

**ENVIRONMENTAL ASSESSMENT
DENBURY ONSHORE, LLC
PROPOSED HORIZONTAL DIRECTIONAL DRILL OF THE NATCHEZ TRACE PARKWAY
MADISON COUNTY, MISSISSIPPI**

NATIONAL PARK SERVICE
2680 Natchez Trace Parkway
Tupelo, Mississippi 38804

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1.0 PURPOSE AND NEED

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

The National Park Service (NPS) is reviewing a proposal by Denbury Onshore, LLC (Denbury) to install a 20-inch diameter pipeline using Horizontal Directional Drill technology under the Natchez Trace Parkway at Mile Post 117.1 in Madison County, Mississippi. Using this technology to install the pipeline, no direct impact to land surface resources within the park will result. The purpose of the proposed crossing is to allow for transport of liquid carbon dioxide (CO₂) produced from wells (Denbury Well 10-13) immediately south of the Parkway, to the north side of the Parkway for dehydration (water removal). After dehydration this CO₂ will be transported by other existing intrastate pipelines to crude oil fields in northwest, south, and southeast Mississippi and then injected into crude oil formations to enhance crude oil production from pressure depleted wells.

The CO₂ being produced is in a liquid state, which forms under pressures above 5.1 atmospheres (greater than five times normal atmospheric pressure). The presence of liquid CO₂ resources in this area of Mississippi is due to a prehistoric volcano beneath the earth's surface in Madison and Rankin Counties known as the Jackson Dome. This volcanic activity created the pressure necessary to capture and create the liquid CO₂ below the earth's surface in processes similar to the formation of natural gas and crude oil. Interested individuals can go to a map of CO₂ wells provided by the Mississippi Oil Journal on the internet at <http://www.mississippioiljournal.com/map/?x=-89.901123046875&y=32.41697290306575&z=11>

Denbury is the largest holder and producer of crude oil resources in the State of Mississippi. The oil fields in Mississippi were developed in the early 1920's. Since the time of first production, the natural pressure of the oil-bearing formation has depleted. Natural pressure production generally allows the recovery of 15 – 30% of the oil within the formation being produced. In the 1970's and 1980's other oil companies flooded these formations with saltwater, which generally recovers an additional 10 - 20%. The use of CO₂ flooding allows for the recovery of an additional 10 – 20% of the oil in the formation. The production, processing, and transmission of CO₂ from wells in the Jackson Dome formation to pressure depleted oil fields inside the state is resulting in a resurgence of new production with increased direct and indirect employment in the energy service sector.

Existing refined products demand by the consuming public exceeds oil production capability in the continental United States, making imports of foreign oil a necessity; however, any use of new technologies to recover greater amounts of crude oil from existing resources, the related employment,

and resulting increased tax revenues to the state and federal government are of direct benefit to the public.

The Natchez Trace Parkway is a National Scenic Byway managed by the U.S. Department of the Interior; National Park Service. This Environmental Assessment (EA) has been prepared to analyze the impacts of three potential alternatives for completing the proposed project: the preferred alternative, the no action alternative, and the alternate route alternative. The EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9), and the National Park Service Director's Order (DO)-12 (*Conservation Planning, Environmental Impact Analysis, and Decision Making*), and The National Historic Preservation Act of 1966 (as amended).

1.2 PURPOSE AND SIGNIFICANCE OF THE PARK

The Natchez Trace Parkway was established by Congress on May 18, 1938, and roughly follows the original Natchez Trace (Old Trace) for 444 miles between Nashville, Tennessee and Natchez, Mississippi. The parkway is closely associated with the Old Trace, but does not follow the route of the Old Trace exclusively. The parkway was constructed in sections over the course of 67 years, and on May 21, 2005, the Natchez Trace Parkway Completion Ceremony celebrated the opening of the final section of the parkway.

The primary purpose of the Natchez Trace Parkway is to memorialize the historical importance of the Old Trace with a useful and attractive parkway. The Old Trace developed from a series of primitive paths created by game animals, American Indians, European explorers, and American settlers. During the eras of French, British, and American settlement, traders floated agricultural products, livestock, coal, and other materials from the Ohio River Valley down the Mississippi River to ports in Natchez and New Orleans. After selling their goods and their boats, the traders hiked or rode home via the Old Trace. In 1800, the Old Trace was designed as a national post road for mail delivery. General Andrew Jackson used it to march troops from Nashville to the Battle of New Orleans to defeat the British during the War of 1812. Union and Confederate forces used the Old Trace during the Civil War. The advent of steamboat travel eventually ended substantial use of the Old Trace and over time it fell into disrepair, gradually becoming overgrown by forest. Many sections of the Old Trace were improved and assimilated into local road systems, but some stretches remain today as remote woodland pathways.

The parkway is designed principally for passenger car traffic, and its design and developments are planned for the benefit and enjoyment of recreational motorists. Its design includes a wide park-like

insulating zone to prevent unsightly roadside developments and to preserve scenic, recreational, natural, and historical features.

The parkway is one of America's 75 National Scenic Byways and 21 All-American Roads. It is unique among federal recreational motorways because it commemorates an earlier transportation route. The primary themes commemorated by the parkway are:

1. Indigenous American Populations
2. Westward Expansion of the British Colonies and the United States, 1763 – 1898
3. Transportation and American Expansion
4. The Civil War

1.2.1 Project Background and Scoping

Parkway Mile Post 117 is located in Madison County, Mississippi where the parkway commences to parallel the north shore of Ross Barnett Reservoir (Figure 1). South of the park boundary at this location, between the parkway and the reservoir, are lands owned by the Pearl River Valley Water Authority, managed by the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) as the *Pearl River Wildlife Management Area*. Denbury is the majority mineral holder for resources occurring underneath these lands and is developing two (2) CO₂ production wells within the boundaries of the management area (Figure 2). Within Madison County, Denbury has additional CO₂ production wells that occur north of the parkway. All of the CO₂ produced from these wells will flow to a common dehydration facility (the *Trace Dehydration Plant*).

Denbury proposes to install the new pipeline under the parkway using horizontal directional drill methodology. Horizontal directional drills (HDD) are a smaller version of the drilling rigs used to drill wells for liquid and gas resources mounted on a semi-trailer or crawler carriage. A pilot hole is drilled according to a set profile from an entry point to an exit point. The hole is then "reamed" to a larger diameter to accommodate the size of the pipe and the pipe is pulled through the created void to the other side of the drill. This technology is very sound and is now widely utilized as a means of pipeline installation for avoiding surface disturbances and passing significant or sensitive geophysical features.

At Mile Post 117.1 the parkway is approximately 470 feet (ft) in width. The entry and exit points of the HDD and all surface workspace required to perform the HDD will be located outside of the park's boundaries. The minimum drill length due to flexibility of the pipe is 700 ft providing no less than a 100 ft

buffer between the Parkway boundary and HDD entry and exit. The depth of crossing is a minimum depth of ten (10) ft below the ground surface. Figure 3 provides an engineered plan view and cross section of the parkway and intended HDD pathway.

Following these HDD plans, Denbury proposes that the action will have no direct impact to the surface characteristics of the parkway.

1.2.1.1 Scoping

Scoping is the effort to involve agencies, organizations, and the public in determining the issues to be addressed in the environmental document. Among other tasks, scoping determines important issues and eliminates issues determined not to be important; identifies other permits, surveys and consultations required with other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping is a process that seeks opinions and consultation from the interested public, affected parties, and any agency with interests or legal jurisdiction.

1.2.1.2 Internal Scoping

Parkway staff of various specialties has been consulted regarding the purpose and need and issues and impact topics appropriate for consideration for the proposal.

1.2.1.3 External Scoping

Denbury, on behalf of the NPS, informally consulted with the U.S. Fish and Wildlife Service (USFWS) about the project's potential to affect federally listed species, and with the MDWFP concerning the potential to affect state species of concern. The NPS consults with the Mississippi Department of Archives and History to ensure the requirements of Section 106 of the National Historic Preservation Act are properly addressed.

1.3 ISSUES

Issues and concerns affecting this proposal were identified through analysis of the proposed work in terms of potential direct and indirect impacts to the park's resources, including the viewscape and user experience. Concerns include potential impacts to:

- Natural Resources. The proposed project's potential to have direct or indirect impacts to the park's soils, vegetation, and wildlife;
- Visitor Experience. The proposed project's potential to directly or indirectly affect visitors' experience because of impacts to the parkway viewscape and road condition; and
- Parkway Operations. The proposed project's potential to directly or indirectly impact parkway staff commitments and maintenance operations.

The NPS manages park resources to maintain them in an unimpaired condition for future generations in accordance with NPS specific statutes, including the Organic Act of 1916 and the National Parks Omnibus Management Act of 1998; and general environmental laws such as the Clean Air Act, the Clean Water Act, the Endangered Species Act of 1973, the National Environmental Policy Act of 1969, as amended, and the National Historic Preservation Act of 1966.

1.4 IMPACT TOPICS

1.4.1 Derivation of Impact Topics

Specific impact topics were developed to focus the analysis and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on internal and external scoping, federal laws, regulations, and Executive Orders; 2006 *NPS Management Policies*; and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

1.4.2 Impact Topics Analyzed in Detail

1.4.2.1 Soils

The 2006 publication of *NPS Management Policies* requires protection of park resources, including soils, to protect parks' scenery, natural and historic objects, and the processes and conditions that sustain them. The National Environmental Policy Act of 1969 calls for an examination of impacts on all components of affected ecosystems. Because the proposed action would have an impact to subterranean soil parent materials, soil is an impact topic that is analyzed in further detail in this environmental assessment.

1.4.2.2 Vegetation

The 2006 publication *NPS Management Policies* requires protection of park resources, including vegetation, to protect parks' scenery, natural and historic objects, and the processes and conditions that sustain them. The National Environmental Policy Act of 1969 calls for an examination of impacts on all components of affected ecosystems. The proposed action will have no direct affect to vegetation resources; however, alternatives would have a direct affect; therefore, vegetation is an impact topic that is analyzed in further detail in this environmental assessment.

1.4.2.3 Wetlands

Executive Order 11990 (*Protection of Wetlands*) requires an examination of impacts to wetlands. The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. *NPS Management Policies* provides direction for the preservation, use, and quality of water in national parks. Director's Order 77-1 *Wetland Protection* establishes NPS policies, requirements, and standards for implementing Executive Order (E.O.) 11990: *Protection of Wetlands*.

No impact to surface resources of the parkway will result from the proposed action; therefore, no affect to resources meeting the criteria for wetlands inside the parkway would result; however, indirectly related activities associated with the pipeline crossing and project alternatives have differing impacts to wetlands; therefore, wetlands is an impact topic that is analyzed in further detail in this EA.

1.4.3 Impact Topics Dismissed from Further Analysis

1.4.3.1 Visitor Use and Experience

Providing for visitor enjoyment is one of the fundamental purposes of the NPS according to the Organic Act. The 1999 Natchez Trace Parkway *Statement for Management* and other park management documents reaffirm the importance and significance of recreational values and establish provisions for recreational uses by providing quality facilities for a more meaningful visitor experience.

Neither the proposed and preferred crossing installation, the no-action alternative, nor the alternative route have any potential to affect the visitor experience at the Natchez Trace Parkway due to the lack of direct impact to parkway resources. No direct or indirect impact to visitor use is anticipated due to the

visual screening of adjacent activities from natural vegetation buffers. Therefore, visitor experience is an impact topic that is not analyzed in further detail in this environmental assessment.

1.4.3.2 Safety

The proposed crossing is for placement of a pipeline utility in service to gather liquid CO₂. The proposed crossing would be a minimum depth of ten (10) ft beneath the land surface of the parkway. The pipeline would be 20-inches in diameter, have a wall thickness of 0.375 inches, and be made of carbon steel having a yield strength of 80,000 pounds per square inch (psi). The operational integrity of the pipeline would be tested by water pressurization at 3600 psi for 48 hours. The pipeline's operational pressure will be 1,800 psi.

Since the pipeline depth of cover will be a minimum of ten (10) ft below ground surface, the potential for accidental impact from any means within the parkway area is highly unlikely. Carbon dioxide in its liquid state is maintained by being under pressure or within a confined vessel or container. Released to the atmosphere, the liquid vaporizes into its gaseous state and disperses into the atmosphere. To be a safety concern, the CO₂ must equal or exceed five (5) percent concentration in the atmosphere. This concentration can only be achieved in a confined or enclosed area; therefore a leak by any means at the parkway crossing could not be a safety concern to users of the parkway or endemic wildlife. This gas is non-combustible and therefore does not pose a threat for explosion in the presence of an ignition source. In fact, CO₂ is a common content for fire extinguishers. For these reasons there does not appear to be a safety concern for users of the parkway; therefore this topic is not analyzed in further detail within the EA.

1.4.3.3 Parkway Operations

Activities associated with installation and operation of the pipeline crossing would not present a demand for staff supervision, nor pose an impediment to land use management after installation. Therefore, parkway operation is an impact topic that is not analyzed in further detail in this EA.

1.4.3.4 Wildlife

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities. According to *NPS Management Policies 2006*, the restoration of native species is a high

priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals.

No direct impact to parkway resources would result from the proposed action; therefore, wildlife, or use of parkway lands by wildlife, will not be affected. Related activities will have temporary impacts to wildlife by possibly disturbing and displacing them during the construction period, but no permanent impacts and no long-term displacement of wildlife will result from post-construction operations of the related facilities; therefore, wildlife will not be analyzed further in this EA.

1.4.3.5 Unique or Important Wildlife Habitat

The proposed crossing installation has no direct impact to habitats of unique quality within the parkway area. Habitat impacts resulting from the adjacent construction activities would affect planted pine silvicultural lands, mesic mixed forests, forested wetlands, scrub wetlands, and emergent wetlands. None of these habitats can be considered unique to the project area. Wetland impacts are discussed in the EA but as a habitat are not considered unique, scarce to the area, or of exceptional value for certain species. Therefore, unique or important wildlife habitat will not be analyzed in detail in this EA.

1.4.3.6 Threatened and Endangered Species

The Endangered Species Act of 1973, as amended, requires an examination of impacts on all federally listed threatened or endangered species. NPS policy requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species.

No direct impact to surface resources within the park boundary will result from the proposed pipeline crossing installation; thus no impact to federally listed or state species of concern would result from the action. Information provided by Denbury, as well as review and authorization of the related construction action by the U.S. Army Corps of Engineers, has concluded that no impact to federal or state species of concern would result from the related construction activities. Therefore, threatened and endangered species is not a topic analyzed in detail in this EA. Written concurrence of no affect to species of concern within the parkway area has been solicited from the USFWS and MDWFP. Copies of the agency communications and responses are included in Appendix A.

1.4.3.7 Paleontology and Geology

Most of Mississippi, including the Jackson area, was under water during the early geologic periods of the Earth and surface materials do not provide evidence of land development until the Cretaceous Period where evidence may be found in the northeast corner of the state. Central Mississippi, including the Jackson area, exhibits development during the Tertiary Period when it is believed that large rivers, swamps, and forests dominated the landscape.

This area of the parkway is with the North Central Hills physiographic belt underlain by Cockfield and Yazoo Formations altered by the Jackson Dome uplift that causes all formations to dip away from its crest at a general trend to the west and southwest. Topography is gently sloping to undulating. The Cockfield formation is Eocene in age and consists of silty clays, silty sands, and lignite. The Yazoo Formation is Eocene in age and consists of blue-green limy clay. Elevations vary from a high of 475 ft above mean sea level (msl) to 140 ft msl. Neither of these formations is considered geologically active.

The fossil record from the Tertiary period is very low and only 128 fossils have been collected across the state. Considering the paucity of the fossil record, the proposed project is unlikely to affect any paleontological resources. Since the project area is not geologically active, paleontology and geology will not be analyzed in detail in this EA.

1.4.3.8 Water Quality

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251 et seq.), is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. Section 401 of the Clean Water Act requires a permit for any activity which may result in any discharge into the navigable waters of the United States. Section 404 of the Clean Water Act requires a permit for any activity which may result in the discharge of dredged or fill material into navigable waters, including wetlands. *NPS 2006 Management Policies* provides direction for the preservation, use, and quality of water in national park units.

Since no direct impact to parkway resources would result from the proposed activity, and the off-park actions and those associated impacts are being analyzed in the wetlands analysis of the EA, water quality will not be analyzed in detail in this EA.

1.4.3.9 Floodplains

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. *NPS Management Policies*, Director's Order 77-2: *Floodplain Management*, and Directors' Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposals in floodplains. *NPS Management Policies* provide direction for the preservation, use, and quality of water in national parks.

The proposed crossing location is not within the floodplain and the associated construction activities and alternatives analyzed in this EA would not result in the placement of structures or changes of elevations within the open regulatory floodplain. Therefore, floodplain impact is an impact topic that is not analyzed in further detail in this EA.

1.4.3.10 Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out mandates of federal law with respect to American Indian and Alaska Native tribes. The lands comprising the parkway are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, Indian trust resources will not be analyzed in detail in this EA.

1.4.3.11 Prime or Unique Farmland

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, National Resources Conservation Service. Prime or unique farmland is defined as soil which particularly produces general crops such as common foods, forage, fiber, and oil seed. Unique farmland produces specialty crops such as fruits, vegetables, and nuts.

A review of the soils status for parkway lands, as well as lands crossed by the indirect actions associated with this project and the alternatives, on the U.S. Department of Agriculture "Web Soil Survey" (<http://websoilsurvey.nrcs.usda.gov/app/>) reveals that no soil series potentially affected by any action or alternative is listed as prime or unique; therefore, prime or unique farmland will not be analyzed in detail in this EA.

1.4.3.12 Environmental Justice

Executive Order 12898 (*General Actions to Address Environmental Justice in Minority Populations and Low Income Populations*) requires all agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities.

None of the direct or indirect related activities or alternatives have impacts to individual's residences or populations of individuals; therefore, impacts along the proposed trial segment would not have disproportionately high adverse health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's *Draft Environmental Justice Guidance* (July 1996). Therefore, environmental justice will not be analyzed in detail in this EA.

1.4.3.13 Soundscapes/Noise

In accordance with *NPS Management Policies 2006* and Director's Order – 47: *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. 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 NPS units, as well as potentially throughout each park unit, being generally greater in developed areas and less in underdeveloped areas.

A temporary impact to the soundscape of the parkway will occur at Mile Post 117 for the duration of the construction activities related to the HDD. This disturbance should not exceed two weeks in total extent. The parkway at this location is principally used by motor vehicle traffic, and as a result the individual duration of occupancy in the area is of such short extent that impact to visitor use and experience is negligible. Once the HDD is complete, and the equipment removed, the soundscape would be restored to the current ambience. The related activities and alternatives are of short duration as well and the potential affect to the parkway is attenuated by vegetation; therefore soundscapes and noise will not be analyzed in detail in this EA.

1.4.3.14 Air Quality

Air quality became a national concern in the mid-1960s, leading to the passage of the Air Quality Act in 1967. The Act (now referred to as the Clean Air Act) and subsequent amendments have established procedures for improving conditions, including a set of National Ambient Air Quality Standards. The U.S. Environmental Protection Agency is directed to set levels for pollutants in order to protect the public health. The National Ambient Air Quality Standards are adopted for six pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. A system of monitoring stations is established across the country to measure progress in meeting these goals. If an area is found to exceed the allowable levels, local officials are required to develop a plan for achieving air quality that meets the standards.

The proposed pipeline crossing installation and alternatives do not include the installation of any equipment that would require new source permitting by the Air Quality Division of the Mississippi Department of Environmental Quality; therefore Air Quality will not be analyzed in detail in this EA.

1.4.3.15 Socioeconomic Environment, including Land Use

The proposed crossing and related activities will not result in measurable land use changes in the surrounding community or the surrounding region. The proposed action and alternatives would provide a beneficial short-term impact to the local economies of nearby counties and other municipalities (e.g. minimal increases in employment opportunities for the construction work force and revenues for local businesses and government generated from construction activities and workers). Any increase would be beneficial region-wide and short-term in duration, lasting only as long as the construction period.

An internal zoning system (as described in the 1987 Natchez Trace Parkway *General Management Plan*) identifies land management requirements within the parkway. Parkway land management zoning is not related to zoning in the surrounding lands. No impact to parkway lands will result from the proposed crossing or alternatives; therefore, impacts on the socioeconomic environment, including land use, will not be analyzed in detail in this EA.

1.4.3.16 Cultural Resources

National Park Service policy and Section 106 of the National Historic Preservation Act requires that the effects of NPS actions on cultural resources be considered, and that appropriate steps be taken to avoid,

minimize, or mitigate these effects. The NPS distinguishes five types of cultural resources: archeological resources, historic structures, ethnographic resources, cultural landscapes, and museum collections.

No direct impact to the land surface and near surface resources of the parkway will result from the proposed crossing installation by HDD. Traditionally, State Historic Preservation Officer's (SHPO's) have considered this means of pipeline construction complete avoidance of any potential cultural resources. For the directly related portions of the project a Phase I Cultural Resources Assessment was completed and a finding of "no significant resources affected" has been issued by the Mississippi Department of Archives and History. Because the HDD avoids any potential intact resources, and the directly associated activities have been provided clearance by the state SHPO, cultural resources will not be analyzed in detail in this EA.

2.0 ALTERNATIVES CONSIDERED

2.1 INTRODUCTION

The alternatives chapter describes and analyzes alternative pathways for achieving a desired result. The three alternatives examined are the: Alternative Route, the No Action Alternative, and the Preferred Alternative.

The purpose of the no action alternative is to provide a basis for comparing the actions and environmental consequences of the action alternatives. In an implementation EA such as this one, the no action alternative is one that precludes any construction activities on or below parkway lands which may have resulting consequences outside the limits of NPS authority.

2.2 NO ACTION ALTERNATIVE (ALTERNATE ROUTE)

The “no action” alternative would cease any further commitment of Park Service staff to review and the potential processing of Denbury’s easement request and would result in no potential for any occurrence of near-term direct affects to parkway resources. A realistic alternative route to the proposed crossing of the parkway exists for Denbury by which the produced CO₂ could be transported by pipeline to a different dehydration plant. Since this route is feasible, logically it also becomes the result of implementing the “no action alternative” if the Park Service denies authorization to cross below the parkway and Denbury wishes to process their produced minerals; therefore the Park Service must consider the environmental impact consequences resulting from a “no action” decision.

The alternate pipeline route is approximately 4 miles in length extending south from Well 10-13 across Ross Barnett Reservoir to an existing Denbury dehydration facility near the community of Goshen Springs. Figure 4 provides a depiction of the proposed and alternate route. It is immediately apparent that water resource impacts would be significantly greater than those resulting from the comparative route that passes below the parkway. Some aspects of the alternate project that are not directly associated with the crossing of the parkway would remain the same and are precluded from our analysis. This is limited to the well pad for the CO₂ wells and access road to Well 10-13.

The following list of items presents a summary comparison of the two projects:

1. The project that includes the crossing of the Parkway is a portion of a pipeline project 1.7 miles in total length. The alternate route project is 3.9 miles in total length. The economic cost

associated with the alternate route would then be higher and those costs would be included in the total production costs passed on to the consumer public.

2. The proposed route includes laying the pipeline in the shoulder of a gravel road to avoid wetland impacts for a distance of 4,180 ft. The alternate route can follow this same means of avoidance for 3,520 ft but cannot avoid wetland impacts for the entire length to reach Ross Barnett Reservoir and would impact 2,240 linear ft of forested and scrub/shrub wetlands before reaching the north shoreline of the lake.
3. The alternate route would include the necessity of two (2) 150 ft by 200 ft (0.68 acres each) workspaces for the crossing of Mississippi State Highway 43. The north workspace would occur in an area of forested/scrub wetland. The south workspace would occur in an inundated portion of the reservoir vegetated by rooted emergent and floating leaved aquatic vegetation. The south workspace would be used to connect the lake crossing portion of the pipeline. The proposed project that includes the crossing of the parkway has no similar need for workspaces in wetlands.
4. The alternate route would require a crossing of the reservoir approximately 1.6 miles in distance. The proposed project including the parkway crossing does not have this need.
5. The pipeline lay across the lake would likely be done by the “push-float” construction technique since pipeline lay barges cannot be brought up river past the dam. This would require a 150 ft x 500 ft workspace on the south shoreline affecting emergent and forested wetlands at this location. The proposed route and crossing of the parkway does not have this need for workspace in wetlands.

Based upon this summary analysis it can be concluded that the alternate route would have direct affects to water quality, wetlands, and a higher potential to directly affect public users of Ross Barnett Reservoir and Highway 43 which does not exist, or would not occur, if the easement request for passing under the parkway is allowed.

2.3 ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with DO-12, the NPS is required to identify the “environmentally preferred alternative” in all environmental documents, including EAs. The environmentally preferred alternative is determined by applying the criteria identified in Section 101 of NEPA, which includes:

- Fulfilling the responsibilities of each generation as a trustee of the environment for succeeding generations;
- Assuring for all generations safe, healthful, productive, aesthetic, and culturally pleasing surroundings;
- Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable or unintended consequences;

- Preserving important historic, cultural, and natural aspects of our national heritage and maintaining wherever possible an environment that supports diversity and variety of individual choice;
- Achieving a balance between populations and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources.

The "Alternate Route" alternative or "No Action" alternative is not the environmentally preferred alternative for several reasons:

1. There is no environmental benefit associated with the greater cost of constructing a longer pipeline to achieve the same result;
2. Impacts to wetlands, which are regulated resources, would be greater, and implementing mitigation measures would still result in wetland impacts greater than those impacts resulting from the proposed route;
3. The cumulative effects of the alternate route greatly exceed those impacts of the proposed route; and
4. The crossing of the parkway will have no affect to surface resources or visitor use and experience.

Based upon the analysis of effects to environmental resources resulting from the proposed project and alternates it is reasonable to conclude that the proposed project is the Environmentally Preferred Alternative.

2.4 ALTERNATIVE CONSIDERED BUT DISMISSED

No other alternative to the proposed or alternate projects discussed above exists to be considered and dismissed. The "no build" alternative could be considered, but the staff of the NPS has no jurisdiction over activities undertaken outside the parkway lands to the extent that the use of the CO₂ wells and need for the gathering pipeline would not exist.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 SOILS

The HDD underneath the parkway would impact subsurface soils (\geq 10 ft below surface) in a cylindrical pathway following the pathway of the drill bit and drill pipe for its entire length of crossing. The soil survey for Madison County prepared by the Natural Resource Conservation Service (formerly known as the Soil Conservation Service) does not provide an analysis of the soils to this depth to include in this discussion. Based upon an off site analysis of surface soils at equal elevation, it is likely the subsurface soils (parent materials to the surface) are a loam or silt loam in texture and composition.

3.2 INTENSITY

The impact to the soils from implementation of the HDD would be the direct transport loss of cut materials and loss of soil porosity by blockage for a two (2) to four (4) inch extent surrounding the drill pathway affecting an area approximately 20-inches in diameter for the entire distance under parkway lands (470 ft). During the HDD a pump mixes water with bentonite clay forming a slick “mud” that is pumped through the hollow core of the drilling pipe and out discharge ports in the drill bit. The drill bit cuts or “drills” a hole into the soil profile. The drilling mud cools the drill bit and transports the cut materials out the annulus of the drill path to be captured in the mud circulation stream and recycled back to the drilling head as part of the cutting fluid discharge.

Saturation and blockage of the surrounding soil porosity occurs from the discharge of the drilling mud at the drill head under pressure. Typically the mud is pumped at pressures between 30 – 60 psi to ensure that the pathway is cleaned of cut materials and flow back to the drill entry point is maintained. A small portion of the drilling mud saturates the soil profile surrounding the drill path resulting in loss of porosity.

The bentonite clay used in the process is a natural material mined and processed for this use and is chemically inert and non-toxic.

3.3 DURATION

Short-term – An impact that attenuates in less than one year.

Long-term – An impact that lasts greater than one year.

3.4 CUMULATIVE EFFECTS

Although the proposed crossing placement would have long-term impact, a long cylindrical soil mass at ten (10) ft below the soil surface, evidence provided by numerous installations of this type and extent do not indicate any resulting change to the apparent surface soil aspects and functions. The bentonite clay lattices will not migrate through soil pores or flocculate into a mass that would form a blockage to groundwater movement through the profile.

3.5 CONCLUSION

No short or long-term impact or impairment to surface or near surface soils of the parkway at the crossing location will result from the proposed project. No impact to groundwater resources would result from the drilling or pipeline placement. The proposed activity would have no adverse impact to parkway visitor use or experience.

3.6 VEGETATION

No direct impact to vegetation resources of the parkway will result from the proposed HDD crossing. Habitat at the crossing location is mesic mixed woods where the principal canopy species are loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), southern red oak (*Q. falcata*), American elm (*Ulmus americana*), and willow oak (*Q. phellos*); with a shrub layer having five (5) percent stem density composed of juvenile specimens of the canopy species and a variable herbaceous layer dominated by longleaf woodoats (*Chasmanthium sessiliflorum*).

Lands to the north of the parkway are private property typified by pine silvicultural lands, rural residences, and pasturage. The lands south of the parkway are owned by the Pearl River Valley Water Authority, managed by the MDWFP as a public hunting area, and these lands and their habitats are manipulated by the Water Authority and wildlife biologists to promote diversity and increase functional values for wildlife.

3.7 INTENSITY

No clearing of vegetation within or immediately adjacent to the parkway would occur in the proposed action, resulting in no impact to exhibited vegetation characteristics or the aesthetic quality of these habitats to users of the parkway.

3.8 DURATION

Since there are no changes in the vegetation complex there are no short-term or long-term impacts to be analyzed.

3.9 CUMULATIVE EFFECTS & CONCLUSION

There is no cumulative impact to habitats within or immediately adjacent to the parkway planned for or resulting from the proposed crossing that would be considered out of normal character for private lands adjacent to the parkway. No aspects of this project or its related components will be visually apparent to parkway users, therefore no impairment of visitor use or experience will result from the proposed project.

3.10 WETLANDS

There are no habitats within the Parkway area at Mile Post 117 that meet the mandatory criteria for soil, hydrology, and vegetation to be determined as wetlands. As discussed in the Alternatives analysis section, related portions of the proposed project and alternatives have wetland impacts resulting from construction and the difference in wetland impacts between the proposed and alternate routes should be reviewed and considered in the NPS decision to allow or deny the pipeline crossing.

A total of 4.39 acres of forested wetlands will be impacted by the well pad, access, and flow line project components of the proposed project. Use of either the proposed or alternate route will not change those aspects of the project, so these associated impacts are dropped from this analysis leaving only remaining portions of the pipeline route impacts for discussion and analysis.

The proposed project that includes the pipeline crossing of the parkway avoids impacts to wetlands of any type by laying within the shoulder of a gravel road for the portion of this route where wetlands occur; therefore, no (zero) wetland impacts are associated with proposed pipeline route.

The no action or alternate route would have 5.01 acres of wetland impacts which includes 3.33 acres of impact to forested wetlands, a 0.68 acre impact to shrub/scrub wetlands, and a 1.0 acre impact to emergent wetlands.

3.11 INTENSITY

The impact to wetlands resulting from pipeline construction is a change in wetland functional values resulting from either a permanent or temporal conversion of habitats. Forested and shrub/scrub wetlands are cleared during construction, but post-construction, usually within one growing season, the vegetation restores naturally as emergent wetland. Except for the portion of the easement maintained in an herbaceous or emergent vegetation state, the remaining space used for construction is allowed to restore to shrub/scrub and then forested habitat through natural succession.

3.12 DURATION

Short-term – effects to vegetation lasting less than one growing season.

Long-term – effects to vegetation lasting longer than one growing season or resulting in a permanent conversion of habitat to another type.

3.13 MITIGATION OF EFFECTS

To compensate for the permanent loss of wetlands from development of the well pad and access road, and the functional value losses from the pipeline easement, Denbury will mitigate for the project impacts by performing 3.0 acres of hardwood restoration on the drill pad after well completion, achieving 1.5 acres of wetland restoration and 22.3 acres of forested wetland restoration activities at the Pearl River Wildlife Management Area (PRWMA) in Waterfowl Impoundment No. 3 (Figure 1), located 0.25 miles southwest of the well pad location, for a sum of 23.8 acres of wetland restoration.

Waterfowl Impoundment No. 3 was harvested by the landowner three (3) years ago. Natural regeneration by seed germination and copious growth has been unsuccessful and the land operator (MDWFP) is seeking to restore these lands for wetland functional value restoration in association with their wildlife and waterfowl management objectives for these lands as a portion of the PRWMA.

Planting will occur in February of 2008 using Denbury contractors supervised by MDWFP staff. The MDWFP personnel have requested that 11.5 acres of the impoundment be planted with their “Enhanced” oak (*Quercus* spp.) seedlings at a density of 200 saplings per acre on a 15 ft X 15 ft grid. An additional 11.5 acres in the impoundment and the 3.0 acres at the restored drilling pad will be planted at the same density and spacing interval as stated above with nursery seedlings of the same oak species.

After initial planting Denbury will continue to assist in seedling survival by providing help with the control of competitive plants during establishment.

3.14 CUMULATIVE EFFECTS

An analysis of the cumulative impacts to wetlands between the proposed route and alternate route results in a determination that intensive short-term and moderate long-term adverse impacts are associated with construction of the “no action” or alternate pipeline route, and no adverse impacts would result from the proposed route. As presented in the *Mitigation* section above, additional compensatory mitigation may be feasibly designed to offset the additional wetland functional losses; however, these would be in addition to the proposed mitigation and increase the overall project impacts to the environment.

3.15 CONCLUSION

The alternate route would have major adverse impacts to wetlands due to the short-term and long-term conversion of forested and scrub/shrub habitats. The proposed route would have no wetland impacts in comparison, and there is no resulting impact to parkway resources or visitor use and experience.

4.0 CONSULTATION AND COORDINATION

Organizations and agencies contacted for information, assisting in identifying important issues, or analyzing impacts include:

4.1 FEDERAL AGENCIES

U.S. Department of the Interior – Fish and Wildlife Service

4.2 MISSISSIPPI STATE AGENCIES

Mississippi Department of Wildlife, Fisheries, and Parks

Mississippi Department of Archives and History

5.0 BIBLIOGRAPHY

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ILLUSTRATIONS

APPENDIX A
AGENCY COMMUNICATIONS