was originally installed, destroying all or portions of an unknown number of sites. Improvements, monitoring, and maintenance activities of the pipeline over the past 50 years has continued to have an adverse, site-specific, long-term, and minor to moderate effect on the resource. In addition, erosion related to pipeline activities may have also contributed to adverse, site-specific, long-term and minor effects on portions of archeological resources.

Given the history of disturbance along the pipeline, previous work along with proposed work under Alternative A would contribute a noticeable increment to the long term, moderate adverse cumulative impact.

Conclusion:

Overall, the implementation of Alternative A (No Action) would create a *adverse, negligible to moderate, site-specific, short and long-term impact* to four eligible archeological resources. Alternative A (No Action) would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other NPS planning document. This alternative would not result in impairment to archeological resources.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey work: Survey work consists of pipeline personnel walking the pipeline corridor, or conducting low level flights with a helicopter. Intrusion into the park by

pipeline personnel conducting surveys along the pipeline may cause short-term, direct impacts to archeological resources en route to the pipeline and along the pipeline itself. Effects could include disturbance of surface remains and features. The effects to archeological resources would be detectable in some areas. The impacts of foot traffic on archeological resources would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would include recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor, or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These areas are already heavily disturbed by natural events. The impacts of erosion control measures on archeological resources would therefore be *directly adverse, negligible to minor, site-specific, and short-term*.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground disturbing activities such as pipeline excavation would be required. Ground disturbing equipment such as tracked excavators, side boom, welding trucks, and sandblasting equipment would have measurable or perceptible effects on fragile archeological resources. The use of heavy equipment for digging or to perform other ground disturbing activities would result in *directly adverse, moderate, site-specific, and long-term* impacts to archeological resources.

Access Routes: Accessing work sites with heavy equipment, such as a track excavator, and using UTVs to leave and return daily to work sites would have a *direct adverse, moderate, site-specific, and long-term impact* to archeological resources.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require ground disturbing activities such as digging may physically impact eligible archeological resources and result in a *direct, adverse, moderate, site-specific, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. There are no archeological resources along this section of pipeline and impacts would be *negligible*.

Restoration Activities: Restoration activities such as replanting may cause a negligible, temporary disturbance to archeological resources if found within the work site. Transplanting and reseeding would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation along the pipeline. However, the impacts of restoration activities on archeological resources would be *directly adverse, minor, site-specific, and long-term*.

Cumulative Impacts:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Overall, the implementation of Alternative B (Preferred) would create an unavoidable, *direct adverse, negligible to moderate, site-specific, short and long-term* effect to four eligible archeological resources. Alternative B (Preferred) would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other NPS planning document. This alternative would not result in impairment to archeological resources.

§106 Summary

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 Alternative B (Preferred) would have an *adverse effect* on four eligible archeological resources in Arches National Park. The NPS would consult with the Utah State Historic Preservation Office, the Advisory Council on Historic Preservation, and potentially affiliated tribes to develop a Memorandum of Agreement (MOA) that would stipulate measures the NPS would take to avoid, minimize, or mitigate adverse effects to historic properties.

Table 6: Effects on Archeological Resources

Resource	Action/ Treatment	Effect*	Mitigation	Further 106 Actions	Remarks
Lithic Quarry	Erosion Control Measures; Anomaly Investigations	NAE	No further work		
Lithic Quarry, Rock Cairn, Road	Erosion Control Measures; Anomaly Investigations	AE	Testing within the 50 foot corridor and in areas required for extra workspace	Consult with SHPO, ACHP, and potentially affiliated tribes on data recovery plan and MOA	
Camp or processing Area	Anomaly Investigations	AE	Testing within the 50 foot corridor and in areas required for extra workspace	Consult with SHPO, ACHP, and potentially affiliated tribes on data recovery plan and MOA.	
Chipping Station	Anomaly Investigations	AE	No further work within the 50 foot corridor but if extra workspace is needed to the north of the pipeline, testing is recommended	Consult with SHPO, ACHP, and potentially affiliated tribes on data recovery plan and MOA.	Possibly NAE if only 50 foot corridor is needed.
Camp or Processing Area	Anomaly Investigations	NAE	No further work		
Chipping Station	Erosion Control Measures; Anomaly Investigations	AE	Testing within the 50 foot corridor and in areas required for extra workspace	Consult with SHPO, ACHP, and potentially affiliated tribes on data	

				recovery plan and MOA.	
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* NHPA= No Historic Properties Affected; NAE= No Adverse Effect; AE= Adverse Effect

Ethnographic Resources

Methodology and Intensity Thresholds

As defined by the National Park Service, an ethnographic resource is a site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. Some places of traditional cultural use may be eligible for inclusion in the National Register of Historic Places as traditional cultural properties (TCPs) because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community (*National Register Bulletin, Guidelines for Evaluating and Documenting Traditional Cultural Properties*) involvement. For purposes of analyzing potential impacts to ethnographic resources, the thresholds of change for the intensity of an impact are defined below.

- Negligible:** Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.
- Minor:** *Adverse:* impact(s) would be slight but noticeable but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.
Beneficial: would allow access to and/or accommodate a group's traditional practices or beliefs.
- Moderate:** *Adverse:* impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive.
Beneficial: would facilitate traditional access and/or accommodate a group's practices or beliefs.
- Major:** *Adverse:* impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that the survival of a group's practices and/or beliefs would be jeopardized.
Beneficial: would encourage traditional access and/or accommodate a group's practices or beliefs.
- Duration:** Short-term refers to a transitory effect, one that largely disappears over a period of days or months. The duration of long-term effects is essentially permanent.

Impacts of Alternative A (No-Action)

Under Alternative A, management and maintenance of the pipeline is done on a case-by-case basis. Each individual project would have ethnographic resources evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to ethnographic resources. The patch of Purple sage is located within the pipeline corridor but surveys conducted by pipeline personnel would not impact the Purple sage as the shrubs can be easily walked around.

Erosional Control Efforts: In areas where the underground pipeline has been exposed through erosion, erosion control measures require that the pipeline be recovered by hand with shovels using soil from inside the pipeline corridor, or by installing flow control devices such as rock check dams in washes. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. Purple sage has not been identified within these washes but rather on a steep slope below a ridge. This is not an area that would require erosion control; therefore erosion control measures would have *negligible* impacts to ethnographic resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. In the unlikely event that pipeline recoating needs to take place in the area of Purple sage, ground-disturbing activities such as excavation would physically impact ethnographic resources. Ground-disturbing equipment, such as tracked excavators, side boom, welding trucks, and sandblasting equipment would have a *directly adverse, moderate, site-specific, and long-term* effect on fragile ethnographic resources such as Purple sage.

Cumulative Impacts

Long-term, major and adverse impacts may have occurred to ethnographic resources when the pipeline was originally installed, possibly destroying all or portions of patches of Purple sage. Improvements, monitoring, and maintenance activities of the pipeline over the past 50 years has continued to have an adverse, site-specific, long-term, and minor to moderate effect on the resource. In addition, erosion related to pipeline activities may have also contributed to adverse, site-specific, long-term and minor effects on patches of Purple sage.

Despite these cumulative impacts, the currently identified patch of Purple sage is on a section of pipeline that is located on a slope, in an area of sand that is the least likely to need maintenance in the foreseeable future. It is not currently slated for maintenance as part of this planning effort. While Alternative A could have a long-term, moderate, adverse impact to ethnographic resources it is unlikely it would contribute a noticeably cumulative increment.

Conclusion

Overall, the implementation of Alternative A (No Action) would have a negligible effect on ethnographic resources with the exception of an anomaly investigation, which would create an unavoidable, *directly adverse, negligible to moderate, long-term*, impact to ethnographic resources, specifically Purple sage. In the unlikely event of an anomaly investigation in the area of the Purple sage patch, the park would consult with the Ute Indian Tribe prior to any work being performed and

develop mitigation measures in consultation with tribal members, the SHPO, and the Advisory Council.

Alternative A (No Action) would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other NPS planning document. This alternative would not result in impairment to ethnographic resources.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or low level flights with a helicopter would have *negligible* impacts to ethnographic resources. The patch of Purple sage is located within the pipeline corridor but surveys conducted by pipeline personnel would not impact the Purple sage as the shrubs can be easily walked around.

Erosion Control Efforts: In areas where the underground pipeline has been exposed through erosion, erosion control measures require that the pipeline be recovered by hand with shovels using soil from inside the pipeline corridor, or by installing flow control devices such as rock check dams in washes. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. Purple sage has not been identified within these washes but rather on a steep slope below a ridge. This is not an area that would require erosion control; therefore erosion control measures would have *negligible* impacts to ethnographic resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. In the unlikely event that pipeline recoating needs to take place in the area of Purple sage, ground disturbing activities such as excavation would physically impact ethnographic resources. Ground disturbing equipment, including tracked excavators, side boom, welding trucks, and sandblasting equipment would have a *direct, adverse, moderate, site-specific, and long-term* effect on fragile ethnographic resources such as Purple sage.

Access Routes: Accessing work sites and allowing heavy equipment such as a track excavator to traverse across ethnographic resources could have a directly adverse, site-specific, long-term, moderate impact. No vehicles and/or equipment would be allowed to traverse up or down the slope that the Purple sage is located on; therefore the impacts of access routes through the Purple sage would be *negligible*.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require ground disturbing activities such as digging may physically impact ethnographic resources. In the unlikely event that an anomaly is found within the area of the Purple sage, ground disturbing equipment, including tracked excavators, welding trucks, and sandblasting equipment would have an *directly, adverse, moderate, site-specific, and long-term effect* on this ethnographic resource.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. There are no ethnographic resources along this section of pipeline and impacts would be *negligible*.

Restoration Activities: Restoration activities following ground disturbance may include replanting native plants as well as reseeding. If this were to occur in the area of the Purple sage, it would have a beneficial effect of promoting the reestablishment of the plant, which could help reduce erosion and sedimentation within the worksite along the pipeline. The impacts of restoration activities on ethnographic resources would therefore be *directly adverse and beneficial, moderate, site-specific, and long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Overall, the implementation of Alternative B (Preferred) would have a *negligible* effect on ethnographic resources with the exception of an anomaly investigation, which would create an unavoidable, *adverse, site-specific, negligible to moderate, long-term* impact to ethnographic resources, specifically Purple sage. In the unlikely event of an anomaly investigation in the area of the Purple sage patch, the park would consult with the Ute Indian Tribe prior to any work being performed and develop mitigation measures in consultation with tribal members, the SHPO, and the Advisory Council on Historic Preservation.

Alternative B (Preferred) would not produce major adverse impacts on cultural resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, or (3) identified as a goal in the park's general management plan or other NPS planning document. This alternative would not result in the impairment of ethnographic resources.

§106 Summary

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, in the unlikely event of an anomaly investigation in the location of the Purple sage patch, implementation of the preferred alternative would have an *adverse effect* on the ethnographic resources in Arches National Park. If an anomaly investigation is necessary, the NPS would consult with the Ute Indian Tribe, Utah State Historic Preservation Office, and the Advisory Council on Historic Preservation, to develop a Memorandum of Agreement (MOA) that would stipulate measures the NPS would take to avoid, minimize, or mitigate adverse effects to ethnographic resources.

Wilderness

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to wilderness were derived from park staff's knowledge of the wilderness and assessing the effect of the alternatives on both the wilderness user and the wilderness setting. A Wilderness Minimum Requirement Guide (MRDG) was completed to determine if the administrative action

is necessary and to determine the minimum activity allowed within the Wilderness. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Effects to wilderness character or experience would be slight, and would be much localized in area and very short in duration (a day or less). The action would not cause a fundamental change in the character of proposed wilderness.
- Minor:** Effects to wilderness character or experience would be relatively small, and would be localized in area or short in duration. The action would not cause a fundamental change in the character of proposed wilderness.
- Moderate:** Effects to wilderness character or experience, including the size of the area affected and the duration would be intermediate. The action would not cause a fundamental change in the character of proposed wilderness. Mitigation measures to offset adverse effects would probably be necessary and likely successful.
- Major:** Effects to wilderness character or experience, including the size of the area affected and the duration would be substantial. The action would cause a fundamental change in the character of proposed wilderness. Mitigation to offset adverse effects would be needed, but its success not assured.
- Duration:** Short-term refers to a transitory effect, one that largely disappears over a period of hours or days. The duration of long-term effects is months or years.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have a Wilderness Minimum Requirement Decision Guide (MRDG) evaluated at each work site to determine administrative action. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor would have negligible impacts to Wilderness. Low level flights with a helicopter are in violation with the Wilderness Act. The helicopter would only be selected by using the MRDG; the noise from the helicopter would have a minor adverse effect on Wilderness character. The “imprint of man’s work” and the lack of “solitude and primitive experience” would be noticeable but would be short-term and site-specific. Survey work would have a *direct and indirect adverse, negligible to minor, site-specific, short-term*, and impact on Wilderness.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. The presence of pipeline personnel could directly or indirectly impact visitor solitude and self-discovery in Wilderness areas by affecting the “solitude and primitive unconfined type of recreation” they can experience. However, a natural gas pipeline through proposed Wilderness does not preserve the “natural” character of Wilderness and this visual

intrusion of the pipeline scar would most likely outweigh the presence of pipeline personnel walking and performing erosion control measures. Therefore erosion control measures would have an *direct and indirect adverse, minor, site-specific, short-term* impact on Wilderness.

Anomaly Investigations: Anomaly investigations may determine recoating sections of pipeline would require surface disturbing activities such as excavation. Excavations would physically impact Wilderness character and values. The visual intrusion of pipeline personnel, vehicles and heavy equipment digging large deep holes into the ground would have a moderate impact to the Wilderness. These ground disturbing sites would not look like they had been “affected primarily by the forces of nature” and would have the “imprint of man’s work”. This visual man-made intrusion would have a *direct adverse, moderate, site-specific, long-term* impact on Wilderness.

Cumulative Effects

Past land uses, including ranching and agriculture, mining of gas, oil and uranium and developing seismic lines affect Wilderness areas. Existing roads, paved and unpaved, within recommended and potential Wilderness areas have affected its “pristine” nature. Many of the above impacts are not very evident to the public. Examples of these disturbances include barbed wire fragments and changes in native plant communities. Wilderness designation of an area affects motorized access and methods/tools that can be used in large areas of the park, sometimes substantially increasing the amount of effort or funds required to accomplish projects compared to other areas of the park. Park operations using mowers, heavy equipment, or large work crews can degrade the Wilderness experience, even though minimum requirement analyses are used. Oil and gas well activities outside park boundaries and traffic such as overflights or scenic airplane tours in areas adjacent to Wilderness could degrade Wilderness experience, both from sight and sound. This alternative when combined with other impacts would result in overall cumulative adverse minor impacts to Wilderness in the cumulative effects area.

Conclusion

Although survey work would have minor impacts, the use of heavy equipment conducting maintenance activities in the Wilderness would have direct, adverse, moderate, site-specific, long-term, and moderate impacts. All these intrusions are site-specific and short to long-term adverse impacts on Wilderness and they would be noticeable to Wilderness visitors. The impacts of current pipeline management on Wilderness would therefore be *direct and indirect, adverse, negligible to moderate, site-specific and localized, short and long-term*. Under current management of the pipeline a Wilderness MRDG would be developed for each proposed worksite. This alternative would not result in impairment to Wilderness. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

After completing the MRDG, it was determined that both alternatives would have negative effects to the four definitions of Wilderness character and associated values if maintenance activities along the pipeline would occur. However, in analyzing other unique criteria such as heritage and cultural resources, economics and time and safety, some positive effects were determined if the preferred alternative was selected. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor would have negligible impacts to Wilderness. Low level flights with a helicopter are in violation with the Wilderness Act. The helicopter would only be selected by using the MRDG; the noise from the helicopter would have a minor adverse effect on Wilderness character. The “imprint of man’s work” and the lack of “solitude and primitive experience” would be noticeable but would be short-term and site-specific. Survey work would have an *indirect, adverse, negligible to minor, site-specific and localized, short-term* impact on Wilderness.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. The presence of pipeline personnel could directly or indirectly impact visitor solitude and self-discovery in Wilderness areas by affecting the “solitude and primitive unconfined type of recreation” they can experience. However, a natural gas pipeline through proposed Wilderness does not preserve the “natural” character of Wilderness and this visual intrusion of the pipeline scar would most likely outweigh the presence of pipeline personnel walking and performing erosion control measures. Therefore erosion control measures would have an *indirect, adverse, minor, site-specific, short-term* impact on Wilderness.

Anomaly Investigations: Anomaly investigations may determine that recoating sections of pipeline would require surface-disturbing activities such as excavation. Excavations would physically impact Wilderness character and values. The visual intrusion of pipeline personnel, vehicles and heavy equipment digging large deep holes into the ground would have a moderate impact to the Wilderness. These ground-disturbing sites would not look like they had been “affected primarily by the forces of nature” and would have the “imprint of man’s work”. This visual man-made intrusion would have a *direct, adverse, moderate, site-specific, long-term* impact on Wilderness.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across the Wilderness would have a directly adverse, site-specific, long-term, moderate impact. Using the UTV’s to leave and return daily to worksites would have potential to cause impacts to soils and vegetation due to the repeated trips. In areas where equipment would need to climb steep access routes, the damage would be greater. Wherever tracks or tires displace soil or sand, whether on a steep hill or elsewhere, progress would be slow and deliberately monitored so that heavy equipment or other responsible equipment can be stopped quickly when soil is being churned up, and salvaging vegetation can occur before more progress is made. On steep slopes, if equipment starts impacting soils, herbaceous plants including grasses must be salvaged from the vehicle route ahead of the vehicles for restoration purposes. Access routes to work sites would not look like they had been “affected primarily by the forces of nature” and would have the “imprint of man’s work”. Access routes would have a *direct and indirect, adverse, moderate, localized, long-term* impact on Wilderness.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact Wilderness character and values. The visual intrusion of pipeline personnel, vehicles and heavy equipment digging large deep holes into the ground would have a moderate impact to the Wilderness. These ground-disturbing sites would not look like they had been “affected primarily by the forces of nature” and would have the “imprint of man’s work”. This visual man-made intrusion would have a *direct and indirect, adverse, moderate, site-specific, long-term* impact on Wilderness.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The excavation would physically impact Wilderness character and values. The intrusion of pipeline personnel, vehicles and heavy equipment digging a more than half a mile long trench would have moderate impact to Wilderness. This ground disturbing activity would not look like the area had been “affected primarily by the forces of nature” and it would have the “imprint of man’s work”. Replacing sections of conduit would have a *direct, adverse, moderate, site-specific, long-term* impact on Wilderness.

Restoration Activities: Restoration activities, such as replanting, may cause negligible, temporary impacts to Wilderness characters and values “with the imprint of man’ work”. Transplanting and reseeding would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation in worksites and access routes along the pipeline and return the areas into “an unimpaired condition”. The impacts of restoration activities on Wilderness would therefore be *directly beneficial, minor, site-specific and localized, and long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Although survey work would have minor impacts, the use of heavy equipment conducting maintenance activities in the Wilderness would have direct, adverse, site-specific, long-term, and moderate impacts. All these intrusions are site-specific and short to long-term adverse impacts on Wilderness and they would be noticeable to Wilderness visitors. The impacts of current pipeline management on Wilderness would therefore be *direct and indirect, beneficial and adverse, negligible to moderate, site-specific and localized, and short and long-term*. Under the preferred alternative a Wilderness MRDG has been developed for proposed pipeline work along the pipeline and mitigation measures (see Chapter 2) would be in place prior to any work on the pipeline. This alternative would not result in impairment to Wilderness. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Natural Soundscape

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to natural soundscape considered noise context, amplitude, and time factors, including duration, frequency of occurrence, and sensitive time periods. The technique used to assess noise impacts from maintenance activities in this document is consistent with methods being developed for *NPS Reference Manual 47, Soundscape Preservation and Noise Management* (NPS in preparation), in accordance with *Management Policies 2006* and *Director's Order #47: Soundscape Preservation and Noise Management*. A SEUG Soundscape Management Plan (SMP) is currently being developed and the following indicators would be included in the SMP regarding the backcountry management zone. However, these specific numbers may not represent the final numbers in the SMP. The thresholds of change for the intensity of an impact are defined below:

- Negligible:** Non-natural (human-caused) sounds are rarely audible (<5% of any hour). When they are audible, they rarely exceed 40 dBA (<5% of any hour). Visitors have the opportunity to experience long periods (>30 minutes per hour) of natural sounds only, free from non-natural sounds. Less than 12 hours exceed this thresholds; of those that do, none exceed Minor.
- Minor:** Non-natural sounds are rarely audible (5-10% of any hour). When they are audible, they exceed 40 dBA for between 5-10% of any hour. Visitors have the opportunity to experience long periods (15-30 minutes per hour) of natural sounds only, free from non-natural sounds. Less than 12 hours exceed this thresholds; of those that do, none exceed Moderate.
- Moderate:** Non-natural sounds are audible 10-25% of any hour. When they are audible, they exceed 60 dBA between 10-25% of any hour. Visitors have limited opportunities to experience periods (5-15 minutes per hour) of natural sounds only, free from non-natural sounds. Less than 12 hours exceed this thresholds; of those that do, none exceed Major.
- Major:** Non-natural sounds are frequently audible (>25% of any hour). When they are audible, they exceed 60 dBA frequently (>25% of any hour). Visitors have few opportunities to experience natural sounds only (<5 minutes per hour), free from non-natural sounds. Twelve hours exceed this threshold.
- Duration:** Short-term refers to a transitory effect, one that largely disappears over a period of minutes or hours. The duration of long-term effects is days or weeks.

Impacts of Alternative A (No-Action)

Degradation due to noise (undesirable human-caused sound) would result from pipeline maintenance activities created from survey work, erosion control efforts, excavation and recoating activities and restoration projects. All involve the use of noise-generating equipment such as vehicles, helicopters and possibly heavy equipment (i.e. track excavators, rock drills, air compressors, and front-end loaders). Each of this equipment is quite loud, especially helicopters, (in excess of 80 decibels).

Hand tools would be primarily used to initially access the anomaly sites and only where hand tools are not feasible, other heavy equipment may be used.

Any use of equipment powered by internal combustion engines would be scheduled (to the degree practicable) during low visitor use seasons (late summer or winter) to reduce impacts to park visitors. Helicopters are only used once a year during the month of May. Further, the use of heavy equipment would be very infrequent in light of the number of the potential locations of anomalies that require this type of equipment (from single events of hours to periods of one to two weeks per year per location for one to two years). This is not frequent or repetitive enough to substantively interfere with human activities in the area or with wildlife behavior and projects would be timed to the degree possible to occur before or after expected seasons of high visitor use and periods of critical wildlife behavior (e.g. nesting), as outlined in mitigation measures relevant to T&E species and species of special concern. Nor would such infrequent noise chronically impair the solitude and tranquility (natural soundscape) associated with the park. Pipeline maintenance would have a *direct, adverse, moderate, site-specific and localized, and long term* impact to the natural soundscape.

Cumulative Effects

Noise impacts in Arches National Park are most often caused by vehicle traffic and humans (sightseers, campers, hikers, etc.). Aircraft over-flight noise is pervasive and vehicle noise in accessible areas of the park (Park Avenue, the Windows, Delicate Arch, and Devil's Garden trailheads, Wolfe Ranch and Devil's Garden campground), can be heard mostly during high visitor use season. Short-term and localized human-caused noise would result from operation of equipment (vehicles, mowers, chainsaws, and heavy equipment) between dusk and dawn. A NPS biological technician has noticed a seemingly new low humming noise, similar to that from a distant and constant train or busy highway, at several different locations in Arches during visits in 2008-2009. Locations included a western-facing alcove in Courthouse Wash and several locations in Salt Valley. The park planner and biological technician both heard the noise on a late November 2009 survey of the pipeline through Salt Valley. The noise source could possibly be highway noise located four and a half miles from the park boundary. This alternative when combined with other impacts would have minor to moderate, additive, short-term adverse impacts on the natural soundscape.

Conclusion

Maintaining the pipeline requires several Human-caused noises would be long-term and site-specific and potentially localized. Audible human-caused noise from heavy equipment may be experienced during periods of equipment operation between sunrise and sunset. Pipeline maintenance activities would not be conducted at night. Pipeline maintenance activities may inhibit the desired condition to have, to the greatest extent possible, the natural soundscape of the park preserved. However, the maintenance of the pipeline is essential in ensuring the pipeline meets safety standards pursuant to the Natural Gas Pipeline Safety Act and the park recognizes that the adverse impacts these maintenance activities to the natural soundscape is an accepted action. The park may disseminate information to the public and staff on various projects as to how and why particularly loud techniques, such as heavy equipment and aircraft, are necessary to accomplish pipeline maintenance activities. The impacts of pipeline maintenance on natural soundscapes would therefore be adverse, moderate, site-specific and localized, and long-term. This alternative would

not result in impairment to soundscape. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Impacts to the soundscape from pipeline maintenance under the preferred alternative are the same as Alternative A.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Impacts to the soundscape from pipeline maintenance under the preferred alternative are similar to Alternative A. Human-caused noise would be long-term and site-specific and potentially localized. Audible human-caused noise from heavy equipment may be experienced during periods of equipment operation between sunrise and sunset. Pipeline maintenance activities would not be conducted at night. Pipeline maintenance activities may inhibit the desired condition to have, to the greatest extent possible, the natural soundscape of the park preserved. However, the maintenance of the pipeline is essential in ensuring the pipeline meets safety standards pursuant to the Natural Gas Pipeline Safety Act and the park recognizes that the adverse impacts these maintenance activities to the natural soundscape is an accepted action. The park may disseminate information to the public and staff on various projects as to how and why particularly loud techniques, such as heavy equipment and aircraft, are necessary to accomplish pipeline maintenance. The impacts of pipeline maintenance on natural soundscapes would therefore be *directly, adverse, moderate, site-specific and localized, and long-term*. This alternative would not result in impairment to soundscape. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Visual Resources

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to visual resources were derived from available scientific data and literature and park staff's past observations of the effects on visual resources from oil and gas development, prescribed fires, wildfires, and exotic plant management. The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Any changes would be below or at the level of detection, and if detected, would have effects that would be considered slight and short-term.
- Minor:** Changes to visual resources would be measurable, although small, short-term, and site-specific. No visual resource mitigation measures would be necessary.
- Moderate:** Changes to visual resources would be measurable and would have consequences, although the effect would be relatively localized. Mitigation measures would be necessary and likely successful.

- Major:** Changes to visual resources would be measurable, would have substantial consequences, and would be noticed regionally. Mitigation measures would be necessary and success could not be guaranteed.
- Duration:** Short-term refers to a period of less than 5 years. Long-term refers to a period of longer than 5 years.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have visual resources evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to visual resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *direct adverse, minor, site-specific, and short-term impact* to visual resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on visual resources especially in areas where large excavations are occurring. Moderate visual effects would likely occur in areas where large areas of vegetation have been physically removed by heavy equipment. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. The impacts of the use of heavy equipment on visual resources would therefore be *directly adverse, moderate, site-specific and localized, and long-term*.

Cumulative Effects

Rural development, oil and gas fields, and lights near park boundaries can affect viewsheds and cause light pollution, degrading night sky viewing and decreased visual resource quality. Pipeline maintenance may have long-term, adverse cumulative impacts on the park's viewshed. The impact to the soils and vegetation to access the pipeline with heavy equipment cause long-term visual scars to the landscape. The adverse impacts resulting from removal of vegetation would be short-term, and would only last until native vegetation can reestablish. Once established, however, native vegetation would have long-term beneficial effects by returning the viewshed to a state that is more representative of the historic condition. This alternative when combined with other impacts would result in overall minor adverse cumulative effects to visual resources in the cumulative area.

Conclusion

Current pipeline maintenance within Arches National Park would impact distant views and local foregrounds. Any excavation to repair the pipeline would have a moderate impact to visual resources. Moderate visual effects would likely occur in areas where large areas of vegetation have been physically removed by heavy equipment. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. Under this alternative, impacts to visual resources would be *adverse, negligible to moderate, site-specific and localized, short and long-term*. This alternative would not result in impairment to visual resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey Work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to visual resources.

Erosion Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *direct adverse, minor, site-specific, short-term* impacts to visual resources.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Excavation would physically impact the landscape which affects the visual resources of the park. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on visual resources especially in areas where large excavations are occurring. Moderate visual effects would likely occur in areas where large areas of vegetation have been physically removed by heavy equipment. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. The impacts of the use of heavy equipment on visual resources would therefore be *directly adverse, moderate, site-specific and localized, and long-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across the landscape would have a directly adverse, site-specific, long-term, moderate impact to visual resources. Using the UTV's to leave and return daily to worksites would have potential to cause impacts to soils and vegetation due to the repeated trips. In areas where equipment would need to climb steep access routes, the damage would be greater. Wherever tracks or tires displace soil or sand, whether on a steep hill or elsewhere, progress would be slow and deliberately

monitored so that heavy equipment or other responsible equipment can be stopped quickly when soil is being churned up, and salvaging vegetation can occur before more progress is made. On steep slopes, if equipment starts impacting soils, herbaceous plants including grasses must be salvaged from the vehicle route ahead of the vehicles for restoration purposes. Access routes would have a *direct, adverse, moderate, localized, and long-term* impact on visual resources.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may physically impact the landscape which effect visual resources of the park. Ground-disturbing equipment, using tracked excavators, side boom, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on visual resources especially in areas where large excavations are occurring. Moderate visual effects would likely occur in areas where large areas of vegetation have been physically removed by heavy equipment. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. The impacts of the use of heavy equipment on visual resources would therefore be *directly adverse, moderate, site-specific and localized, and long-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The visual resources along this section of pipeline are the vegetative community, Greasewood Flats and the unvegetated Entrada Sandstone. Although this section is already impacted with previous pipeline access and maintenance work, accessing the conduit would require the use of a rock drill to break up the bedrock in the Entrada Sandstone formation. Digging a trench more than half a mile would also remove vegetation from the Greasewood Flats community. Replacing conduit would be *directly adverse, moderate, site-specific, and long-term* to visual resources.

Restoration Activities: Restoration activities, such as salvaging and replanting, may cause minor to moderate, temporary impacts to visual resources. Effects could include damage to transplanted plants, reduced vigor and even death. The effects to native vegetation may be detectable in some areas. However, these changes may be small, short-term, and the effects would be site-specific. The soils along some of this section of pipeline are moderately saline to strongly saline and revegetative efforts may be difficult. The installation of jute matting would facilitate revegetation efforts. Once native vegetation is established the impacts to visual resources would be beneficial as they become reestablished. The impacts of restoration activities on visual resources would therefore be *directly adverse and beneficial, minor to moderate, site-specific and localized, and short to long-term*.

Cumulative Effects

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion

Under the preferred alternative several mitigation measures would be in place prior to work commencing and a Vegetation Monitoring Plan (Appendix B) would ensure a higher success rate of impacted native vegetation which would reduce the impacts to visual resources. Salvaging native plants on site and having a native plant seed source

available would reduce the impacts of pipeline maintenance. Survey work, the use of heavy equipment along the pipeline and the impact from personnel conducting maintenance activities would have adverse, site-specific, short-term, minor to moderate impacts to visual resources. Rehabilitating native plant communities would be beneficial and may reduce the potential for soil erosion and sedimentation in disturbed areas, especially on steep slopes and reduce the impacts to the park's visual resources. The impacts to visual resources would be *directly beneficial and adverse, negligible to moderate, site-specific and localized, and short-to-long term*. This alternative would not result in impairment to visual resources. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Visitor Use and Experience

Methodology and Intensity Thresholds

Visitor records and staff observations of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the effects of the actions on both alternatives. The impact on the ability of the visitor to experience a full range of park resources was analyzed by examining the resources impacted. The following definitions are used to define intensity levels:

Negligible: The effect on availability of desired visitor experiences, or the number of visitors affected, would be slight or nonexistent.

Minor: The effect on availability of desired visitor experiences, or the number of visitors affected, would be relatively small. The effect would be limited to relatively few individuals, be localized in area or short in duration, and/or affect recreation opportunities common in the park or region.

Moderate: The effect on availability of desired visitor experiences, or the number of visitors affected, would be intermediate. The effect would involve an intermediate number of visitors, portion of the park, duration, and/or affect recreation opportunities uncommon in the park or region. The visitor would likely be able to express an opinion about the changes.

Major: The effect on availability of desired visitor experiences, or the number of visitors affected, would be substantial. The effect would involve a substantial number of visitors, portion of the park, duration, and/or affect recreation opportunities uncommon or unique in the park or region. The visitor would likely be able to express a strong opinion about the changes.

Duration: Short-term effects last only during the construction phase (i.e. pipeline maintenance). Long term effects refer to lasting longer than the maintenance phase.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have impacts to visitor use and experience evaluated at each work site. The following actions occur annually or have occurred in the past.

Survey work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have negligible to minor impacts to visitor use and experience. Intrusion by pipeline personnel conducting surveys may be noticeable to a few visitors and the noise from low level flights may be a negative impact would impact the visitor experience of a national park. Survey work along the pipeline would be *direct and indirect, adverse, negligible and minor, site-specific and localized, and short-term* impact to visitor use and experience.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *negligible* impacts to visitor use and experience.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, using tracked excavators, side booms, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on park visitors especially in areas where large excavations are occurring. Operation of equipment, like a jackhammer or rock drill, backhoes and other vehicles would have a short-term effect on visitor experience at the park. This visual and noise intrusion to visitors would be a directly adverse, short-term, site-specific and minor impact. Visitor access may also be restricted from worksite areas during the project. These closures may be scheduled (to the degree practicable) during low visitor use seasons. The impacts of anomaly investigation to visitor use and experience would therefore be *directly and indirectly, adverse, minor, site-specific and localized, and short-term*.

Cumulative Effects:

Park operations using mowers, heavy equipment, aircraft or large work crews can degrade the visitor experience. Oil and gas and other development activities outside park boundaries and the associated traffic in areas adjacent to the park could degrade visitor experience, both from sight and sound. The quality of visitor experience may be reduced when visitors are exposed to pipeline maintenance projects and the inconvenience of construction noise, dust, and possible off-limit areas. However, under this alternative, visitor functions along the pipeline are not expected to change. This alternative when combined with other impacts would result in overall minor additive adverse effects to visitor use and experience in the cumulative effects area.

Conclusion:

Some aspects of pipeline maintenance may intrude on the visitor experience: mechanized and motorized equipment such as vehicles, heavy equipment and helicopters, would cause a certain level of noise when used within the park, thereby compromising the preservation of natural conditions (including the lack of manmade noises). The use of heavy equipment would be very infrequent in light of the number of the potential locations of anomalies that require this type of equipment (from single events of hours to periods of one to two weeks per year per location for one

to five to ten years). This is not frequent or repetitive enough to substantively interfere with human activities in the area. The visual changes to the area from creating an unnatural surface within the park would have a minor adverse effect on visitor experience because the changes would be readily noticeable. All these intrusions are site-specific and short to long-term adverse impacts and they would be noticeable to park visitors. Under current pipeline maintenance impacts to visitor use and experience would be *directly and indirectly, adverse, negligible to minor, site-specific and localized, and short-term*. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey work: Survey work consisting of pipeline personnel walking the pipeline corridor would have negligible impacts to visitor use and experience. Conducting low level flights with a helicopter may have a minor impact to visitors in the area. The helicopter would be noticeable but would be short-term and site-specific. Survey work would have a *direct and indirect, adverse, negligible to minor, site-specific and localized, and short-term* impact on visitor use and experience.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation. The presence of pipeline personnel could directly or indirectly impact visitor solitude and self-discovery in the park by affecting their experience. Therefore erosion control measures would have a *direct and indirect, adverse, minor, site-specific, and short-term* impact on visitor use and experience.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, using tracked excavators, side booms, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on park visitors especially in areas where large excavations are occurring. Operation of equipment, like a jackhammer or rock drill, backhoes and other vehicles would have a short-term effect on visitor experience at the park. This visual and noise intrusion to visitors would be a directly adverse, short-term, site-specific and minor impact. Visitor access may also be restricted from worksite areas during the project. These closures may be scheduled (to the degree practicable) during low visitor use seasons. The impacts of anomaly investigation to visitor use and experience would therefore be *directly adverse, minor, site-specific and localized, and short-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across the park landscape would have a directly adverse, site-specific, long-term, moderate impact to visitor use and experience. Using the UTV's

to leave and return daily to worksites would have potential to impact visitors in the area due to the repeated trips. In areas where equipment would need to climb steep access routes, the damage would be greater to soils and vegetation and create a greater visual scar and would be noticed by park visitors. Access routes to work sites would not look like natural and may impact visitors use and experience in a national park. Access routes would have a *direct, adverse, moderate, localized, long-term* impact on visitor use and experience.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface disturbing activities such as digging may physically impact visitor use and experience. The visual intrusion of pipeline personnel, vehicles and heavy equipment digging large deep holes into the ground would have a minor impact to the visitor's use and experience. These ground-disturbing sites would not look natural. This visual man-made intrusion would have a *direct, adverse, minor, site-specific, long-term*, impact on visitor use and experience.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The intrusion of pipeline personnel, vehicles and heavy equipment digging a more than half a mile long trench would have moderate impacts to the visitor in this area. The sounds generated from the backhoe with attached rock drill would have an adverse impact. The ground-disturbing activity would not look natural even after the area has been revegetated. Replacing sections of conduit would have a *direct, adverse, moderate, site-specific, long-term* impact on visitor use and experience.

Restoration Activities: Restoration activities, such as replanting, may cause negligible, temporary impacts to visitor use and experience. Transplanting and reseeding would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation in worksites and access routes along the pipeline and return the areas into a natural condition. Moderate visual effects would likely occur in areas where large areas of vegetation have been physically removed by heavy equipment. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. Rehabilitation of native plant communities by salvaging and reseeding would be readily apparent to some visitors. The impacts of restoration activities on visitor use and experience and would therefore be *directly beneficial, minor, site-specific and localized, and long-term*.

Cumulative Effects:

The cumulative impacts of past and planned pipeline installation and maintenance activities are the same as those discussed for Alternative A (No Action).

Conclusion:

Although survey work would have minor impacts, the use of heavy equipment conducting maintenance activities would have direct, adverse, site-specific, long-term, and moderate impacts to visitors use and experiences in the park. Some aspects of pipeline maintenance may intrude on the visitor experience: mechanized and motorized equipment such as vehicles, heavy equipment and helicopters, would cause a certain level of noise when used within the park, thereby compromising the preservation of natural conditions (including the lack of manmade noises). The use of

heavy equipment would be very infrequent in light of the number of the potential locations of anomalies that require this type of equipment (from single events of hours to periods of one to two weeks per year per location for one to five to ten years). This is not frequent or repetitive enough to substantively interfere with human activities in the area. The visual changes to the area from creating an unnatural surface within the park would have a minor adverse effect on visitor experience because the changes would be readily noticeable. All these intrusions are site-specific and short to long-term adverse impacts and they may be noticeable to park visitors. Under the preferred alternative the impacts of pipeline management would therefore be *direct and indirect, beneficial and adverse, negligible to moderate, site-specific and localized, and short and long-term*. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Park Operations

Methodology and Intensity Thresholds

Implementation of a project can affect the operations of a park such as the number of employees needed; the type of duties that need to be conducted; when/who would conduct these duties; how activities should be conducted; research projects, and administrative procedures. The methodology used to assess potential changes to park operations is defined as follows:

- Negligible:** Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on parks operations.
- Minor:** The effect would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.
- Moderate:** The effects would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- Major:** The effects would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.
- Duration:** Short-term effects last only during the construction phase (i.e. building the parking lot). Long term effects refer to lasting longer than the construction phase.

Impacts of Alternative A (No-Action)

Under Alternative A, current management of the pipeline is done on a case-by-case basis. Each individual project would have impacts to park operations. The following actions occur annually or have occurred in the past.

Survey work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to park operations.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These washes are typically devoid of vegetation and these erosion control measures would have *negligible* impacts to park operations.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, using tracked excavators, side booms, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on the parks natural and cultural resources especially in areas where large excavations are occurring. Resource management would need to be consulted regarding the resources within worksites. Consultation with resource management would take time and energy away from ongoing park projects and tasks as resource staff would need to be present prior to the project and onsite during the project. The impacts of anomaly investigation to park operations would therefore be *directly adverse, minor to moderate, site-specific and localized, and short-term*.

Cumulative Effects

Any project that occurs in the park has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction to this chapter would have some degree of effect on employees and park operations. Planning projects such as the development of a transportation plan and planning for improvements to the road corridors typically involve the majority of park staff to contribute their expertise and assistance. Resource management projects such as exotic vegetation management and cultural resource surveys would primarily involve resource management staff. Building rehabilitation and road maintenance issues would primarily involve the maintenance staff. Visitor contact, interpretation, and safety activities usually involve rangers and interpretive specialists. Under the no-action alternative, park operations would be impacted greatly as each project would warrant consultation with various park staff. This alternative when combined with other impacts would result in overall minor impacts to park operations in the cumulative effects area.

Conclusion

Current pipeline maintenance within Arches National Park would impact natural and cultural resources. Any excavation to repair the pipeline would have a minor to moderate impact to park operations. Moderate impacts to park operations would likely occur in areas where large areas of vegetation and soils have been physically removed by heavy equipment and would require resources staff to survey worksites for various resources and to be present during pipeline operations. These areas may be devoid of vegetation until native vegetation becomes reestablished through reseeding and other treatments. Resource management staff would need to continue checking on revegetation efforts to monitor plant survival rates. Under this

alternative, impacts to park operations would be *directly adverse, negligible to moderate, site-specific and localized, and short and long-term*. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Impacts of Alternative B (Preferred)

Under Alternative B, pipeline maintenance would be identified in advance and specific activities would be planned for. The following actions have been identified as probable activities that could occur within the next 10 years:

Survey work: Survey work consisting of pipeline personnel walking the pipeline corridor or conducting low level flights with a helicopter would have *negligible* impacts to park operations.

Erosional Control Efforts: In areas where the underground pipeline is exposed, erosion control measures would require recovering the pipeline by hand with shovels using the soil from inside the pipeline corridor or by installing flow control devices such as rock check dams in washes. Installing these check dams may occasionally require the assistance of a small trackhoe. Erosion of the pipeline typically occurs in dry washes where intermittent flash floods wash away the sedimentation covering the pipeline. These erosion control measures would have *negligible* impacts to park operations.

Anomaly Investigations: Anomaly investigations may determine that sections of the pipeline would need to be recoated. If this is the case, ground-disturbing activities such as pipeline excavation would be required. Ground-disturbing equipment, using tracked excavators, side booms, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on the parks natural and cultural resources especially in areas where large excavations are occurring. Resource management would need to be consulted regarding the resources within worksites. As the majority of natural and cultural resources have been previously analyzed, resource management staff would still be consulted but the workload would not be as extensive as under Alternative A. The impacts of anomaly investigation to park operations would therefore be *directly adverse, minor, site-specific and localized, and short-term*.

Access Routes: Accessing work sites and allowing heavy equipment, such as a track excavator, traverse across the park landscape would have a directly adverse, site-specific, long-term, minor impact to park operations. Using the UTV's to leave and return daily to worksites would have potential to impact natural and cultural resources along the access route due to the repeated trips. In areas where equipment would need to climb steep access routes, the damage would be greater to soils and vegetation and create a greater visual scar. Park resource managers would have analyzed access routes under this alternative; however any new proposed route would need to be analyzed. Access routes would have a *direct, adverse, minor, localized, and long-term* impact on park operations.

Recalibration of the 2009 Anomaly Investigation and Repair: Recalibration of the 2009 anomaly investigation would occur and may require additional ground-disturbing work if errors or missed anomalies are found. Anomaly investigations that require surface-disturbing activities such as digging may impact park operations. Ground-disturbing equipment, using tracked excavators, side booms, welding trucks as well as sandblasting equipment would have measurable or perceptible effect on

the parks natural and cultural resources especially in areas where large excavations are occurring. Resource management would need to be consulted regarding the resources within worksites. As the natural and cultural resources have been previously analyzed, resource management staff would still be consulted but the workload would not be as extensive as under Alternative A. The impacts of anomaly investigation to park operations would therefore be *directly adverse, minor, site-specific and localized, and short-term*.

Replacement of Conduit: Replacing sections of underground conduit along .62 miles of the eastern part of the pipeline would require digging 18 inches into the surface with a backhoe. The intrusion of pipeline personnel, vehicles and heavy equipment digging a more than half a mile long trench would have minor impacts to park operations. As this location has been analyzed for natural and cultural resources the impacts to operations would be minor. Replacing sections of conduit would have a *direct, adverse, minor, site-specific, long-term* impact on park operations.

Restoration Activities: Restoration activities, such as replanting, may cause minor, temporary impacts to park operations. Transplanting and reseeding would have a beneficial effect of promoting the reestablishment of native vegetation, which could help reduce erosion and sedimentation in worksites and access routes along the pipeline and return the areas into a natural condition. Resource management would be consulted on which plants should be salvaged and which seed sources should be used. The impacts of restoration activities on park operations would therefore be *directly adverse, minor, site-specific and localized, and long-term*.

Cumulative Effects

Any project that occurs in the park has an effect on park operations; therefore, most of the actions listed in the cumulative scenario in the introduction to this chapter would have some degree of effect on employees and park operations. Planning projects such as the development of a transportation plan and planning for improvements to the road corridors typically involve the majority of park staff to contribute their expertise and assistance. Resource management projects such as exotic vegetation management, cultural resource surveys would primarily involve resources staff. Building rehabilitation and road maintenance issues would primarily involve the maintenance staff. Visitor contact, interpretation, and safety activities usually involve rangers and interpretive specialists. Under the preferred alternative, park operations would be impacted but not to the extent under Alternative A. Pipeline projects would warrant consultation with park staff but as most the analysis has been completed this consultation would require less time and energy. This alternative when combined with other impacts would result in overall minor cumulative effects to park operations.

Conclusion

Under the preferred alternative the majority of resources have been analyzed prior to any work being done along the pipeline and the impacts to park operations would be less than under Alternative A. Several mitigation measures would be in place prior to work commencing to ensure cultural and natural resources would not be as impacted. A Vegetation Monitoring Plan would also be in place and would ensure a higher success rate of impacted native vegetation which may reduce the impacts to park operations. Salvaging native plants on site and having a native plant seed source available would reduce the impacts to park resource management staff. Park staff, such as resource management would still need to be contacted prior to any project

starting but the time and energy spent on pipeline projects would be less. The impacts to park operations would be *directly, adverse, minor, site-specific and localized, and short-to-long term*. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS 2006 *Management Policies*.

Summary Statement of Impacts for Each Alternative

Under Alternative A (No Action), current management of the pipeline would continue under a SUP for conducting maintenance along the pipeline. However, environmental analysis would be conducted separately for each individual maintenance action that arises. Overall, Alternative A would have directly adverse, negligible to moderate, short and long-term impacts to almost all the impact topics with the exception of threatened endangered species. Impacts to threatened and endangered species and species of special concern would be negligible to minor as conservation measures of spatial and seasonal buffers would be adhered to. Most maintenance activities would need mitigations developed and in place prior to work commencing and these measures can be found in Chapter 2. Park operations would have the greatest impact under Alternative A as park employees would be required to assist William's personnel with each separate activity and survey required for each individual project that occurs along the pipeline. This constant assistance would require more time and energy for pipeline activities and would replace other park management projects as a priority for a time being. Within the next ten years, these impacts to park resources would not result in any unacceptable impacts, nor would park resources be impaired.

Under Alternative B (Preferred), the results of proposed maintenance activities are similar to Alternative A. Impacts would also be negligible to moderate on park resource with the exception of threatened and endangered species, species of special concern and park operations. Impacts to threatened and endangered species and species of special concern would also be negligible to minor as conservation measures of spatial and seasonal buffers would be adhered to. Park operations, however, would only have minor impacts under Alternative B. Since the proposed maintenance activities have been analyzed and surveys have already been completed, the park doesn't have to hold up current projects to start analyzing pipeline maintenance projects as they occur.

The only beneficial impact of pipeline maintenance is under Alternative B. Restoration activities are analyzed under this alternative and would have a beneficial impact to the park's natural resources as a vegetation and monitoring plan (Appendix B) would be initiated with any proposed maintenance action. This plan would ensure that if recoating the pipeline is needed the vegetation at the worksite would be salvaged prior to the project occurring and then transplanted when the project is completed. Monitoring of these worksites is included in this plan and would help guarantee the success of revegetation efforts. Within the next ten years, these impacts to park resources would not result in any unacceptable impacts, nor would park resources be impaired.

Yet, it is important to note that with regard to both alternatives, the overall impacts to resources may become unacceptable when considered in total and in the time frame of more than ten years. The continued maintenance of this pipeline with the repeated survey trips, erosional control measures, and recoating issues, the impacts

of pipeline maintenance may become an unacceptable impact to park resources. Soils and vegetation would not have sufficient amount of time to become established and flourish and the cumulative effects of continued maintenance of the pipeline would impede the attainment of a park's desired future conditions for natural and cultural resources and would be inconsistent with the park's purpose and values. During the last 60 years, the majority of the work along the pipeline has been fairly minimal in dealing with erosional control efforts and occasional recoating issues. Still, the life of the pipeline is diminishing and maintaining the pipeline would become more extensive and the impacts of continually maintaining this pipeline would potentially border on impairment of park resources. If it is determined by the NPS that pipeline maintenance is starting to impair park resources then the Williams Northwest Pipeline must be rerouted outside of Arches National Park.

CHAPTER 5- CONSULTATION AND COORDINATION

External Scoping

External (public) scoping was conducted to inform various agencies and the public and to generate input regarding the proposal to develop an environmental assessment/assessment of effect that would analyze the effects of issuing a SUP to perform pipeline maintenance within Arches National Park. This effort was initiated with the distribution of a scoping letter and brochure, which was sent to interested parties and adjacent landowners. In addition, the scoping brochure was posted on the PEPC website. The public was given 30 days to comment on the project beginning August 17, 2009.

In addition to the aforementioned public entities, the following agencies and Native American Tribes were sent scoping information or were contacted for information regarding the project:

Federal Agencies

U.S. Department of Interior – Fish and Wildlife Service
U.S. Department of Interior – Bureau of Land Management
Advisory Council on Historic Preservation
Intermountain Regional Office-National Park Service
Glen Canyon National Recreation Area
National Parks Conservation Association
US Geological Society

State Agencies

Utah Historical Society (office of the State Historic Preservation Officer)
Utah State Parks and Recreation
Utah Department of Natural Resources Division of Forestry, Fire & State Lands

Other Interested Parties

Williams Pipeline Company
Grand County Council
San Juan County Commission
San Juan County Economic Development
Trust Lands
US Senator, Utah, Bob Bennett
US Senator, Utah, Orrin Hatch
Congressman Jim Matheson
Bates Wilson Legacy Foundation
Grand Canyon Trust
The Nature Conservancy
Moab Area Chamber of Commerce
Red Rock Forests
City of Moab

Consulted Native American Tribes and Pueblos

Hopi Tribal Council
Jemez Pueblo
Jucarilla Apache Nation
Laguna Pueblo

Navajo Nation
Pueblo of Acoma
Pueblo of Cochiti
Pueblo of Isleta
Pueblo of Nambe
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of San Clara
Pueblo of San Ildefonso
Pueblo of Santo Domingo
Pueblo of Taos
Pueblo of Tesuque
Pueblo of Zuni
San Felipe Pueblo
San Juan Pueblo
Sandia Pueblo
Santa Ana Pueblo
Southern Ute Tribe
Ute Indian Tribe
Ute Mountain Tribe
Ysleta Del Sur Pueblo
Zia Pueblo

During the 30-day scoping period, two responses were received from the public through letters. Two Native American Tribes responded; the Pueblo of Laguna and the Hopi Tribe. No other federal or state agencies responded during the scoping period. The tribes that responded affirmed their affiliation with the project area and stated that they do not anticipate impacts to Native American sites or resources. They had no objection to the proposed project, and requested to be kept informed of the project's progress, including immediate notification if Native American materials are discovered during maintenance activities.

Internal Scoping

Internal scoping was conducted by an interdisciplinary team of professionals from Arches National Park National Park and the Southeast Utah Group. Interdisciplinary team members met in January 2009 and in July 2009 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. Over the course of the project, team members have conducted individual site visits to survey and evaluate the proposed maintenance on the pipeline. The results of the two meetings and subsequent meetings are documented in this EA/AEF.

Environmental Assessment/Assessment of Effect Review and List of Recipients

The EA/AEF would be released for public review in April 2010. To inform the public of the availability of the EA/AEF, the National Park Service would publish and distribute a letter or press release to various agencies, tribes, and members of the public on the park's mailing list, as well as place an ad in the local newspaper. Copies of the EA/AEF

would be provided to interested individuals, upon request. Copies of the document would also be available for review at the monument's visitor center and on the internet at <http://parkplanning.nps.gov/> under Arches National Park.

The EA/AEF is subject to a 30-day public comment period ending May 15, 2010. During this time the public is encouraged to post comments online at <http://parkplanning.nps.gov/arch> or mail their written comments to the National Park Service address provided at the beginning of this document. Following the close of the comment period, all public comments would be reviewed and analyzed, prior to the release of a decision document. The National Park Service would issue responses to substantive comments received during the public comment period, and would make appropriate changes to the EA/AEF, as needed.

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