

National Park Service  
U.S. Department of the Interior

Big Thicket National Preserve  
Texas



# Environmental Assessment

Fort Apache Energy, Inc.  
Proposal to Directionally Drill and Produce:

The Baptist Foundation No. 1 and Nordin No. 1 Wells from Two  
Locations Outside the Turkey Creek Unit  
in Tyler County, Texas

Big Thicket National Preserve,  
Tyler County, Texas

September 2013

In 1916, Congress created the National Park Service in the Department of the Interior to:

...promote and regulate the use of the Federal areas known as national parks, monuments, and reservations...by such means and measures as to conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (NPS Organic Act, 16 U.S.C. § 1).

Prepared by  
United States Department of the Interior □ National Park Service

## Environmental Assessment

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from Two Locations Outside the Turkey Creek Unit  
Big Thicket National Preserve  
Tyler County, Texas**

**Summary:** In accordance with National Park Service (NPS) regulations for nonfederal oil and gas rights, Fort Apache Energy, Inc., (Fort Apache) submitted application to the NPS to directionally drill and produce two wellbores from two surface locations outside the Turkey Creek Unit of the Big Thicket National Preserve (BTNP) to reach bottom hole targets of 8,700 feet each beneath the Turkey Creek Unit. These wells would be named the “Fort Apache Energy, Inc., Baptist Foundation No. 1 and Nordin No. 1 Wells” (Baptist Foundation #1 and Nordin #1). Any discussion, analysis, or determination of effects / impacts in this Environmental Assessment (EA) for the Baptist Foundation #1 and Nordin #1 would be the same for any possible future, additional wellbores drilled for from the same well pads. However, no additional wells are anticipated at this time. The proposed Baptist Foundation #1 northern edge of the well pad would be located 80 feet from, and generally parallel to, the Unit boundary, and the wellbore coordinate would be located 200 feet from the Unit boundary at the nearest point. The proposed Nordin #1 western edge of the well pad would be located adjacent to, and generally parallel to, the Unit boundary, and the wellbore coordinate would be located 135 feet from the Unit boundary at the nearest point. All infrastructure and access for these wells and surface locations would be located entirely on private property with no use of BTNP surface.

This EA evaluates two alternatives. Alternative A, No Action, evaluates baseline conditions in which the wells would not be drilled; therefore, there would be no new impacts on the environment. Alternative B, Proposed Action, evaluates the proposal to directionally drill and produce two wells from separate surface locations. By directionally drilling from outside the Unit and applying other mitigation measures, operators would substantially reduce impacts on Unit resources and values. Therefore, the NPS dismissed several topics from detailed analysis, and the EA provides the reasoning that supports this dismissal. Issues that were retained for more detailed analysis included the impact of elevated noise on the natural soundscape; impacts to lightscape/night sky; impacts to air quality; impacts to wildlife; and impacts on certain resources and uses on adjacent lands, where impacts could potentially exceed minor levels. For both sites, these topics included geology and soils and vegetation. Due to the proximity to the Preserve boundary and the particular environmental conditions at the

proposed well sites, the NPS also reviewed water resources/floodplains/wetlands for the wells.

Through the analyses, the NPS concluded that the intensity of adverse impacts would range from negligible to moderate. No major adverse impacts were identified; and no impairment of NPS resources or values would occur as a result of the proposed action. The duration of some impacts would be short-term, lasting from several days to 3 years (during construction and drilling); while other impacts would be long-term, extending beyond 3 years, depending on how long the wells are produced. Most impacts would primarily be localized around point sources, while some impacts could extend into the Unit and surrounding lands outside the Unit.

**Public Comment:** If you wish to comment on this EA, you may post comments online at <http://parkplanning.nps.gov/bith>, or mail or hand-deliver comments to the address below. Comments must be entered into the web-based system or postmarked by October 21, 2013 to be accepted. 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. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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## 1.0 PURPOSE OF AND NEED FOR ACTION

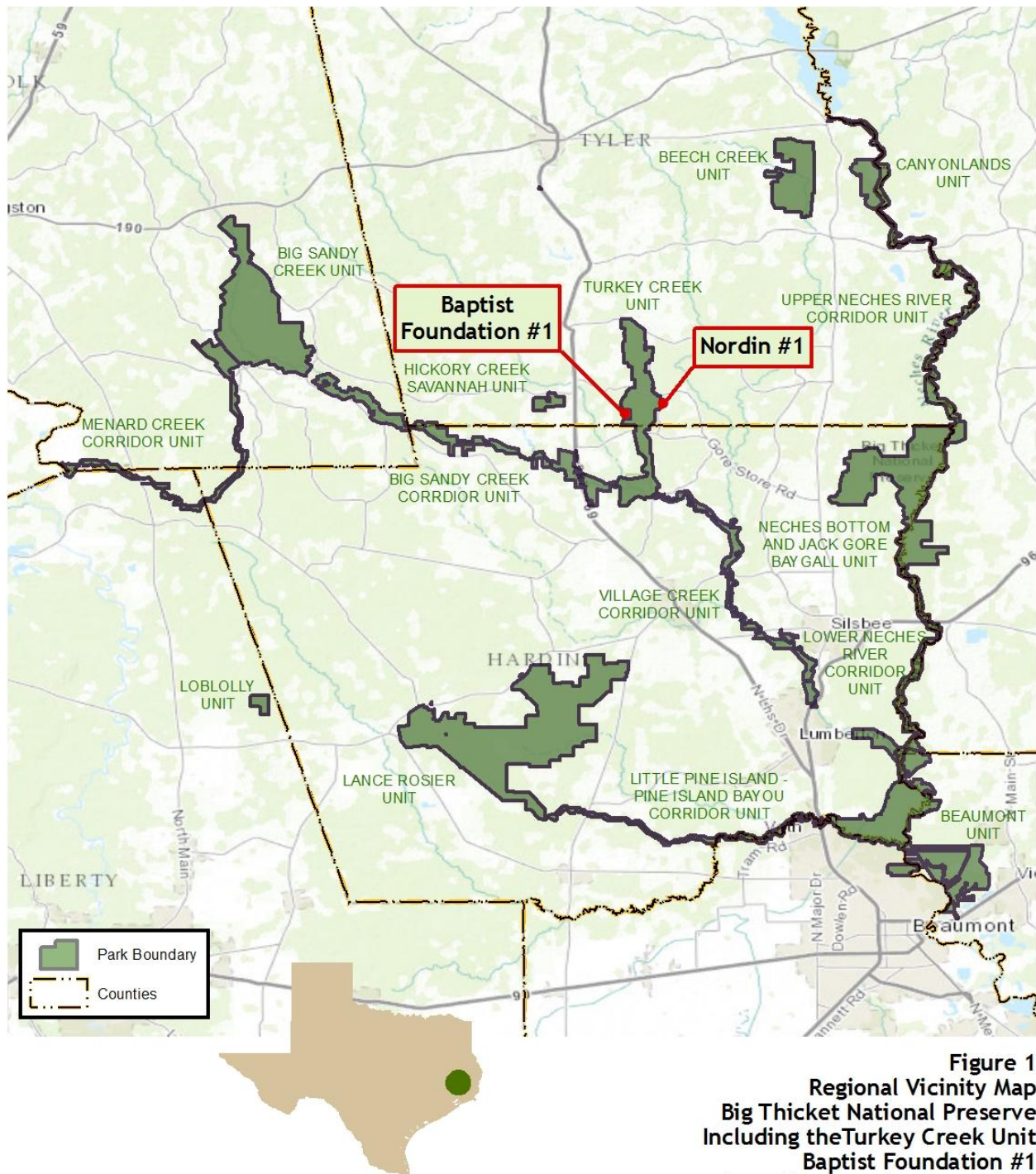
This EA has been prepared to comply with the National Environmental Policy Act (NEPA) to provide a decision-making framework, and to determine whether an Environmental Impact Statement (EIS) should be prepared regarding the Fort Apache Energy, Inc. (Fort Apache) submitted application to the National Park Service (NPS) to directionally drill the Baptist Foundation No.1 and Nordin No. 1 (referred to from here forward simply as the Baptist Foundation #1 and Nordin #1) from two surface locations outside the Turkey Creek Unit of Big Thicket National Preserve (Preserve) to reach a bottom hole target beneath the unit. This EA evaluates the environmental impacts of two alternatives: the No Action Alternative, or baseline alternative, and proposal by Fort Apache to directionally drill and produce these wells from two private surface locations outside the Turkey Creek Unit of the Preserve to reach a bottom hole target beneath the Turkey Creek Unit.

One of the purposes of this analysis is to determine whether the Fort Apache directional wells would qualify for an exemption from the NPS's nonfederal oil and gas rights regulations found at 36 CFR 9B. Specifically, § 9.32(e) governs operators that propose to develop nonfederal oil and gas rights in any unit of the National Park System by directionally drilling two wells from surface locations outside unit boundaries to a location under federally-owned or controlled lands within park boundaries. Per § 9.32(e), an operator may obtain an exemption from the 9B regulations if the Regional Director is able to determine from available data that a proposed drilling operation under the park poses "no significant threat of damage to park resources, both surface and subsurface, resulting from surface subsidence, fracture of geological formations with resultant fresh water aquifer [sic] contamination or natural gas escape or the like." This EA also serves the purpose of disclosing to the public the potential impacts on the human environment, both inside and outside the Unit.

When Congress authorized the establishment of Big Thicket National Preserve on October 11, 1974, the U.S. Government acquired surface ownership of the area. Private entities retained the subsurface mineral interests on most of these lands, while the State of Texas retained the subsurface mineral interests underlying the Neches River and navigable reaches of Pine Island Bayou. Thus, the Federal Government does not own any of the subsurface oil and gas rights in the Preserve. To protect the Preserve from oil and gas operations that may adversely impact or impair Preserve resources and values, the NPS regulates those operations in accordance with NPS laws, policies and regulations. The NPS recognizes that the applicants possess private property rights to nonfederal oil and gas in the Preserve. Such rights are accorded protection under the 5<sup>th</sup> Amendment of the U.S. Constitution, which states "... no person shall be deprived of property without due process of law; nor shall private property be taken for public use without just compensation." Figure 1 is a regional/vicinity map depicting the proposed project locations.

The area of analysis for evaluating impacts of the proposed actions in this EA will vary depending on the impact topic. These analysis areas are described for each topic in Section 3. The area of analysis for cumulative impacts includes the Unit of the Preserve and the area contiguous to the Unit (approximately one-half mile beyond Preserve boundaries).

Figure 1. Regional Vicinity Map



**Figure 1**  
**Regional Vicinity Map**  
**Big Thicket National Preserve**  
**Including the Turkey Creek Unit**  
**Baptist Foundation #1**  
**And Nordin #1 Project Locations**  
**Hardin, Jasper, Jefferson, Liberty, Orange,**  
**Polk, and Tyler Counties, Texas**

## 1.1 Objectives of Taking Action

The objectives of taking action are to:

- Avoid or minimize impacts on Unit resources and values, visitor use and experience, and human health and safety.
- Prevent impairment of the Unit's resources and values.
- Provide Fort Apache, as the lessee of nonfederal oil and gas mineral interests, access to explore for and develop oil and gas resources in a manner which will assure the natural and ecological integrity of the Preserve.

## 1.2 Special Mandates and Direction

The NPS evaluates project-specific proposals for directionally drilling and producing wells from surface locations outside the Preserve to reach bottom hole targets beneath the Preserve on a case-by-case basis prior to deciding whether to issue an exemption in accordance with § 9.32(e). The following discussion is a summary of the basic management direction the NPS follows for issuing such an exemption.

### 1.2.1 Big Thicket National Preserve Enabling Act

Congress established the Preserve with the Act of October 11, 1974, Pub. L. No. 93-439, 88 Stat. 1254, codified as amended at 16 U.S.C. §§ 698-698e (2000), as the nation's first preserve, "[i]n order to assure the preservation, conservation, and protection of the natural, scenic, and recreational values of a significant portion of the Big Thicket area in the State of Texas and to provide for the enhancement and public enjoyment thereof." The authorizing legislation directs the Secretary of the Interior to administer the lands within the Preserve "in a manner which will assure their natural and ecological integrity in perpetuity." The Preserve comprises 15 separate Units, totaling approximately 112,000 acres. After the Preserve's establishment, the United States began acquiring lands within the Preserve's authorized boundaries. However, private entities retained ownership of the mineral estate underlying their lands, and the State of Texas retained ownership of the mineral estate underlying the Neches River and navigable reaches of Pine Island Bayou. Although the United States does not own any of the mineral estate underlying the Preserve, Congress charged the NPS with protecting the Preserve from oil and gas operations that may adversely impact the Preserve's resources and values. The statute states:

In the interest of maintaining the ecological integrity of the preserve, the Secretary [of the Interior] shall ... promulgate and publish such rules and regulations in the *Federal Register* as he deems necessary and appropriate to limit and control the use of, and activities on, Federal lands and waters with respect to ... exploration for, and extraction of, oil, gas, and other minerals ... 16 U.S.C. § 698c(b)

The establishment of Big Thicket as a national preserve created a new National Park System category, which meets different criteria than other parks and recreation areas within the System. These criteria were set forth in the House of Representatives committee report (House

Committee Report No. 93-676 pertaining to the establishment of Big Thicket National Preserve and Big Cypress National Preserve, approved on the same date), as follows:

In the past, the Congress has authorized and established many areas for inclusion in the National Park System: national parks, national monuments, national recreation areas, national historic sites, and others. A systematic effort has been made to establish standards or criteria for each of these different categories in an effort to maintain the integrity of the values which each attempts to serve. The description of the [Big Thicket] area as a national preserve will establish a new category which can serve as a feasible and desirable vehicle for the consideration of other nationally significant natural areas which differ from the qualities attributed to national parks and national recreation areas. The committee chose to call the area a preserve rather than a reserve, feeling that such distinction may be important.

Reserve refers to stock – a commodity held for future use. Preserve refers more definitively to the keeping or safeguarding of something basically protected and perpetuated for an intended or stated purpose, as with the specific objectives for [Big Thicket] provided by this legislation. In general, national preserves will be areas of land and/or water which may vary in size, but which possess within their boundaries exceptional values or qualities illustrating the natural heritage of the Nation. Such areas would often be characterized by significant scientific values, including, but not limited to, ecological communities illustrating the process of succession, natural phenomena, or climax communities. In addition they could be characterized by a habitat supporting a vanishing, rare or restricted species; a relict flora or fauna persisting from an earlier period; or large concentrations of wildlife species. Other scientific, geologic, geomorphic or topographic values might also contribute to the purposes for which an area might be recognized.

The principal purpose of these areas should be the preservation of the natural values which they contain. They might differ, in some respects, from national parks and monuments insofar as administrative policies are concerned. Hunting, for example, subject to reasonable regulation by the Secretary, could be permitted to the extent compatible with the purposes for which the area is established. Other activities, including the extraction of minerals, oil, and gas could be permitted if such activities could be conducted without jeopardizing the natural values for which the area seeks to preserve. Management of the watershed resources might also be appropriate if that would enhance the value of the preserve as it serves other needs.

All management activities within these areas should be directed toward maintaining the natural and scientific values of the area, including the preservation of the flora and fauna and the reestablishment of the indigenous plant and animal life, if possible. Areas where scientific discoveries or historical events took place would contribute to the values of the preserve and should be managed in a manner which will maximize both the natural and historical values.

National preserves may accommodate significant recreational uses without impairing the natural values, but such public use and enjoyment would be limited to activities where, or periods when, such human visitation would not interfere with or disrupt the values which the area is created to preserve. Construction of physical facilities of any kind

would be minimized and would be limited to those developments which are essential to the preservation and management of the area and the safety of the public. To the extent such facilities are deemed necessary and appropriate; they would be constructed in a manner which would minimize their impact on the environment and their intrusion on the natural setting.

Given the park's enabling statute, oil and gas exploration and development activities at the Preserve is an activity clearly contemplated by Congress and addressed in both statute and NPS regulations, and are not unusual or unexpected occurrences. Mineral exploration and development is addressed in the Preserve's *General Management Plan* (1980), and *Oil and Gas Management Plan* (2006).

### **1.2.2 NPS Nonfederal Oil and Gas Regulations, 36 CFR 9B**

The authority to manage and protect Federal property arises from the Property Clause of the United States Constitution. The Property Clause provides that "Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States . . ." U.S. Const. Art. IV, § 3, cl. 2.

In 1916, Congress exercised its power under the Property Clause and passed the NPS Organic Act, 16 U.S.C. § 1 *et seq.* Section 3 of the Organic Act authorizes the Secretary of the Interior to "make and publish such rules and regulations as he may deem necessary or proper for the use of the parks..." 16 U.S.C. § 3.

Pursuant to § 3 of the NPS Organic Act and individual park statutes, including that of Big Thicket National Preserve, the Secretary of the Interior promulgated regulations at 36 CFR Part 9, Subpart B ("9B regulations") in 1979. The 9B regulations apply to operations that require access on or through federally-owned or controlled lands or waters in connection with non-federally owned oil and gas in all National Park System Unit (36 CFR § 9.30(a)). The Service's jurisdiction under these regulations does not extend to any activities occurring outside park boundaries, even if such activities are associated with a nonfederal oil and gas operation occurring inside a park.

The NPS Nonfederal Oil and Gas Rights Regulations (36 CFR 9B) and other regulatory requirements assist park managers in managing oil and gas activities so they may be conducted in a manner consistent with the NPS mandate to protect park resources and values. In implementing these regulations, the NPS must determine whether proposed operations meet the 36 CFR 9B approval standards and whether the operations have the potential to impair park resources and values.

Section 9.32(e) of the regulations governs operators that propose to develop their nonfederal oil and gas rights in a park by directionally drilling up to 5 wells from a surface location outside unit boundaries to a location under federally-owned or controlled lands or waters within park boundaries. It is limited in scope to those aspects of the directional drilling operation occurring within park boundaries.

Per § 9.32(e), an operator may obtain an exemption from the 9B regulations if a Regional Director is able to determine from available data that a proposed drilling operation under the park poses "no significant threat of damage to park resources, both surface and subsurface,



resulting from surface subsidence, fracture of geological formations with resultant fresh water aquifer [sic] contamination or natural gas escape or the like." The regulations define operations as "all functions, work and activities within a unit in connection with exploration for and development of oil and gas resources, the right to which is not owned by the United States..."(36 CFR § 9.31(c), underlining added). The potential impacts considered in the §9.32(e) exemption process relate only to effects on park resources from downhole activities occurring within the boundary of the park, not threats to park resources associated with the operation outside park boundaries.

Under the regulations, the NPS may determine that: 1) an operator qualifies for an exemption from the regulations with no needed mitigation to protect park resources from activities occurring within park boundaries; 2) an operator qualifies for an exemption from the regulations with needed mitigation to protect subsurface park resources from activities occurring within park boundaries; or 3) an operator must submit a proposed plan of operations and a bond to the NPS for approval. Each one of these legally permissible options is briefly described below.

1. Exemption with No Mitigation (*no approval or permit issued*): The NPS determines that the proposed operation inside the park qualifies for an exemption under § 9.32(e) without any mitigation or conditions required by the NPS on the downhole activities. This option will arise when there is no potential for surface or subsurface impacts in the park from the downhole activities (e.g., the wellbore does not intercept an aquifer within the park). Under this option, the NPS is not granting an approval or issuing a permit.
2. Exemption with Mitigation (*no approval or permit issued*): The NPS determines that the proposed operation inside the park qualifies for an exemption under § 9.32(e) if there is no potential for surface impacts to park resources from downhole operations in the park and the operator adopts mitigation measures or conditions that reduce potential impacts on subsurface resources (e.g., an aquifer) to "no measurable effect." As in option #1 above, the NPS is not granting an approval or issuing a permit.
3. Plan of Operations (approval and "permit" issued): This regulatory option would apply if the NPS determines that it cannot make the requisite finding for a § 9.32(e) exemption because (1) impacts to surface resources from the downhole operations are involved, or (2) impacts to subsurface resources cannot be adequately mitigated to yield "no measurable effect." This option would also apply if an operator does not apply for an exemption and the NPS does not consider granting an exemption on its own initiative. In these cases, a prospective operator must submit and obtain NPS approval of a proposed plan of operations and file a bond before commencing directional drilling activities inside a park. The required plan and bond will be limited in scope to those aspects of the directional drilling operation that occur within park boundaries. As a result, many of the general plan information requirements set forth under § 9.36 would not apply. Mitigation measures and/or conditions of approval would be integral to this option. Such mitigation could encompass the protection of cultural resources, cave/karst resources, aquifers, floodplains, wetlands and other surface resources from operations occurring inside the park. Under this option, an operator must have the NPS's approval of a proposed plan before commencing any



activity in the boundaries of the park. The approved plan constitutes the operator's "permit."

The proposed directional wells (from two surface locations) would qualify for an Exemption with No Mitigation (Option 1), because no surface access in the Unit would be needed for any phase of drilling, production, transportation, or reclamation activities; and the wellbore would be drilled to cross into the Unit at substantial depth so as to not cross usable quality groundwater. The NPS identified no resource occurring on the surface of the Preserve that could be affected by the wellbore crossing into the plane of the Preserve at substantial depth to extract hydrocarbons and other associated liquids from beneath the Preserve. There is no threat to park resources or values regardless of what methods and materials Fort Apache uses to drill, case, cement, or plug and abandon the sections of the hole inside the Unit. Likewise, if the wells are produced, any method of completion, stimulation, or injection that occurs inside the Unit within the borehole would not pose a substantial threat of damage to Unit resources and values.

### **1.2.3 Protecting Park Resources from External Activities**

The NPS may seek compensation under 16 U.S.C. § 1911 and other appropriate statutes, if any activities outside park boundaries, including oil and gas operations, damage park resources.

### **1.2.4 NPS Monitoring of Nonfederal Oil and Gas Operations**

The NPS ability to monitor and inspect directional drilling operations is limited to downhole operations within the park (e.g., setting and cementing surface casing and plugging operations, etc.). As a practical matter, monitoring of downhole activities inside the park can only be accomplished from the surface location outside the park. As a result, the NPS may need to access the surface location and should make such access a condition of an exemption under option 2 or a condition of approval under option 3. The NPS must coordinate the timing of such access with the operator. For directional drilling operations sited outside a park, the 9B regulations provide no authority to require an operator to grant the NPS access for the purpose of observing compliance with terms unrelated to the downhole activities inside the park. When the NPS has made an upfront determination that a directional drilling operation is exempt without conditions from the regulations because of the lack of impacts, there is no 9B regulatory reason to access the surface location outside the park (option 1).

Where a State or Federal agency, other than the NPS, has applied mitigation measures via their respective environmental compliance or permitting processes, that agency, not the NPS, has sole responsibility for monitoring and enforcing its mitigation measures. In the event the NPS becomes aware of a compliance concern related to another agency's jurisdiction, the NPS should alert that agency in a constructive manner.

### **1.2.5 National Environmental Policy Act of 1969 (NEPA)**

The National Environmental Policy Act (NEPA) applies to major Federal actions. NEPA requires agencies to take a "hard look" at the environmental consequences of their proposed actions (Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989)). A legally adequate NEPA document (EA or EIS) must consider the direct, indirect, and cumulative

impacts (effects) of the proposed action on the environment, along with connected, cumulative and similar actions (40 C.F.R. § 1508.25; DO-12 Handbook, Chapter 2, § 2.4).

The requirements of NEPA are triggered by *Federal* actions (projects, activities, or programs funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; those requiring a federal permit, license, or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a federal agency). The NEPA process must be completed before a decision can be made to proceed with the proposal.

While it can be argued that NEPA is not triggered under options #1 and #2 described above because the NPS does not grant an approval or issue a permit under these options, the prudent course of action the NPS has selected is to comply with this statute in making § 9.32(e) determinations. In addition, the NEPA document will contain the analysis and documentation required under § 9.32(e) and will disclose to the public the potential impacts that could occur both inside and outside of the park.

The types of impacts considered are direct, indirect, and cumulative. Actions may be connected, cumulative, and similar.

1. Connected actions are closely related and, therefore, should be discussed in the EA. Actions are connected if they:
  - (i) automatically trigger other actions, which may require environmental analysis under NEPA;
  - (ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or
  - (iii) are interdependent parts of a larger action and depend on the larger action for their justification.

Connected actions occurring outside of the park related to the directional drilling operation inside the park include the construction of the well pads and access road; drilling and completion; hydrocarbon production and transportation; and well plugging and surface reclamation. The impacts of these connected actions both inside and outside of the Preserve will be addressed in this EA.

2. Cumulative actions when viewed with other proposed actions may have cumulatively significant impacts and should, therefore, be discussed in the same environmental document. Cumulative actions that should be analyzed in the NEPA document include surface drilling and production operations outside of the park as well as any other activities that may have additive impacts to resources (e.g., logging, road building, construction projects, prescribed burns, etc.).
3. Similar actions when viewed with other reasonably foreseeable or proposed agency actions have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency may wish to analyze these actions in the same NEPA document. The agency should do so when the best way to assess the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement. Similar actions could include

activities such as the construction of private and public roads, drilling of water wells, and other types of construction activities. Similar actions were not identified for analysis in this EA.

### 1.2.6 Approved Park Planning Documents

Approved park planning documents also provide a framework for determining how nonfederal oil and gas operations are conducted within Big Thicket National Preserve.

The General Management Plan (GMP) is the major planning document for all National Park System Units. The GMP sets forth the basic philosophy of the unit, and provides strategies for resolving issues and achieving identified management objectives required for resource management and visitor use. The GMP includes environmental analysis and other required compliance documentation. A GMP was completed for Big Thicket National Preserve in 1980. The park is currently in the process of preparing a new GMP.

The NPS completed an *Oil and Gas Management Plan* for the Preserve on February 28, 2006 (NPS, 2006b). The *Oil and Gas Management Plan*:

- identifies Preserve resources and values susceptible to adverse impacts from oil and gas operations;
- establishes performance standards and impact mitigation measures for oil and gas operations to protect and prevent impairment to Preserve resources and values from adverse impacts from oil and gas operations;
- establishes performance standards and impact mitigation measures for oil and gas operations to avoid or minimize impacts from oil and gas operations on visitor use and enjoyment, and human health and safety;
- provides holders of oil and gas rights reasonable access for exploration and development; and
- provides pertinent information to oil and gas operators to facilitate planning and compliance with NPS and other applicable regulations.

Fort Apache's proposal is in accordance with the goals and objectives articulated in the above mentioned planning documents.

### 1.3 Issues and Impact Topics Evaluated

In accordance with Director's Order 12, scoping, or requesting early input before the analysis formally begins, is required on all EAs prepared by NPS. Although public scoping is encouraged where an interested or affected public exists, issuing offices are only required to involve appropriate Federal, State, and local agencies and any affected Indian tribe. The issuing office decides the method of scoping.

Early in the planning and development of the directional drilling applications by Fort Apache, the NPS conducted scoping with them and their consultants, BIO-WEST, Inc. (BIO-WEST); and others, including the Alabama-Coushatta Tribe of Texas, the Texas Historical Commission, and the U.S. Fish and Wildlife Service, to identify the resources, values, and other concerns that could be potentially impacted by drilling and producing the wells, to define major issues,

alternatives, potential impacts, and mitigation measures. Scoping was conducted through meetings, telephone conversations, written comments, and on-site observations and assessments. The Preserve released a public scoping brochure for the proposal to solicit public input prior to completing the EA for this proposal.

The Preserve released a public scoping brochure describing the Fort Apache Baptist Foundation #1 and Nordin #1 wells on May 22, 2013, to announce a 30-day public scoping period. The public scoping brochure was mailed to affected State, Federal and local agencies, and other interested persons and organizations, including: the Alabama-Coushatta Tribe of Texas, the Austin and Houston Sierra Clubs, the Big Thicket Association, BIO-WEST, Fort Apache, the Railroad Commission of Texas, the Texas Commission on Environmental Quality, the Texas Committee on Natural Resources, the Texas Historical Commission, and the U.S. Fish and Wildlife Service. The Preserve also posted the public scoping brochure on the park's website. One scoping comment letter was received from the Lone Star Chapter and Houston Regional Group of the Sierra Club. Substantive scoping comments focused on analyzing cumulative effects, acquisition of mineral rights, and the enforceability of mitigation measures.

Based on project scoping concerns, and the level and extent of potential impacts likely to occur, the NPS determined that the impact topics listed in Table 1, below, would likely have more than minor impacts and, therefore, would be carried forward for detailed analysis in Section 4 of this EA. Other topics were addressed by taking a hard look at potential impacts; however, these were dismissed from further analysis, because their impacts would not be expected to exceed minor levels (see Section 1.3).

**Table 1. Impact Topics Carried Forward for Detailed Analysis in Section 3**

<b>Baptist Foundation #1 and Nordin #1 Wells</b>
<ul style="list-style-type: none"> <li>• Natural Soundscape in and outside the Turkey Creek Unit</li> <li>• Air Quality in and outside the Turkey Creek Unit</li> <li>• Lightscapes/Night Sky in and outside the Turkey Creek Unit</li> <li>• Wildlife in and outside the Turkey Creek Unit</li> <li>• Adjacent Landowners, Resources and Uses, focusing on an analysis of the following resources and values located outside the Unit: <ul style="list-style-type: none"> <li>• Vegetation</li> <li>• Geology and Soils</li> </ul> </li> <li>• Visitor experience, aesthetic resources inside the Turkey Creek unit</li> </ul>

Based on the above list of impact topics, issue statements were developed to help define problems or benefits pertaining to the proposal to drill and produce the directional well (see Table 2). The issue statements describe a cause and effect relationship between an activity and the impact topic.

**Table 2. Issue Statements for Impact Topics Retained for Detailed Analysis**

<b>Impact Topic</b>	<b>Issue Statement</b>
Natural Soundscape in and outside the Turkey Creek Unit	<ul style="list-style-type: none"> <li>• The existing natural soundscape in the project area is intermittently impacted by human development as the proposed surface location for Baptist Foundation #1 is located approximately 900 feet from the nearest residence to the south and the proposed surface location for Nordin #1 is located approximately 200 feet from the nearest residence to the southeast. Natural sounds are intrinsic elements of the environment that are vital to the functioning of ecosystems and can be used to determine the diversity and interactions of species within communities. Natural soundscapes are often associated with parks and preserves and are considered important components of the visitor experience as well as the natural wildlife interactions.</li> <li>• Construction and/or maintenance of the access road and well pads along with associated noise from construction and operation equipment would affect the quality of the natural soundscape in the general vicinity of the operations. This would occur primarily during the construction and drilling phases, but would extend on a smaller scale to the production phases.</li> <li>• Vehicles and generators used for construction and/or maintenance of the access roads, well pads, and flow lines; and drilling, production, plugging, and reclamation activities, would result in increased noise in the vicinity of the operations.</li> </ul>
Air Resources in and outside the Turkey Creek Unit	<ul style="list-style-type: none"> <li>• Air resources in the Preserve are influenced by the Beaumont/Port Arthur/Orange airshed and portions of the Preserve are within the non-attainment area for ozone in Liberty County, and the maintenance area for Hardin, Tyler, and Orange Counties. Specific pollutants can injure vegetation and fish and wildlife, damage materials, and affect water quality (e.g., acidify water).</li> <li>• Construction and/or maintenance of the access roads and well pads along with exhaust from combustion of gasoline and diesel-powered vehicles and equipment used for drilling and production operations would increase emissions of particulate matter, which could affect air resources in the general vicinity of the operations.</li> <li>• Drilling, production, transport and storage of hydrocarbons and the use of gasoline and diesel-powered engines (vehicles, generators, compressors, etc.) would emit pollutants and produce fugitive dust resulting from construction and drilling operations. These emissions could degrade air resources within the general vicinity of the operation and contribute toward regional air quality degradation. These substances, depending on ambient concentrations, can have damaging effects on some vegetation and on the health of humans and wildlife.</li> </ul>
Lightscapes/Night Sky in and outside the Turkey Creek Unit	<ul style="list-style-type: none"> <li>• The existing lightscape of the proposed site is affected by skyglow produced from nearby residential lighting in the vicinity of the project location. Typical impacts to natural lightscapes include the introduction of artificial light sources such as permanent lights used at</li> </ul>

Impact Topic	Issue Statement
	<p>residences and oil and gas production sites, and temporary lights on vehicles and equipment.</p> <ul style="list-style-type: none"> <li>• Construction and/or maintenance of the access roads and wellpads; and associated lights from construction and operation equipment would affect the quality of the lightscape in the general vicinity of the operations.</li> <li>• Drilling would require the use of rig and location lighting. If the wells prove to be productive, automated location lighting may be permanently installed over the producing life of the wells. Artificial lighting could interfere with views of the night sky in the area of activity, and possibly affect wildlife.</li> </ul>
Wildlife in and outside the Turkey Creek Unit	<ul style="list-style-type: none"> <li>• Drilling, production, and maintenance activities could adversely affect wildlife over the short- to long-term. These activities could result in avoidance of the area by wildlife due to increased noise, lighting, and human presence.</li> <li>• The release of hydrocarbons or other hazardous and contaminating substances from vehicles and drilling/production equipment could injure or kill wildlife.</li> <li>• Heavy equipment used for reclamation operations could injure or kill wildlife and degrade habitat over the short-term. However, reclamation of oil and gas sites over the long-term could restore surface and subsurface water quality and quantity that support wildlife.</li> </ul>
Adjacent Land Owners, resources, and uses.	<ul style="list-style-type: none"> <li>• <b>Vegetation.</b> Construction and operation of the proposed facilities would result in impacts to vegetation outside the Preserve at the wellpad locations. <ul style="list-style-type: none"> <li>• Vegetation would be totally removed in areas for the construction of the access roads and wellpads. Vegetation removal could change the future structure and composition of vegetative communities in the project areas and increase storm runoff and soil erosion.</li> <li>• The release of hydrocarbons and contaminating or hazardous substances could damage or kill vegetation directly, via contact with contaminants on-site, or indirectly, via pathways from contaminated areas.</li> <li>• Disturbances/removal of vegetation could lead to the unintentional spread and establishment of non-native plant species transported in or on drilling and maintenance equipment.</li> <li>• Reclamation of the oil and gas sites could re-establish vegetative communities and surface and subsurface drainage patterns necessary to support vegetative growth.</li> </ul> </li> <li>• <b>Geology and Soils.</b> Construction and operation of the proposed facilities would result in impacts to geology and soils outside the Preserve at the wellpad locations. <ul style="list-style-type: none"> <li>• Construction and maintenance of the access roads, wellpads, and flowlines, could increase surface runoff, increase soil erosion, rutting, and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth</li> </ul> </li> </ul>

Impact Topic	Issue Statement
	<p>and regeneration of vegetation.</p> <ul style="list-style-type: none"> <li>• Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. In general, clayey soils are more subject to compaction than sandy soils.</li> <li>• The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines during drilling and production operations could alter the chemical and physical properties of the soil in the vicinity of the oil and gas activities. Changes in soil properties could result directly from contact with contaminants on-site, or indirectly, via runoff from contaminated areas.</li> </ul>
Visitor experience and aesthetic resources inside the Turkey Creek Unit	<ul style="list-style-type: none"> <li>• Siting of the proposed wells, production facilities, and access roads outside the Preserve could result in adverse impacts on soundscapes, air quality, lightscapes, and wildlife (as discussed above). Impacts to these resources would also result in adverse impacts to visitor experience. The most pronounced effects would result from natural soundscape and lightscape impacts.</li> <li>• <b>Natural Soundscape.</b> Construction and operation of the proposed facilities would result in an increase in noise levels inside the preserve as generated by the drilling operations.</li> <li>• <b>Lightscape.</b> Drilling would require the use of rig and location lighting. If the wells prove to be productive, automated location lighting may be permanently installed over the producing life of the wells. Artificial lighting could interfere with views of the night sky in the area of activity.</li> </ul>

#### 1.4 Issues and Impact Topics Eliminated From Further Analysis

In this section of the EA, 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,
- they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected, or
- effects (following any needed mitigation) would not exceed minor levels, and there is little controversy on the subject or reason to otherwise include the topic. Generally, a minor effect would result in a detectable change, but the change would be small and of little consequence.

Because there would be no effect or the effects would be minor or less, there would either be no or little contribution towards cumulative effects. 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 (see Appendix A).

The topics listed in the following table have been eliminated from further analysis for one or more of the reasons listed above.

**Table 3. Impact Topics Eliminated from Further Analysis**

<b>Nordin #1 and Baptist Foundation #1 Wells</b>
<ul style="list-style-type: none"> <li>• Socioeconomics</li> <li>• Catastrophic Incidents, such as Well Blowouts, Well Fires or Major Spills</li> <li>• Environmental Justice</li> <li>• Prime and Unique Farmland Soils in the Turkey Creek Unit</li> <li>• Geology and Soils in the Turkey Creek Unit</li> <li>• Water Resources: Groundwater, streamflow, floodplain and wetlands in and outside the Turkey Creek Unit</li> <li>• Fish and Aquatic Life in or outside the Turkey Creek Unit</li> <li>• Vegetation in the Turkey Creek Unit</li> <li>• Threatened and Endangered Species in and outside the Turkey Creek Unit and Other Species of Management Concern in the Unit</li> <li>• Cultural Resources in and outside the Turkey Creek Unit</li> </ul>

The following sections explain why each of these topics was dismissed from further evaluation and provides limited analyses that support the dismissals. Wherever appropriate, the analyses describe the effects of “in-park operations” and “connected actions.”

- **In-Park Operations** would consist of the subsurface operations taking place under the Unit – i.e., the wellbore crossing into the Unit at substantial depth, so as to not cross usable quality groundwater, to reach the bottomhole target beneath the Unit to extract hydrocarbons and other associated fluids from beneath the Unit.
- **Connected Actions** would consist of activities associated with access road maintenance; construction and maintenance of the wellpads, production facilities, drilling and completion, hydrocarbon production and transportation and well plugging and surface reclamation outside the Unit.

The analysis of impacts from in-park operations contains the analysis and documentation required under § 9.32(e). The analysis of impacts from connected actions satisfies a broader NEPA requirement to assess impacts on the human environment.

#### **1.4.1 Socioeconomics**



Socioeconomic issues include the effect of the proposed drilling and possible production of the wells on the local and regional economies, and the effects of the proposed action on visitation in the Preserve, which in turn affects those economies. The description presented below of past, present, and reasonably foreseeable oil and gas development in and adjacent to the Preserve provides supporting data to base the cumulative impact analyses in this section and for analyses presented in Section 3.

The proposed action would generate an unknown amount of revenue for the local economy through rents or other payments to adjacent private surface owners. Mineral owners would receive bonus payments for leases, and could subsequently receive rentals or royalties. Local businesses would receive revenue from purchases of food, fuel, lodging, and other incidental purchases by drilling and production crews and managers. However, revenue from oil and gas production would likely affect only a small number of people, and the individuals or groups affected would not necessarily be from the socioeconomic area in the vicinity of the project. On the other hand, increased oil and gas activity in the area could potentially have restrictive effects on the local economy. An example of this effect would be fluctuations in the housing market and/or property values with the development of oil and gas operations near residences or from the demand for housing from workers. In addition, a small amount of forested and semi-forested area would be lost on up to 1.5 acres each until the wells are plugged and the project area is reclaimed.

Big Thicket National Preserve contributes to the local and regional economies by adding sales, taxes, and employment related to the acquisition of services, supplies and materials needed to administer the Preserve. In addition, tourism-related expenditures contribute to the economy, and also create jobs to support tourism. The NPS has estimated that there were approximately 135,262 visitors to the Preserve in 2012 (NPS, Public Use Statistics Office, 2013). Specific data detailing how many visits to the Turkey Creek Unit or use of the Turkey Creek Trail is unavailable because the Preserve does not track visits to the Unit. Hunting (and trapping) is not permitted within the Turkey Creek Unit.

Visitor uses in the Turkey Creek Unit include hiking, picnicking, backcountry camping, and bird watching. The Preserve's Turkey Creek Trail is approximately 0.8 miles east of the Baptist Foundation #1 wellpad and 0.5 miles west of the Nordin #1 wellpad, straight-line; and the Preserve's Turkey Creek Day-Use Area, Kirby Nature Trail, is 5.3 miles south of the Baptist Foundation #1 and Nordin #1 wellpads, straight-line). The Turkey Creek Day-Use area provides paved parking, picnic tables, environmental education center and portable restrooms. The on-water distance between the upstream Turkey Creek Trailhead and the downstream Turkey Creek Day-Use Area is approximately 15 miles.

It is estimated that in the 2005 fiscal year, visitors to the Preserve spent a total of \$6,592,000, creating or supporting 141 area jobs (Stynes, 2006). In the event of a serious oil spill and/or accident involving serious personal injury or death, the public could perceive that the Preserve is not a desirable place to visit. Tourism could fall, resulting in reduced revenues to the local and regional economies. However, the likelihood of this happening is relatively low, because the applicant would be required to take precautions to prevent accidents under Federal statute and numerous Statewide Rules administered by the Railroad Commission of Texas (RRC). Please see the section below that addresses the possibility of catastrophic incidents, such as well blowouts, well fires, or major spills.

Big Thicket National Preserve lies within the Railroad Commission of Texas' District 3. RRC District 3 includes 29 counties in southeast Texas. Seven counties within District 3 contain portions of the Preserve. As of September 2012, there were approximately 7,697 regular producing oil wells and 3,733 regular producing gas wells in RRC District 3, totaling 11,279 wells. Of these wells, a total of 2,934 wells or 25 percent of the District total are located within the 7 Preserve counties. These include 2,100 oil wells (27 percent of the District total) and 834 gas wells (22 percent of the District total). The number of wells currently producing oil or gas from nonfederal mineral acreage beneath the Preserve is very small in relation to both the total producing wells in the seven counties containing the Preserve and the total producing wells in RRC District 3.

The NPS has prepared a revised reasonably foreseeable development (RFD) scenario to project future oil and gas development, based on an assessment by the United States Geological Survey of remaining hydrocarbons beneath Big Thicket National Preserve (Schenk, 1999). The revised RFD was produced in response to public comments received on the *Draft Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2004), for which the original RFD had been produced, and the increase in drilling activity experienced in RRC District 3 in 2005 and throughout the United States and Texas from 2002 to the present (Baker Hughes Incorporated, 2007). The RFD provides a reasonable assumption of future development of nonfederal oil and gas for park planning purposes, and provides a basis for measuring potential environmental impacts. It does not represent a benchmark or decision point for acceptable levels of activity that could occur to develop the oil and gas underlying the Preserve. During the revision effort, the USGS's assessment of the remaining hydrocarbon potential beneath the Preserve was reviewed, and the NPS contacted operators who have recently drilled wells in and adjacent to the Preserve to verify the assumptions made.

The RFD projects that, initially, 3-D seismic surveys would be conducted throughout the entire Preserve, and the data obtained would be used to delineate oil and gas drilling prospects. It was assumed that approximately 40 additional wells would be drilled over the next 15 to 20 years to produce the 4 million barrels of oil and natural gas liquids (condensate) and 94 billion cubic feet of natural gas from Tertiary and Upper Cretaceous-age reservoirs assumed to underlie the Preserve. Based on an exploratory drilling success rate of approximately 50 percent and a developmental drilling success rate of 75 percent, of the 40 wells anticipated to be drilled, 27 could be commercially successful (the remaining 13 would be plugged as dry holes). The NPS acknowledges that the RFD is based on available production data, and that more or fewer wells could be drilled or produced. Under the RFD scenario, it would reasonably be anticipated that Preserve-wide, up to 465 acres could be disturbed for geophysical exploration operations; and up to 241 acres could be developed for drilling, production and transportation operations for a total future development of 706 acres.

Due to the narrow, linear nature of many of the Preserve's Units many of the drilling and production operations are anticipated to follow the existing trend for siting from surface locations outside the Preserve to access hydrocarbons beneath the Unit using directional drilling technology. However, exploratory and development wells are expected to be sited within some Unit that are greater in size, like the Big Sandy Creek and Neches Bottom and Jack Gore Baygall Unit. Therefore, it is possible that the actual acreage disturbed by drilling, production and transportation operations would approximate that projected by the RFD. However, the NPS expects the actual figure to fall somewhere between the RFD projection and

zero (0) acres (which would be the case if all oil and gas wells under the Preserve were drilled directionally without the disturbance of federal surface).

A survey of NPS records indicates that nine two-dimensional (2-D) seismic surveys were conducted in the Big Sandy Creek Unit between 1977 and 1983. Five of these surveys were conducted as cable-only, or walk-across, operations, and the remaining four involved the use of drilling equipment (typically referred to as highland rigs or Ardco buggies) to place energy sources (explosives) within the Unit. One of the latter surveys was conducted over four separate lines within the Unit. A three-dimensional (3-D) seismic survey involving the drilling of shotholes with articulating tractor drills was completed in 2004 over most of this Unit. Between 1978 and 1983 seismic exploration conducted in the Neches Bottom and Jack Gore Baygall Unit included 20 2-D seismic surveys. Most of these surveys (18) were conducted as cable-only operations, and several included multiple lines. A 3-D seismic survey completed in 1999 over most of this Unit utilizing a combination of tractor drills, all-terrain vehicle mounted drills, rickshaw drills, man-portable drills, and jon boat mounted drills to drill shotholes. One 3-D seismic survey (the Famcor New Ace) and 24 assorted 2-D seismic surveys have been completed on the Menard Creek Unit. The 3-D survey was directional and did not occur inside the Preserve.

Within the RRC District 3, a total of 11,279 wells have been drilled as of September 2012. Of these wells, 2,934 are located within the 7 counties where Big Thicket National Preserve is located. These include 2,100 oil wells and 834 gas wells. The trend over the past decade for drilling wells to produce oil and gas underlying the Preserve is towards directionally drilling from surface locations outside the Preserve to bottomhole targets beneath the Preserve. From 1998 through the present, there have been no wells drilled from surface locations within the Preserve. However, oil and gas exploration and development has continued during that time. Since the last well drilled from inside the Preserve was completed in 1997, 34 directional wells were drilled from surface locations outside the Preserve to reach bottomhole targets beneath the Preserve. During the same period, applicants received § 9.32(e) exemption determinations for 23 additional directional wells that have not yet been drilled.

According to Chapter 3 of the Big Thicket National Preserve Oil and Gas Management Plan, there were 6 drilled and abandoned wells within the Turkey Creek Unit. They include 1 dry hole and 5 that produced oil and/or gas. The Milestone Operating Company William Rice B-5 well is currently operational within the Turkey Creek Unit; it is located approximately 1.4 miles north of the proposed Baptist Foundation #1 surface location. There are 6 pipelines located within the Unit. All 6 transport natural gas, with 2 of the 6 out of service.

**Impacts from In-Park Operations and Connected Actions:** The analysis of impact to socioeconomic resources is not separated into in-park operations and connected actions, since both the in-park borehole and connected action together are needed to produce the effect on socioeconomics. The proposed action (if the directional wells were drilled and hydrocarbons are discovered and produced) would result in only a negligible effect on the local or regional economy, since they represent such a small amount the total production in the RRC District 3. The amount of revenue generated from leases, royalties, and rents would be very limited, and revenue related to production would not necessarily be retained locally. Revenue from sales of goods to crews would be limited and sporadic, and short-term.

**Cumulative Impacts:** Cumulative impacts on socioeconomics within the project area would continue to occur because of Preserve operations, visitor use, hunting, development including oil and gas operations, commercial timber harvest creating demand for goods and services, and other sources of economic development. An example of the latter would be residential or commercial development adding to the tax base of the area. The divestiture of timberlands surrounding the Preserve by traditional, integrated forest products companies could also affect socioeconomics of the area. All three of the major landholding neighbors to the Preserve, International Paper, Louisiana Pacific, and, most recently, Temple-Inland have sold their timberlands. The sale of these lands has been primarily to institutional investors. This represents a shift in land management strategy towards maximizing returns on timberland assets for shareholders.

It is unclear what the cumulative effect to socioeconomics of institutional investment in timberlands adjacent to the Preserve would be. As impacts from the proposed directional wells are not expected to create more than a negligible impact on the local or regional economy, the implementation of the proposal is not expected to add cumulative impacts to socioeconomic values in the project area.

**Conclusion:** Because revenue from oil and gas production of these wells would likely affect only a small number of people, and the potential for job loss at the Preserve is very low and would produce a small effect on the local and regional economies, socioeconomics was dismissed from further analysis in this EA.

#### 1.4.2 Catastrophic Incidents, such as Well Blowouts, Well Fires or Major Spills

One issue related to the proposed actions is the potential for catastrophic incidents, including well blowouts, well fires, or major spills. The Railroad Commission of Texas (RRC) oversees the State's oil and gas industry, gas utilities, pipelines, safety in the liquefied petroleum gas industry, and surface mining and reclamation of coal and uranium. The RRC divides the state up into 12 Districts for purposes of administering and regulating oil and gas operations under its jurisdiction, and maintains statistics on blowout and well control problems, and spills. In this section, data are provided for calendar years 2010 and 2011 for incidents reported in RRC District 3, which includes Big Thicket National Preserve and would be representative of blowout events/well control problems, fires and spills that occur in or adjacent to the Preserve. RRC District 3 includes 29 counties in southeast Texas. Data are also presented for the seven counties within District 3 in which Big Thicket National Preserve is located.

As of September 2012, there were approximately 7,546 regular producing oil wells and 3,733 regular producing gas wells in RRC District 3, totaling 11,279 wells. Of these wells, a total of 2,934 wells or 26 percent of the District total are located within the 7 counties where Big Thicket National Preserve is located. These include 2,100 oil wells (19 percent of the District total) and 834 gas wells (7 percent of the District total). See the following links for the RRC raw data on well counts, spills (H8 reports), and blowouts:

<http://www.rrc.state.tx.us/data/wells/wellcount/index.php>

<http://www.rrc.state.tx.us/environmental/spills/h8s/index.php>

<http://www.rrc.state.tx.us/data/drilling/blowouts/index.php>

Table 4, below, shows the number of reported well control problems, well fires, and major spills in RRC District 3 during calendar years 2011 and 2012.

**Table 4. Well Control Problems, Well Fires, and Major Spills in RRC District 3 and the Seven Counties around Big Thicket National Preserve during 2011 and 2012**

<b>Type of Incident</b>	<b>No. of Incidents in RRC District 3 during 2011 and Rate of Occurrence</b>	<b>No. of Incidents in 7 Counties around Big Thicket National Preserve during 2011 and Rate of Occurrence</b>	<b>No. of Incidents in RRC District 3 during 2012 and Rate of Occurrence</b>	<b>No. of Incidents in 7 Counties around Big Thicket National Preserve during 2012 and Rate of Occurrence</b>
Blowouts or Well Control Problems during Drilling Operations	6 1 well control problem per 1,834 wells per year	1 1 well control problem per 2,941 wells per year	2 1 well control problem per 5,716 wells per year	0 1 well control problem per 2,934 wells per year
Well Fires	1 1 well fires per 11,300 wells per year	1 1 well fires per 2,941 wells per year	1 1 well fires per 11,430 wells per year	0 1 well fires per 2,934 wells per year
Major Oil Spills (defined as exceeding 5 barrels)	3 1 major spill for every 3,767 wells per year	1 1 major spill for every 2,941 wells per year	9 1 major spill for every 1,270 wells per year	7 1 major spill for every 419 wells per year

**Well Blowouts.** The term “blowout” means the uncontrolled escape of formation fluids (water/brine, gas, oil) from a well. Given present day technology, a well blowout is extremely rare. According to RRC data, the vast majority of reports deal with well control problems that never manifested in full, sustained blowouts.

During 2011, there were 12 well control problems reported in RRC District 3, of which 2 were located in the counties where Big Thicket National Preserve is located. Neither of these incidents affected the resources and values in the Preserve. In 2012, there was 1 fire that resulted from a well blowout. The 1 reported fire in RRC District 3 during 2012 equates to 1 fire for every 11,424 wells per year. The 1 reported fire occurred did not occur in the seven-county area where Big Thicket National Preserve is located. See <http://www.rrc.state.tx.us/data/drilling/blowouts/index.php>

Of the 30 directional wells drilled outside the Preserve since 1986 for which NPS issued § 9.32(e) exemption determinations, the Comstock Black Stone B1 is the only well that reported well control problems. The well control problems reported by Comstock for the Black Stone B1 well did not result in a well blowout or well fire. During wireline operations to retrieve the measured well depth, the internal float on the drill string failed and the packoff on the wireline lubricator failed, resulting in oil-based drilling mud flowing up the drill pipe. The wireline was pulled out of the hole, the safety valve was shut in and the well was secured. No injuries or fatalities

occurred during the incident. The well control problems did not result in impacts off the wellpads; and there were no impacts on the resources and values in the Preserve.

**Well Fires.** During 2011, 21 well fires were reported in RRC District 3. Of these 21 total fires in the district, 9 occurred in the seven-county area where Big Thicket National Preserve is located.

Of these 9 fires, one occurred on a Choice Exploration, Inc. natural gas drilling operation known as the Village Creek SP GU Lease in Hardin County near the city of Lumberton. This drilling operation is located within the boundary of Village Creek State Park (VCSP) on recently acquired lands. The nearest Big Thicket National Preserve property to this project location is the newly acquired Village Creek Corridor which lies 0.75 miles east at the nearest point. On April 1, 2011, the drilling contractor had reached the bottomhole target and was withdrawing the wellbore. This withdrawal passed through a zone of high pressure, the well “kicked”, and natural gas and drilling fluids began to escape through a damaged seal and spewed onto the drilling rig floor. All personnel evacuated the rig to a safe distance and immediately notified Fort Apache and all other appropriate agencies and authorities of the incident. The escaping natural gas ignited approximately ten minutes later, from an unknown ignition source, resulting in an explosion and subsequent rig fire. The rig fire then ignited the adjacent woodlands and burned about 22 acres of VCSP property before being extinguished within 12 hours. The fire on the drilling platform continued, but self-extinguished within 48 hours. Boots & Coots International Well Control, Inc. of Houston Texas were hired and remained on-scene until their snubbing unit had the well safely plugged within a period of 2 weeks. There were no injuries as a result of this incident. In August 2011, the original well was re-drilled, along with a second bottomhole target and wellbore. Both wells are currently producing natural gas. This well fire resulted in impacts off the wellpads including a 22 acre wildfire within VCSP that was extinguished within 12 hours. There were no impacts on the resources and values in the Preserve which is 0.75 miles distant.

During 2012, 1 fire was reported in RRC District 3, which equates to 1 fire for every 11,279 wells per year. The one reported fire did not occur in the seven-county area where Big Thicket National Preserve is located.

**Major Spills.** The Texas RRC defines “major spills:” as those exceeding five barrels of oil and require reporting of release of that amount (Tex. Admin. Code Tit. 16, § 1.30 (2005)). During 2011, in RRC District 3, there were 20 spills reported greater than 5 barrels of oil, equating to approximately 1 spill for every 372 wells per year. Four of the 20 spills were located in the 7 counties in which Big Thicket National Preserve is located. During 2012, in RRC District 3, there were 46 spills reported, equating to approximately 1 spill for every 164 wells per year. Twenty-two of the 48 spills were located in the 7 counties in which Big Thicket National Preserve is located.

Any oil and gas operator that could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR 110.3, into navigable waters, as defined in 40 CFR 110.1, is required to have a Spill Prevention Control and Countermeasure Plan in accordance with 40 CFR Part 112. Some of the specific requirements that an operator of onshore oil drilling and workover facilities must adhere to under 40 CFR 112.14, Spill Prevention, Control, and Countermeasure (SPCC) Plan requirements for onshore oil drilling and workover facilities, include:

- Meet the general requirements listed under Sec. 112.7, and also meet the specific discharge prevention and containment procedures listed under this section.
- Position or locate mobile drilling or workover equipment so as to prevent a discharge as described in Sec. 112.1(b).
- Provide catchment basins or diversion structures to intercept and contain discharges of fuel, crude oil, or oily drilling fluids.
- Install blowout prevention (BOP) assembly and well control system before drilling below any casing string or during workover operations. The BOP assembly and well control system must be capable of controlling any well-head pressure that may be encountered while that BOP assembly and well control system are on the well.

Due to these requirements, in the rare event of a major spill consisting of five or more barrels of oil, the spill would be rapidly contained and removed, so that impacts are short-lived and limited to the immediate area of operations. In the event that a spill did occur and did spread into the Preserve, the impacts could be remedied and mitigated over time. In the rare event that spilled substances from a well blowout or major spill would be transported into the Preserve, or a well fire would spread into the Preserve, the NPS would seek damages and restoration costs under the Park System Resources Protection Act, 16 U.S.C. § 1911 (2005). While applicability of the Park System Resources Protection Act would be applied only after damages to the Preserve's resources or values have occurred, this tool is also an effective deterrent for operators to apply the necessary preventative measures to prevent an incident from affecting the Preserve.

Analysis of impacts from reasonably expected spill incidents, which would not reach the magnitude of a reportable major spill consisting of five or more barrels of oil, is presented under other impact topics in Sections 1 and 3 of this EA.

**Impacts from In-Park Operations:** Under the proposed action, both directional wells would be drilled from separate wellpads located outside the Unit boundary. The proposed in-park operations, consisting of the directionally drilled wellbore crossing into the plane of the Unit at a depth below the usable quality groundwater zone and extracting hydrocarbons and other fluids from beneath the Unit, would have no impact on the surface regardless of what methods and materials Fort Apache uses to drill, case, cement, or plug and abandon the section of the hole inside the Unit. Likewise, if the wells are produced, any methods of completion, stimulation, or injection that occur inside the Unit would not pose a substantial threat of damage to park resources. Surface subsidence caused by fluid withdrawals is not a reasonable expectation because of the target reservoir properties (depth, porosity, compaction, hydropressure, etc.) and adjacent overlying sediments. Fracture of geologic formations with resultant usable quality water zone contamination is not an issue in the § 9.32(e) determination because activities inside the Preserve would occur below the deepest usable quality water zone. Further, in-park operations would have no potential for well-blowouts, well fires, or major spills.

**Impacts from Connected Actions:** The NPS recognizes that unplanned incidents associated with oil and gas operations such as well blowouts, fires, and major spills near the boundaries of Big Thicket National Preserve present a risk of damage to park resources and values. However, the rates of occurrence for such incidents are low and are not a reasonable expectation of project implementation. If such an incident did occur, required mitigation measures provided in

Fort Apache's application would reduce the potential for spilled substances or a well fire to spread into the Preserve, and would provide for timely response and cleanup. Therefore, there is a reasonable expectation that the spill would be confined to the wellpads, or, if it did reach the Preserve, that the natural environment could be reclaimed or would otherwise recover over time so that impairment would not occur. In the event that Preserve resources or values would be damaged, the NPS could seek remedy both on the ground and in the form of monetary compensation. Any further analysis on this topic would be highly speculative.

**Cumulative Impacts:** Cumulative impacts related to this topic can be assessed by examining relevant data for wells located within the seven counties that contain the Preserve. There are very low rates of occurrence for all three types of incidents, ranging from 9 well fires, 4 major spills, and 2 blowouts reported in 2011, out of a total of 2,941 wells in service (1 incident for every 196 wells) and 0 well fires, 22 major spills, and 0 blowouts reported in 2012 (1 incident for every 133 wells). Cumulatively, the addition of two directional well bores from separate wellpad locations in this proposed action would not add more than negligible effects to these regional incident statistics.

**Conclusion:** Because there would be low potential for a catastrophic incident, such as well blowout, well fire or major spill occurring as a result of the in-park operations, and because the likelihood of such incidents from the connected actions is very low, it is not expected that catastrophic incidents, such as a well blowout, well fire and major spill in and outside the Unit, would result in more than minor impacts, and this topic was dismissed from further analysis in this EA.

### 1.4.3 Environmental Justice

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

Per the U.S. Department of Health and Human Services (DHHS), Tyler County is not considered "low income" because, as of 2011, less than 20% of its residents were below the poverty level (19.2%). African-American persons and persons of Hispanic or Latino origin constituted 11.5% and 7.4% of the Tyler County population, respectively (U.S. Census Bureau 2010). However, the Proposed Action would not have disproportionate health or environmental effects on the community. As such, environmental justice was dismissed as an impact topic in this EA.

For 2011, the DHHS poverty guideline for a family or household of four is \$22,350 (DHHS 2011). The median household income for Tyler County, the county in which the proposed project is located, was \$35,847. For Silsbee, located in Hardin County, adjacent to Tyler County, is the closest city to the proposed project area that has census data recorded for the year 2010, shows a median household income of \$52,138 (U.S. Census Bureau 2010). Silsbee is located approximately 16.5 miles from Project location. Minority populations in proximity to the proposed project area that may be impacted are shown in Table 5 below.



**Table 5. Minority Characteristics of the Proposed Project Area**

Census Geography	Total Population	Percentage (%) of Racial Distribution							Total Minorities (%)
		White	Hispanic or Latino *	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Two or More Races	
Tyler County	21,666	86.4	7.4	11.5	.7	.3	0.0	2.0	21.9
City of Silsbee	6,661	65.8	4.0	30.3	0.4	0.6	0.0	1.5	36.8
Town of Woodville	2,586	70.0	4.4	26.5	.3	.6	.2	1.5	33.5

\*Hispanic or Latino data pertains to those who specified they were of Hispanic or Latino ethnic origin. The U.S. Census Bureau considers ethnicity separate from race. Hispanic or Latino is an ethnic population and may be of any race. Source: U.S. Census Bureau (2013).

**Conclusion:** A review of the racial distribution, median household income, and general nature of the proposed project reveals that there would be no effect to minority or low-income populations as a result of the Proposed Action and negligible effects resulting from connected actions. Based on the scope, size, and location of this project, no disproportionate health or environmental effects on the community are expected. Therefore, environmental justice was dismissed from further analysis in this EA.

#### 1.4.4 Prime or Unique Farmland Soils in the Unit

As a result of a substantial decrease in the amount of open farmland, Congress enacted the Farmland Protection Policy Act (Public Law 97-98). In August 1980, the Council on Environmental Quality directed that Federal agencies must assess the effects of their actions on prime or unique farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, timber, and oil seed; unique farmland is defined as soil that produces specialty crops such as fruits, vegetables, and nuts. Prime and unique farmland soils are those that are actively being developed and could be converted from existing agricultural uses to nonagricultural purposes, as described above. Urban or built-up land, public land, and water areas cannot be considered prime farmland.

Soils inside the Unit cannot be considered prime and unique farmland soils because they are public lands unavailable for food or fiber production. The Farmland Protection Policy Act only applies to direct Federal actions and does not apply to the connected actions identified in this EA (that is, the surface disturbances outside the Unit).

Because there are no prime and unique farmland soils in the Unit, and the Farmland Protection Policy Act does not apply to private projects on private properties, this impact topic was dismissed from further analysis in this EA.

#### 1.4.5 Geology and Soils

The geology and soils within the Preserve adjacent to the proposed wells were examined to determine if more than negligible effects could occur from either in-park or connected actions. The soils and characteristics of the area surrounding the wells are described below:

The soil at the Baptist Foundation #1 wellpad and access road location is described as Olive-Dallardsville complex (OiA) with slopes of 0 to 1 percent. This loam/fine sandy loam is very poorly to moderately well drained with more than 80 inches to restrictive features and with no frequency of flooding, but frequent ponding and located generally on open depressions (U.S. Department of Agriculture, Soil Conservation Service, 1983). This soil is classed as partially hydric, meaning that at least one component of the map unit is rated as hydric, and at least one component is rated as not hydric. In this case, the minor “hydric” components are the possible presence of gilgai (pimple mounds) and/or meandering channels, neither of which are present in the proposed area of the well. Therefore, the entire area is located within the non-hydric component of the Olive Dallardsville complex.

The soil at the Nordin #1 wellpad and access road location is described as Otanya very fine sandy loam (OtB) with slopes of 1 to 3 percent and Silsbee fine sandy loam (SiD) with slopes of 5 to 15 percent. These soils are classified as well drained with more than 80 inches to restrictive features and with no frequency of flooding or ponding and located generally on flats (U.S. Department of Agriculture, Soil Conservation Service, 1983). They are not classified as hydric.

**Impacts from In-Park Operations:** Under the proposed action, the wells would be directionally drilled into the Preserve at a substantial depth beneath the land surface where the wellbores cross the Unit boundary. The Nordin #1 and Baptist Foundation #1 wells would be directionally drilled from privately owned surface locations approximately 135 feet east (Nordin #1) and 200 feet south (Baptist Foundation #1) of the Turkey Creek Unit boundary and the wellbore would cross into the Unit at a depth of approximately 2,100 feet (Nordin #1) and 3,250 feet (Baptist Foundation #1) true vertical depth (TVD) to a target depth of 8,200 feet TVD, extracting hydrocarbons and other fluids from beneath the Unit. Therefore, based on the depth below the surface of the Preserve, there would be no impacts on the geology and soils within the Preserve from the in-park subsurface oil and gas operation proposed for these wells.

**Impacts from Connected Actions:** To evaluate whether the proposed activities outside the Preserve could impact geology and soils in the adjacent Unit, the NPS considered the potential for surface subsidence caused by the production of hydrocarbons and the potential for contamination of adjacent lands from operations outside the Preserve. For this, the NPS examined types and volumes of contaminants that would be present at the well/production site, the probability of release, and the potential for migration into the Unit.

The potential for subsidence is not a concern in the vicinity of the Preserve. The hydrocarbon producing zones are deep and have moderate porosity. There is a long history of oil and gas production in the area without evidence of subsidence occurring.

The potential for runoff of contaminants onto Preserve soils was evaluated at the site. There is very little potential for impacts to geology and soils in the Preserve. The potential for runoff of contamination to offsite soils was considered for all phases of oil and gas development:

construction, drilling, production, and plugging/reclamation. The effects from the connected actions to geology and soils would be primarily associated with surface impacts from vehicle use, construction, drilling, and fluid transport at the wellpads and the access road corridors. Construction operations would require clearing of land, removal of vegetation, and disturbance of soils, especially at the wellpads and along the access roads. During rain events, runoff containing sediment or oils from construction equipment could reach adjacent lands. Drilling and production could result in releases of hydrocarbons, produced waters, or treatment chemicals, which could runoff to neighboring properties, along with soil from bare areas on the pad and/or access road. No major spills would be likely, as previously described (see “Catastrophic Incidents”, above). Plugging and reclamation would provide for regrading of soils and revegetation, but runoff and the potential for off-site contamination would persist until the site was totally reclaimed and any cleanup completed.

The potential for runoff to reach lands inside the Preserve from Baptist Foundation #1 would be minimal, based on site topography and the mitigation and minimization measures that Fort Apache would implement for all phases of the operation. The wellpad and access road sites for Baptist Foundation #1 are relatively flat, with low-gradient sheet-flow drainage toward the Unit. One potential pathway is the wellpad access road entrance intersection with Hicksbaugh Road, where the road follows the Preserve boundary (please see Figure 3 and Figure 4). The potential for runoff to reach lands inside the Preserve from Nordin #1 is moderate. The western boundary of the wellpad site is nearly shared with the preserve. However, the drill location is set back from the boundary approximately 135 feet. The project location does have a slight slope with potential for drainage toward the Unit. Mitigation would include scheduling construction to avoid rain events, constructing a 3 foot high ring levee (berm) around the wellpads and also the tank batteries during the production phase, constructing a washout / emergency pit, using a closed-loop containerized mud system, reducing the size of the wellpads after drilling completion, and adherence to a Spill Prevention and Countermeasure Plan. Erosion control measures would include the use of mulching, seeding, silt fences, and hay bales (see Table 6 for a complete list of mitigation). Reclamation would include restoring the site to original contours, removal of any contaminated soils, replacing topsoil, and revegetation. Based on these measures and site conditions, there would be a low potential for migration of contaminants into the Unit; and if it were to occur, there would likely be ample time and space to respond to a release before there would be impacts on geology and soils in the Unit. The potential for adverse impacts to soils and geology in the Unit would be negligible from the development of these wells over the short or long-term.

**Cumulative Impacts:** Vehicle uses, existing and future oil and gas operations in and outside the Preserve, maintenance of transpark oil and gas pipelines, routine park operations, forestry operations adjacent to the Preserve, and continued land development near the Preserve boundary would all contribute to cumulative impacts on geology and soils in the Preserve. The cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was considered in the Preserve’s *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005), and negligible to minor cumulative impacts were identified for this impact topic. Overall, the proposed action would contribute negligible adverse effects to the cumulative impacts on geology and soils in the Preserve and adjacent lands.

**Conclusion:** Because there would be no impacts on the Preserve’s geology and soils from in-park oil and gas operations, and impacts from the connected actions would be minor based on the flat site topography and mitigation that would help to confine any releases to the site, the

topic of geology and soils in the Turkey Creek Unit was dismissed from further analysis in this EA.

#### **1.4.6 Water Resources: Groundwater, Streamflow, Floodplain and Wetlands**

The proposed project location landform is generally flat. The vegetation or forest type is classified as upper and mid slope oak pine forest/baygall thicket. There are no flood plains, wetlands, special aquatic sites, or “other waters of the United States” within the proposed area of these wellpads or access roads corridors. FEMA floodplain data indicates that the wellpads and access road corridors lie entirely outside of the 100 year floodplain zone. National Wetland Inventory (NWI) data indicates the nearest wetlands are two freshwater forested shrub wetlands, one located approximately 2,100 feet southeast of the Baptist Foundation #1 wellpad and one located approximately 350 feet southwest of the Nordin #1 wellpad edges at the nearest point. There would be no clearing or disturbance of any kind within this remotely sensed forested wetland. During the field survey of the project area, no obligate wetland plant species were observed, no drainage channels or gilgai mounds were observed (which might be indicative of a hydric soil), and site surface hydrology was not indicative of a regulatory forested wetland. Therefore, it was determined that there would be no loss of regulatory wetlands or “Waters of the United States” as a result of this proposed action. According to the RRC Groundwater Advisory Unit, the base of usable-quality water that must be protected is estimated to occur to a depth of 1,000 feet below the land surface. Moreover, the fresh water contained in the interval from the land surface to a depth of 1,000 feet must be isolated from water in underlying beds.

**Impacts from In-Park Operations:** Under the proposed action, the wells would be directionally drilled from outside the Preserve and cross into the Unit at substantial depths, as described under “Geology and Soils,” above. Therefore, there would be no impacts on either the surface water flows or usable quality groundwater zones either in or outside the Unit, floodplains, or wetlands from the subsurface oil and gas operations in the Unit.

**Impacts from Connected Actions:** The proposed wellpads and access road corridors for these wells would not be located within floodplains, wetlands, or special aquatic sites. The proposed surface casing and cementing program, site location, site design, and mitigation measures that Fort Apache would implement during construction, drilling, and production activities are designed to confine impacts to the wellpads and the wellbore. If a catastrophic release were to occur, there is the potential for impacts to neighboring wetlands, but as previously discussed, the possibility of such a release was determined to be negligible, based on the low frequency of recent occurrences in the area.

**Cumulative Impacts:** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, forestry operations adjacent to the Unit, and land development near the Unit boundary could contribute to cumulative impacts on water resources, floodplains or wetlands in and around the Turkey Creek Unit. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve’s *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005), and up to moderate impacts were identified from all actions that could affect water resources, floodplains and wetlands in the cumulative impacts

analysis area. The effects of the proposed action would not contribute more than negligible adverse impacts to the overall cumulative impact of all these actions in the region.

**Conclusion:** There would be no impacts on water resources from in-park oil and gas operations, and impacts from the connected actions would be negligible to minor, based on the lack of water resources at the sites, mitigation to prevent off-site contamination, and the low chance of catastrophic release. Therefore, the topic of water resources, floodplains, and wetlands in and outside the Turkey Creek Unit was dismissed from further analysis in this EA.

#### 1.4.7 Fish and Aquatic Life

The nearest permanent water body or waterway to the proposed action is Turkey Creek, which lies about 5,700 feet distant at the nearest straight-line point from Baptist Foundation #1 to the east and 900 feet distant at the nearest straight-line point from Nordin #1 to the west; and about 3,000 feet distant along the centerline of the nearest existing drainage pathway. Fort Apache would implement mitigation measures that would include scheduling construction to avoid rain events, constructing a berm around the wellpads, constructing a washout / emergency pit, using a closed-loop containerized mud system, reducing the size of the wellpads after drilling completion, constructing a 3-foot berm around the tank battery, and adherence to a Spill Prevention and Countermeasure Plan. Also, erosion control measures would include the use of mulching, seeding, silt fences, and hay bales (see Table 6 for a complete list of mitigation). Reclamation would include restoring the site to original contours, removal of any contaminated soils, replacing topsoil, and revegetation. Based on the distance of the proposed action to the nearest fish and aquatic life habitat and the mitigation measures that would be implemented, the potential for adverse impacts to fish and aquatic life would have no effect from the development of these wells over the short or long-term. Therefore, this topic was dismissed from further analysis.

#### 1.4.8 Vegetation

Impacts on vegetation would occur from the proposed action both outside the Preserve Unit (on the adjacent property where the wellpads and access roads would be constructed), as well as possibly on land located inside the Unit if significant runoff were to occur from the well sites (similar to impacts to soils and geology in the Preserve, as discussed above). However, the potential for impacts to vegetation within the Unit is not expected to exceed negligible levels, as discussed below. Where the clearing of all vegetation for the construction of the wellpads and access roads would occur, the vegetation type can be generally described as bottomland oak forest at Baptist #1 and cultivated pasture at Nordin #1. The vegetation composition at Baptist #1 consists of swamp chestnut oak (*Quercus michauxii*), water oak (*Quercus nigra*), sweet gum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), large-flower magnolia (*Magnolia grandiflora*), southern bayberry (*Morella caroliniensis*), yaupon (*Ilex vomitoria*), and bay-gall holly (*Ilex coriacea*). The vegetation at the Nordin #1 site consists of cultivated pasture grasses with a sparse canopy of loblolly pine, large-flower magnolia, sweet gum, and water oak.

**Impacts from In-Park Operations:** Under the proposed action, the wells would be directionally drilled into the Preserve at a substantial depth under the land surface, as described

under “Geology and Soils.” Therefore, there would be no impacts on vegetation either within or outside the Unit from the in-park subsurface oil and gas operation proposed.

**Impacts from Connected Actions:** The possible impacts to the vegetation inside the Unit from all phases of development would be similar to those described above under “Geology and Soils”, with the primary concern being off-site migration of contaminants and sediment that could adversely affect adjacent vegetation. Hydrocarbons, chemicals, and produced water can damage or kill vegetation, and soils and sediment can smother plants or coat leaves. Herbicides used to control site vegetation could migrate off-site, although this is unlikely if they are applied according to label instructions.

Mitigation that would reduce impacts to offsite vegetation would be similar to those measures listed for “Geology and Soils” and includes implementing spill prevention and control planning, berms, erosion control measures, and self-contained systems. There would be a low potential for migration of contaminants into the Unit; and if this were to occur, there would likely be ample time and space to respond to a release before there would be impacts on vegetation in the Unit. For these reasons, and with the implementation of mitigation measures, potential adverse impacts to vegetation in the Unit from development of these wells over the short- and long-term are expected to be negligible.

**Cumulative Impacts:** Existing and future oil and gas operations outside the Unit, maintenance of transpark oil and gas pipelines, urban development, and forestry operations adjacent to the Unit would contribute to cumulative impacts on vegetation. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve’s *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005), and up to moderate adverse impacts were identified from all actions that could affect vegetation in the cumulative impacts analysis area. The effects of the proposed action would not contribute more than minor adverse impacts to the overall cumulative impact of all these actions in the region.

**Conclusion:** There would be no impacts on vegetation from in-park oil and gas operations, and impacts from the connected actions would be minor based on the low chance of a catastrophic release, mitigation measures that would be implemented to prevent releases and off-site contamination, and the relatively flat site topography and low runoff potential. Therefore, the topic of vegetation in the Unit was dismissed from further analysis in this EA.

#### 1.4.9 Threatened and Endangered Species and Other Species of Management Concern

Under the Endangered Species Act of 1973 (ESA), the NPS has responsibility to address impacts to federally-listed, candidate, and proposed species. Also, NPS policy requires that State-listed species, and others identified as species of management concern by the park, are to be managed in parks in a manner similar to those that are federally-listed. Big Thicket National Preserve does not have any species of management concern identified. Thus, Federal and State-listed species would be addressed in this EA following Federal law and NPS policy.

Under NPS policy, the proposed operations would qualify for an exemption with no mitigation. Under this scenario, actions by the NPS with respect to the Endangered Species Act (1973) are non-discretionary. The wells would originate on lands located outside of the Unit, and the

wellbores would cross through the Unit at a sufficient depth to preclude any effect on surface resources (species or habitat). Therefore, the NPS has no Endangered Species Act § 7 responsibility or authority associated with the proposed wells, other than assessing potential impacts to threatened and endangered species from connected actions outside the Unit.

Appendix A provides the U.S. Fish and Wildlife Service (FWS) list of threatened or endangered species that may occur in Tyler County, Texas. The list includes two federally-listed endangered species; one migratory bird: the red cockaded woodpecker (*Picoides borealis*) and one plant: Texas trailing phlox (*Phlox nivalis* ssp. *Texensis*). The bald eagle (*Haliaeetus leucocephalus*), is included on the FWS list for Tyler County. The species was delisted as of June 2007; however, it is still afforded increased protection under the Bald and Golden Eagle Protection Act. Additionally, one candidate species, the Louisiana pine snake (*Pituophis ruthveni*) may be found in Tyler County, Texas. The FWS species list includes a brief description of the habitats required by these species. There is no federally-designated critical habitat in or near Big Thicket National Preserve.

Appendix B contains a current listing by the Texas Parks and Wildlife Department (TPWD) of a total of 46 threatened, endangered, and state-identified sensitive species that may occur in Tyler County, Texas. The TPWD species list includes a brief description of the habitats required by these species.

**Impacts from In-Park Operations:** As previously noted, under NPS policy, the proposed operation would qualify for an exemption with no mitigation. The wells would originate on lands located outside of the Unit, and the wellbores would cross through the Unit at a sufficient depth to preclude any effect on surface resources. Therefore, the NPS has no § 7 responsibility or authority associated with the proposed wells; however, an assessment of impacts from in-park operations shows that there would be no impacts on threatened or endangered species in the Unit from the subsurface oil and gas operations.

**Impacts from Connected Actions:** The Preserve has not documented any federally or State-listed threatened and endangered species in the area of the proposed wells. During 2012, no federally-listed species were documented in the Turkey Creek Unit during vegetation mapping and sampling.

Fort Apache retained BIO-WEST, Inc. to conduct an endangered species survey of the area surrounding the proposed wellpads location and access roads. In addition to their general habitat review, target site reconnaissance was performed by BIO-WEST, Inc. to determine if any listed species were observed at the proposed site. A field investigation was conducted on May 1, 2013 (BIO-WEST and Stephanie Burgess, NPS). There were no indications of any State or federally-listed threatened or endangered species found on or in the vicinity of the proposed wellpads, or the combined access road corridors.

The design of this proposal would avoid any surface disturbance of habitat in the Preserve. Thus, no federally-listed, candidate or proposed species, nor State-listed species, on the NPS acreage would be directly impacted by the proposal through removal or disturbance of soils or vegetation. Less direct, yet potential impacts to species occupying the Unit could occur through noise disturbance, loss and fragmentation of habitat on adjacent private lands, and potential for spills of oil and other produced fluids. However, as previously described, the potential for more than short-term disturbances from noise or contaminating substances is unlikely, based on site

conditions and mitigation employed to reduce risk of runoff. Mitigation for potential oil spills which could affect habitat in the Unit is included in Fort Apache's application.

NPS determined that the directional drilling and production of the Fort Apache Nordin #1 and Baptist Foundation #1 wells would have no effect on federally-listed threatened and endangered species or their habitat in or outside the Unit, nor would there be an effect to the State-listed species which may possibly occur in the Unit. This determination is based upon a combination of factors. First, the habitat in the project area is not suitable for any of the species identified by U.S. Fish and Wildlife Service. Second, there is an absence of observations of any species documented in Appendix A, Appendix B or Preserve records based on site-specific surveys completed by the proponent. Third, the depth with which the wells would enter the Unit eliminates the possibility of surface habitat disturbance. Lastly, mitigation measures have been designed into the project to reduce impacts to wildlife.

**Cumulative Impacts:** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities, urban development and forestry operations adjacent to the Unit could impact threatened or endangered species, and other species of management concern. Over time, protection provided to species of management concern would maintain and improve habitat for those species in the Preserve, resulting in cumulative beneficial impacts. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005), and up to moderate adverse impacts were identified from all actions that could affect threatened and endangered species in the cumulative impacts analysis area. Considering the lack of habitat for listed species at the proposed well sites and the fact that the surveys conducted found no listed species at the project location, the effects of the proposed action would have no effects to species of management concern.

**Conclusion:** There would be no impacts on species of management concern from in-park oil and gas operations, and the connected actions would have no effect on federally-listed threatened and endangered species or their habitat in or outside the Unit, nor would there be an effect on any State-listed species within the Unit from connected actions, based on the lack of habitat for these species at the site, field survey results that indicate these species are not present, and mitigation that would minimize impacts to wildlife in general. Therefore, the topic of species of management concern in and outside the Unit was dismissed from further analysis in this EA.

#### 1.4.10 Cultural and Ethnographic Resources

Under § 106 of the National Historic Preservation Act of 1966, as amended, the NPS has a responsibility to consider the effects undertakings may have on cultural resources listed on or eligible for listing on the National Register of Historic Places. The law also requires that agencies discuss their actions, before taking them, with the State Historic Preservation Office or Tribal Historic Preservation Officer, the Advisory Council on Historic Preservation, if necessary, as well as other consulting parties, such as certified local governments.

Under the proposed action, the wells would be directionally drilled from a surface location outside the Unit. The wellbores would cross into the Unit at a depth below usable quality



groundwater to extract hydrocarbons and other fluids from beneath the Unit. The wells would qualify for an exemption with no mitigation because the wells would originate on land located outside of the Unit, and the wellbores would cross through the Unit at a sufficient depth so as to have no impact on the surface of the Unit. Under this scenario, actions by the NPS with respect to the National Historic Preservation Act are non-discretionary. Because the in-park operations would have no effect on cultural resources inside the Unit, the NPS has no § 106 responsibility, nor authority, associated with the wells for the proposed in-park operations for which a 9.32(e) exemption is being evaluated. As part of the NEPA analysis, however, the NPS is providing the following analysis of the effects of the action on cultural resources. Impacts from in-park operations for the proposed wells are discussed below and dismissed from further analysis, along with impacts outside the Turkey Creek Unit, because recent cultural surveys have been conducted for other proposed actions (seismic surveys) in the vicinity of these wells, and no cultural resources or sites were discovered within the immediate vicinity of, or adjacent to, the wells.

**Impacts from In-Park Operations:** There is no potential for surface or subsurface impacts within the Unit from downhole operations occurring inside the Unit. Therefore, in-park operations would have no effect on cultural resources.

**Impacts from Connected Actions:** As part of the NEPA analysis, the NPS also considered the impacts of the connected actions on cultural resources in and outside the Turkey Creek Unit. The NPS has no authority under 36 CFR § 9.32(e) to require Fort Apache to contract an archeological survey in the project area on lands adjacent to the Unit. Recent archeological surveys were conducted for other proposed actions in the immediate area and no cultural resources were recorded during these surveys.

However, there are five previously recorded sites in the extended areas surrounding the project vicinity including three historic-age structures dating from the 19th to mid-20th centuries, a 19th-century cemetery, and 1 aboriginal artifact scatter that appears to date to the Middle to Late Archaic periods based on the presence of 1 temporally diagnostic projectile point. All five sites are currently considered to be of undetermined eligibility for inclusion in the National Register of Historic Places. No previously recorded cultural resources are present within or adjacent to the proposed project facilities, though the project locations have not been previously surveyed for cultural resources. The possible impacts to the cultural resources inside the Unit from all phases of development would be similar to those described above under “Geology and Soils”, with the primary concern being off-site migration of contaminants that could adversely affect cultural resources. Hydrocarbons, chemicals, and produced water could damage cultural artifacts. As previously described, topography within the wells is relatively flat. However, this cultural landscape bears little resemblance to its historical condition due to the many human caused land use changes including timber harvests, cattle grazing, oil and gas exploration, roadway construction and residential development, and the creation of Big Thicket National Preserve, all affecting the landscape in the area. The greatest effects of the proposed project on the cultural landscape, during drilling operations, would be temporary.

Mitigation that would reduce impacts to offsite cultural resources would be similar to those measures listed for “Geology and Soils” and includes spill prevention and control planning, berms, erosion control measures, and self-contained systems (see Tables 6, 7, and 8). There would be a low potential for migration of contaminants into the Unit; and if this were to occur, there would be ample time and space to respond to even a major release before there would be

impacts on previously discovered cultural resources in the Unit. It is possible that undiscovered cultural resource sites exist in the Unit, but the mitigation measures previously discussed are expected to confine potentially adverse impacts. Furthermore, there is a low probability that the area immediately adjacent to the wellpads contains cultural resources due to its proximity to Turkey Creek. Therefore, adverse impacts to cultural resources both inside and outside the Turkey Creek Unit are not expected from the development of these wells.

**Cumulative Impacts:** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, and forestry operations adjacent to the Unit could impact cultural resources in the analysis area; however, compliance with the National Historic Preservation Act is anticipated to result in projects undertaken within the Unit having no adverse effect. Over time, cultural resources outside the Unit could be incrementally lost, with cumulative adverse impacts on cultural resources and traditional cultural practices in the region. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005), and up to moderate adverse impacts were identified from all actions that could affect cultural resources in the cumulative impacts analysis area. However, since no adverse impacts to cultural resources are expected inside or outside the Unit, the effects of this part of the proposed action represent no effect to the overall cumulative impact of all actions in the region.

**Conclusion:** Because there would be no cultural resources affected in the Unit from in-park operations or connected actions the topic of cultural resources was dismissed from further analysis in this EA.

#### 1.4.11 Climate Change Pollutants

On-going scientific research has identified the potential impacts of climate changing pollutants on global climate. These pollutants are commonly called “greenhouse gases” and include carbon dioxide, CO<sub>2</sub>; methane; nitrous oxide; water vapor; and several trace gas emissions.

Through complex interactions on a regional and global scale, these emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although climate changing pollutant levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO<sub>2</sub> concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically referred to as global warming.

Increasing CO<sub>2</sub> concentrations also lead to preferential fertilization and growth of specific plant species. Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (GISS 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern hemisphere. Figure 4 demonstrates that northern latitudes (above 24°N) have exhibited temperature increases of nearly 1.2°C (2.1°F) since 1900, with nearly a 1.0°C (1.8°F) increase since 1970.

Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of these “greenhouse gases” are likely to accelerate the rate of climate change. The Intergovernmental Panel on Climate Change (IPCC) has recently completed a comprehensive report assessing the current state of knowledge on climate change, its potential impacts, and options for adaptation and mitigation. In lieu of printing of this report, it is available on the IPCC web site (<http://www.ipcc.ch>). According to this report, global climate change may ultimately contribute to a rise in sea level, destruction of estuaries and coastal wetlands, and changes in regional temperature and rainfall patterns, with major implications to agricultural and coastal communities.

The IPCC has suggested that the average global surface temperature could rise 1 to 4.5 degrees Fahrenheit (°F) in the next 50 years, with significant regional variation. The National Academy of Sciences (2006) has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer models indicate that such increases in temperature will not be equally distributed globally, but are likely to be accentuated at higher latitudes, such as in the Arctic, where the temperature increase may be more than double the global average. Also, warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Vulnerabilities to climate change depend considerably on specific geographic and social contexts.

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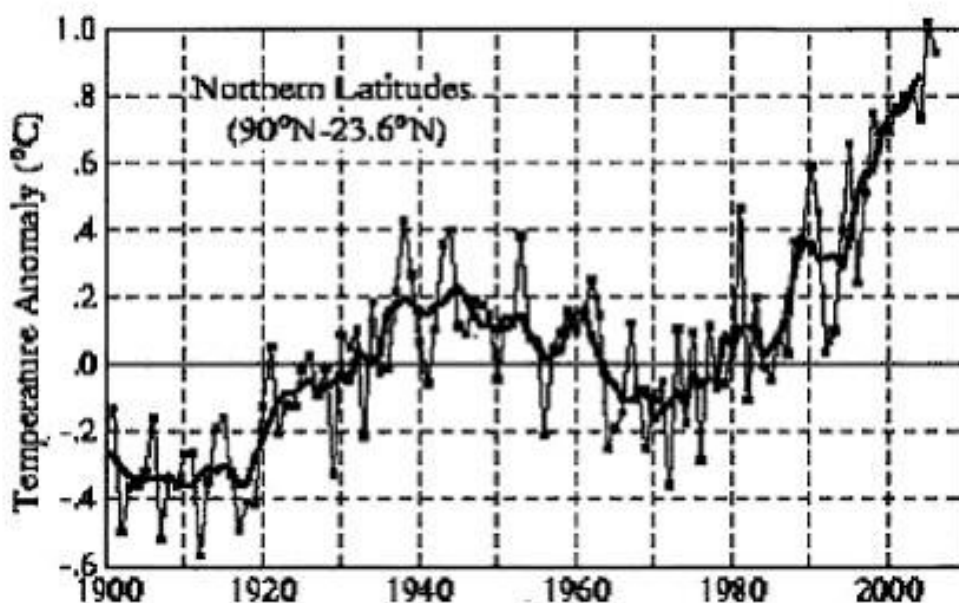


Figure 2. Annual Mean Temperature Change for Northern Latitudes (24-90°N)

Source: GISS (2007)

NPS recognizes the importance of climate change and the potential effects it may have on the natural environment. The drilling for oil and gas process may generate emissions of climate

changing pollutants. The five proposed wells contemplated in this assessment would involve the use of vehicles to access operations locations; the use of combustion engines in earth-moving equipment to clear areas to construct oil and gas access roads and wellpads; and the use of combustion engines to drill the wells. Park operations and recreational activities that involve the use of combustion engines would also generate CO<sub>2</sub> and methane. Wind erosion from disturbed areas and fugitive dust from roads along with entrained atmospheric dust has the potential to darken glacial surfaces and snow packs resulting in faster snowmelt. Other activities may help sequester carbon, such as managing vegetation to favor perennial grasses and increase vegetative cover, which may help build organic carbon in soils and function as “carbon sinks”. Anticipated emissions from oil and gas operations as described above Section 1.4.6 are anticipated to be low.

The assessment of climate changing pollutant emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.” The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. Currently NPS does not have an established mechanism to accurately predict the effect of development activities in this assessment on global climate change (CCSP 2006). However, potential impacts to air quality due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species’ spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations would be likely to impact the timing and quantity of snowmelt, which, in turn, could impact aquatic species.

Because of the low emissions anticipated from drilling two wells, it is reasonable to expect that there would be no effect on climate change; therefore, this topic was dismissed from further analysis in this assessment.

## 2.0 ALTERNATIVES

Two alternatives are described and evaluated in this EA, Alternative A, No Action, and Alternative B, Proposed Action, Application as Submitted. Alternatives considered but dismissed from further analysis are described and the reasons for dismissing them are given. Analyses for selecting the environmentally preferred alternative and the NPS preferred alternative are also provided.

### 2.1 Alternative A, No Action

The No Action Alternative is required under the National Environmental Policy Act (NEPA) and establishes a baseline for comparing the present management direction and environmental consequences of the action alternative. Under No Action, the surface location and wells would not be developed.

### 2.2 Alternative B, Proposed Action, Application as Submitted

Under Alternative B, Fort Apache would directionally drill the wells as proposed in their application. Figures 3 and 4 show the surface location and bottomhole target coordinates with different background imagery and include the Unit boundary, contours, local roads and land features.

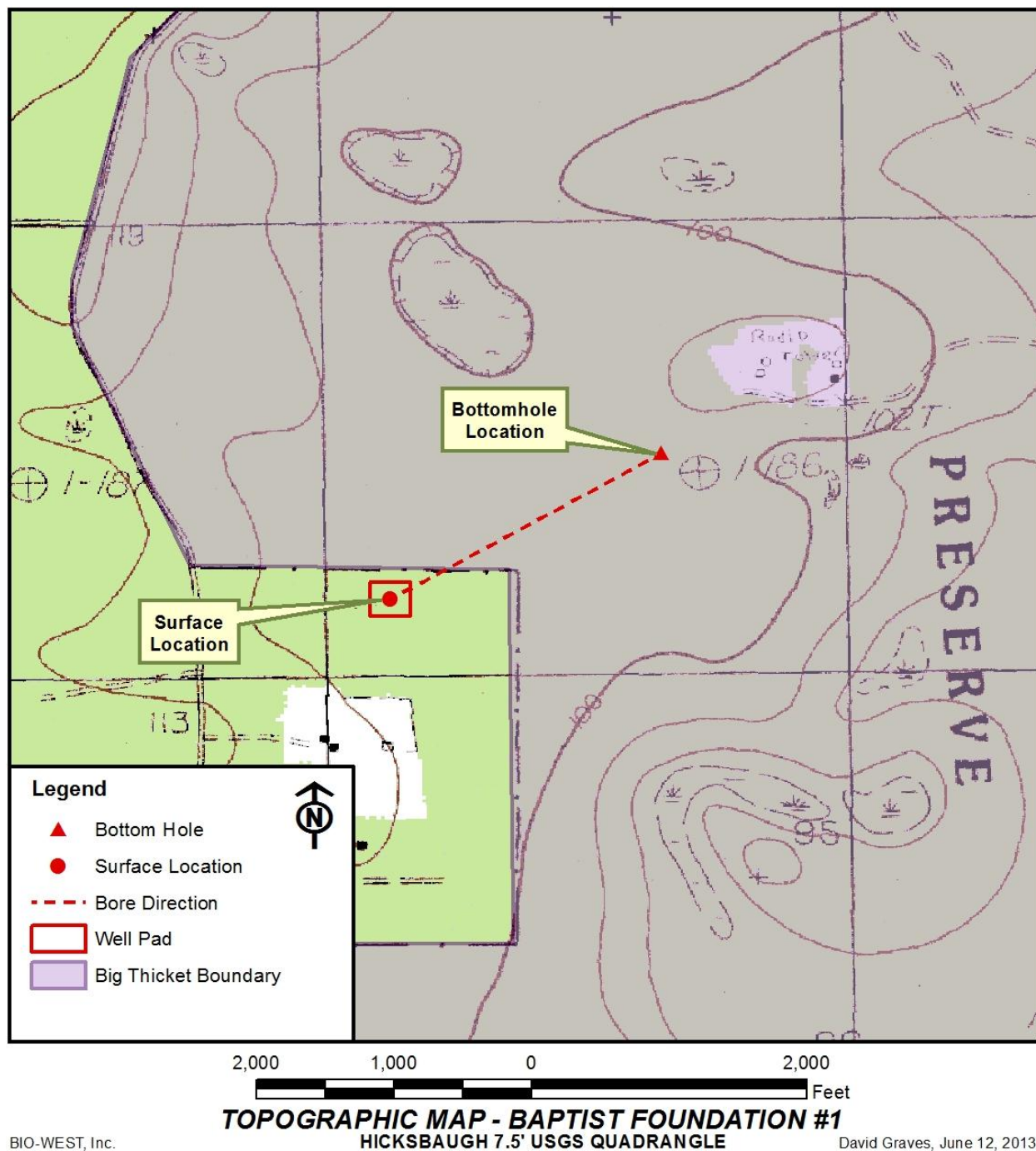
#### 2.2.1 Location of the Well

The surface and bottomhole coordinates for the two wells are provided in Table 6, below (State Plane, NAD 27, Texas, Central Zone, Survey Feet, given in UTM).

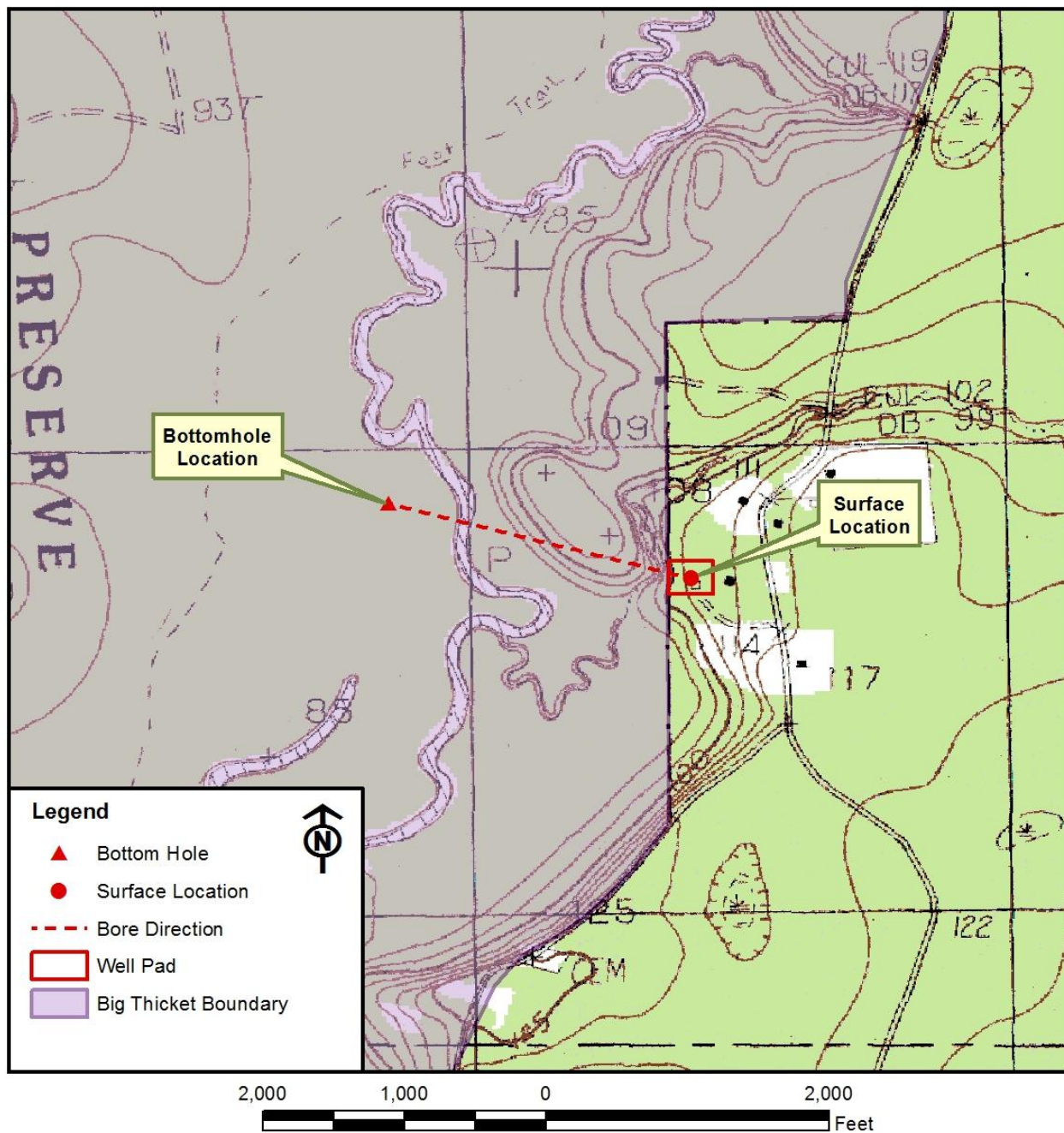
**Table 6. Surface and Bottomhole Location Coordinates**

<b>Well Name</b>	<b>Surface Location</b>	<b>Bottomhole Location</b>
Nordin #1	X = 3889043 Y = 367061	X = 3887215 Y = 367450
Baptist Foundation #1	X = 3881969 Y = 368036	X = 3883134 Y = 369168

Figure 3. Maps depicting Baptist Foundation #1 and Nordin #1 and the Turkey Creek Unit (USGS 7.5' Hicksbaugh Quad Background).





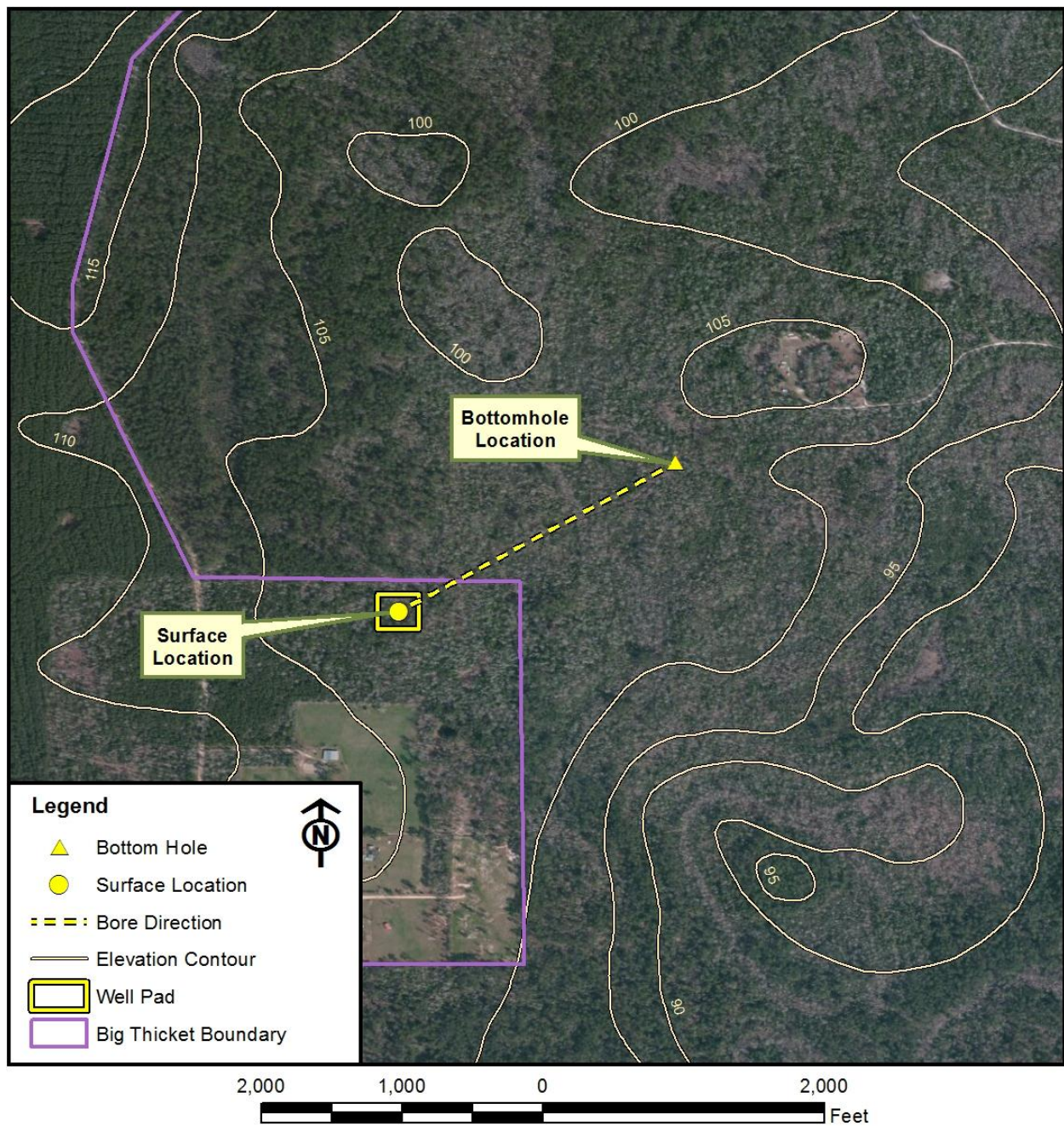


**TOPOGRAPHIC MAP - NORDIN #1**  
**HICKSBAUGH 7.5' USGS QUADRANGLE**

BIO-WEST, Inc.

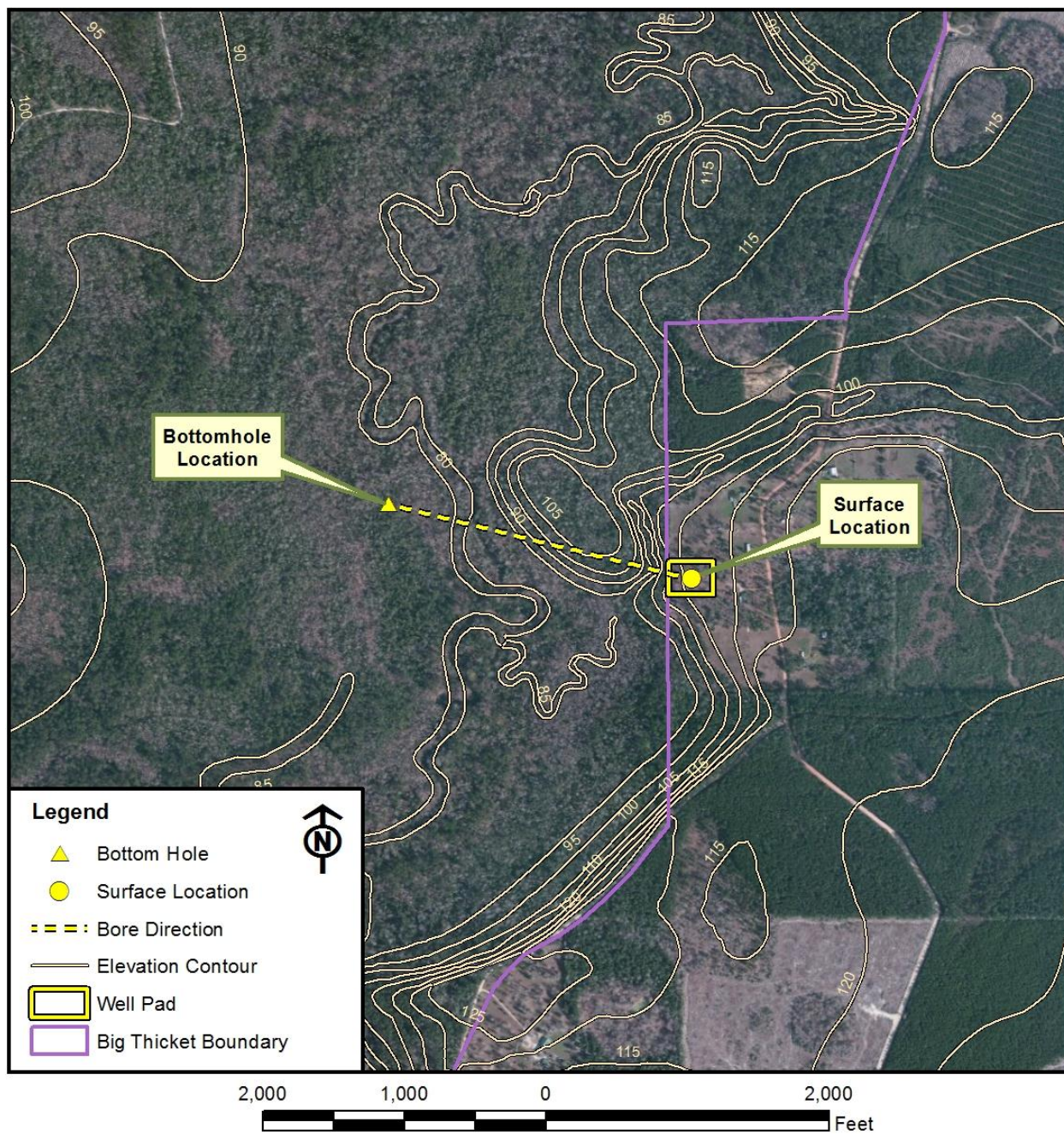
David Graves, June 12, 2013

Figure 4. Maps depicting Baptist Foundation #1 and Nordin #1 and Turkey Unit  
(2010 Aerial Image Background).



**CONTOUR ELEVATIONS (HYPSOGRAPHY) - BAPTIST FOUNDATION #1**  
 BIO-WEST, Inc. David Graves, June 12, 2013





# **CONTOUR ELEVATIONS (HYPSOGRAPHY) - NORDIN #1**

BIO-WEST, Inc.

David Graves, June 12, 2013

### 2.2.2 Access

Access to the Baptist Foundation #1 project location would be along a newly constructed road that would be approximately 1,150 feet long by 30 feet wide (totaling 34,500 sq. ft. or 0.79 acre) and extending easterly from Hicksbaugh Road to where it meets the northwestern corner of the wellpad. The access to the Nordin #1 project location would be along a newly constructed road that would be approximately 320 feet long by 30 feet wide (totaling 9,600 sq. ft. or 0.22 acre) and extending westerly from Pineville Road to where it meets the northeastern corner of the wellpad.

### 2.2.3 Wellpads

The Nordin #1 wellpad would measure approximately 230 feet x 290 feet (66,700 sq. ft. or 1.53 acres); and Baptist Foundation #1 wellpad would measure 250 feet x 270 feet (67,500 sq. ft. or 1.55 acres). Both locations would be constructed by mechanically clearing the area with heavy machinery. Gravel would be placed on the pad (and access road) to provide the all-weather work surface necessary to drill and operate the well. The Baptist Foundation #1 well would be sited approximately 82 feet south of the Unit boundary. The Nordin #1 well would be sited directly east of the Unit boundary. A 100-foot x 100-foot washout/emergency (reserve) pit excavated to a clay base would be constructed adjacent to the pad site to be used as a retention basin for washing the steel rig tanks and to contain any excess runoff from the area of the rig equipment. A fresh-water well would be drilled on site. Construction of the Nordin #1 and Baptist Foundation #1 wellpads would not require fill into waters of the U.S. and, therefore, would not require a § 404 permit from the U.S. Army Corps of Engineers.

### 2.2.4 Drilling

Fort Apache's proposed operations inside the Preserve would consist of drilling hole from a point below approximately 2,100 feet (Nordin #1) and approximately 3,250 feet (Baptist Foundation #1) TVD, where the wellbore crosses the unit boundary, to a target depth (TD) of 8,200 feet TVD, resulting in about 6,100 feet (Nordin #1) and 4,950 feet (Baptist Foundation #1) TVD of wellbore being within the Unit. The wellbore would then have a 10 3/4 surface casing set and cemented to a depth of 1,000 feet TVD. The wells would then be completed, or plugged and abandoned as a dry hole.

As per RRC Groundwater Advisory Unit (0051R Transition Form Rev. 9/1/2011), the base of usable-quality water that must be protected is estimated to occur at a depth of 1,800 feet below the land surface. Moreover, the fresh water contained in the interval from the land surface to a depth of 1,000 feet must be isolated from water in underlying beds. Fort Apache would comply with all provisions of the Railroad Commission of Texas' statewide oil and gas rules to drill and eventually plug the wells to ensure the protection of usable quality water zones.

The proposed drilling period is approximately two weeks, with an additional two-week completion period. All mud and cuttings would be contained within a closed-loop, tank system to recirculate drilling mud. Figures 5 and 6 show the proposed drilling facility and production facility layouts.

Figure 5. Proposed Nordin #1 Well Drilling Facility.

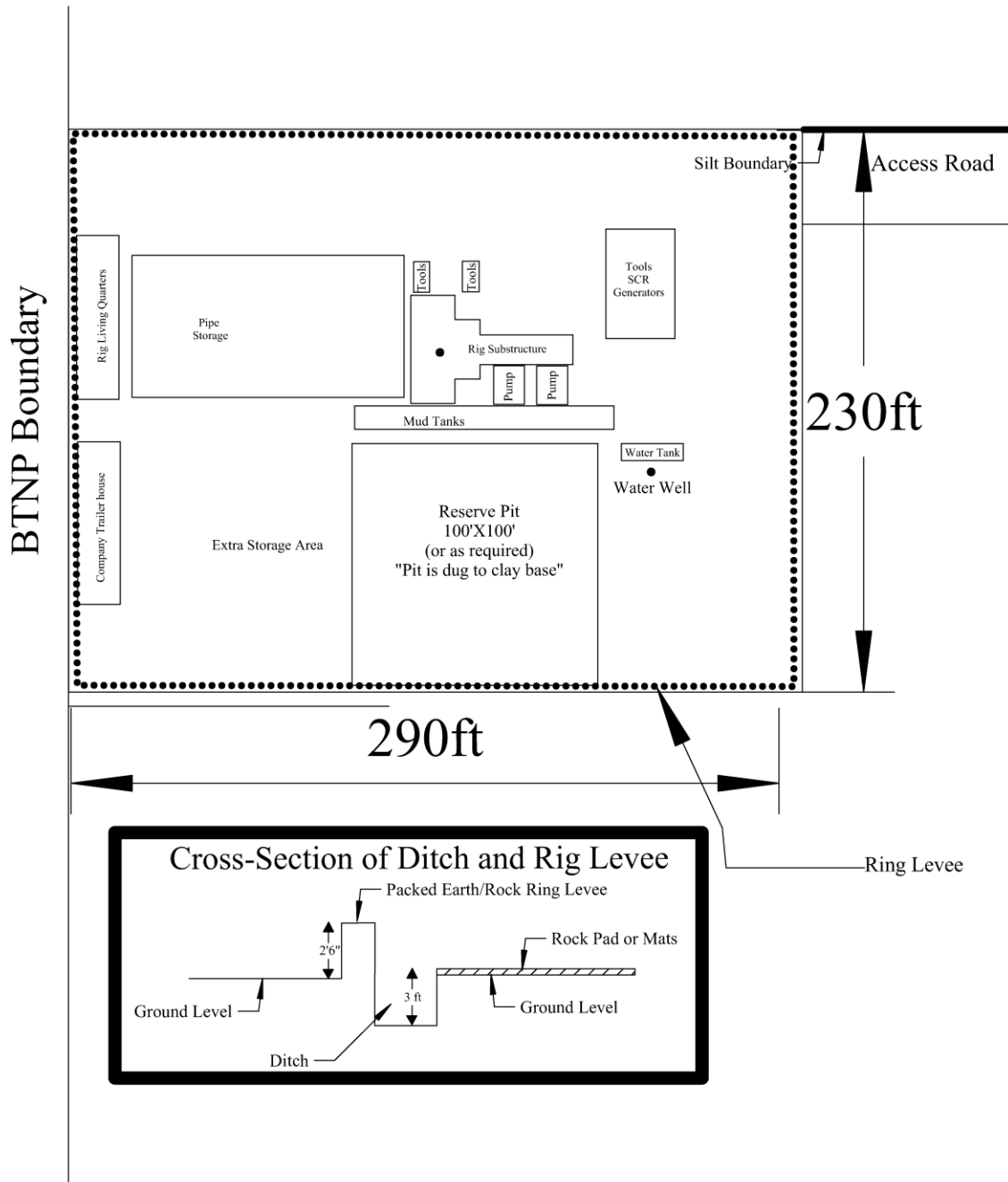
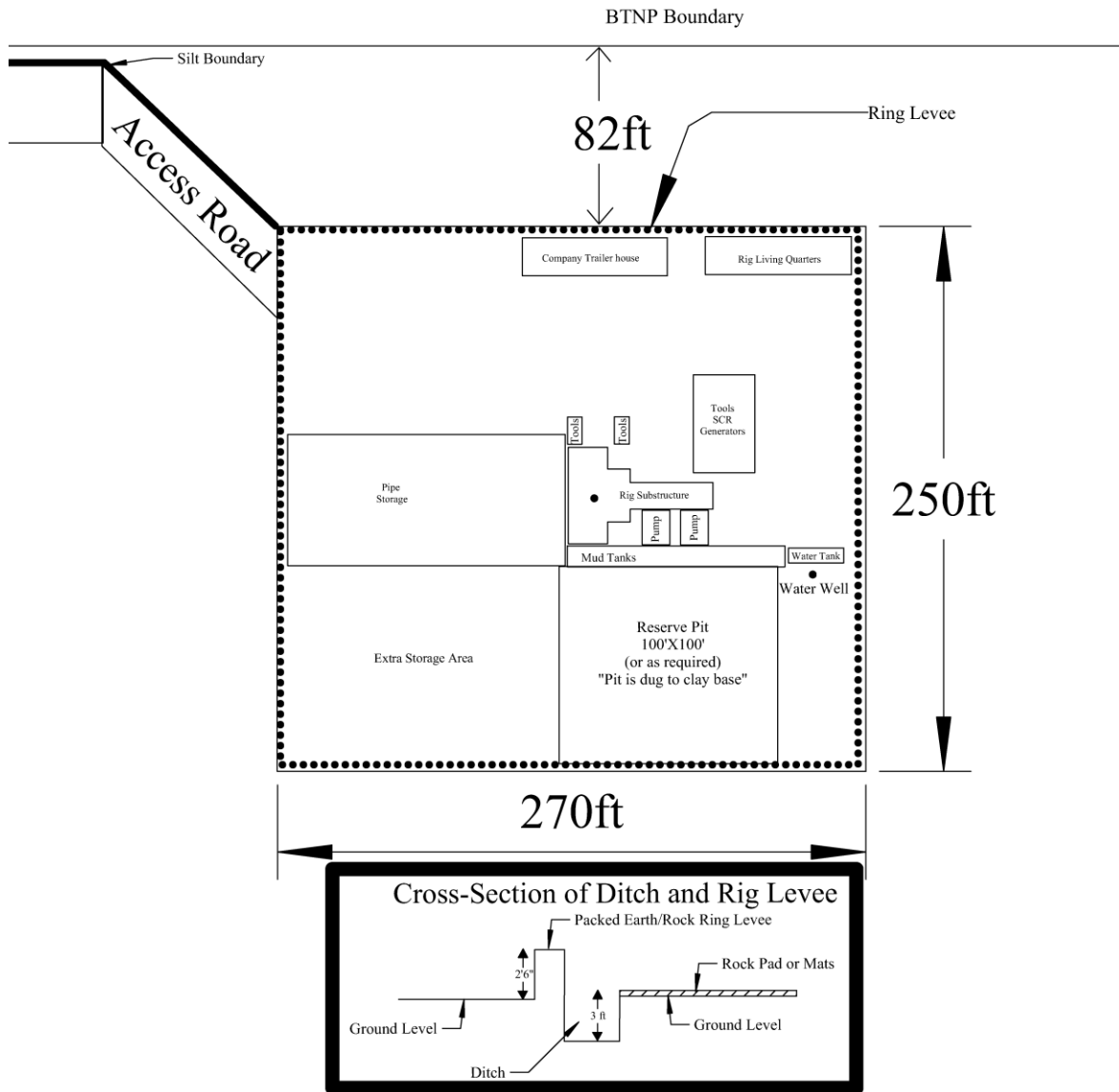


Figure 6. Proposed Baptist #1 Well Drilling Facility.



### **2.2.5. Flowline**

Should the wells be successfully completed as producing oil and/or gas wells and Fort Apache deems necessary, a flowline would be constructed to extend from the wellbore location to an existing infrastructure outside of the Unit boundary. The flowline would be entirely within a new flowline corridor. The flowline, of wrapped and welded steel, would be buried to a minimum depth of 3 feet below the surface.

### **2.2.6. Production Facilities**

If oil and/or gas are discovered and the proposed wells are completed as a producer, production facilities would be constructed within the areas utilized to drill the wells. The production facility would be developed on the existing rock pad in approximately two weeks. Features could include the wellhead with a Christmas tree valve system, line heaters and separation devices, a glycol dehydration unit, a tank battery consisting of a water tank and two (minimum) condensate tanks, a series of flowlines connecting the components, and a gas sales line and meter. The facility would be developed and maintained according to the Fort Apache Spill Prevention Control Countermeasures (SPCC) Plan and 40 CFR 112.7.

The tank battery would have an earthen berm or retaining wall (covered with rock to reduce erosion) surrounding the feature that provides secondary containment with a capacity of 1.5 times the capacity of the single largest tank. The approximate height of the berm would be 2 feet. The off-load connection would have a safety drip device below it to catch any dripping fluid lost during hook-up and disconnection.

All oil and water (storage) lines from the production facility to the tanks would be buried at a depth of 1 foot below the surface.

Figure 7. Proposed Nordin #1 Well Production Facility Layout

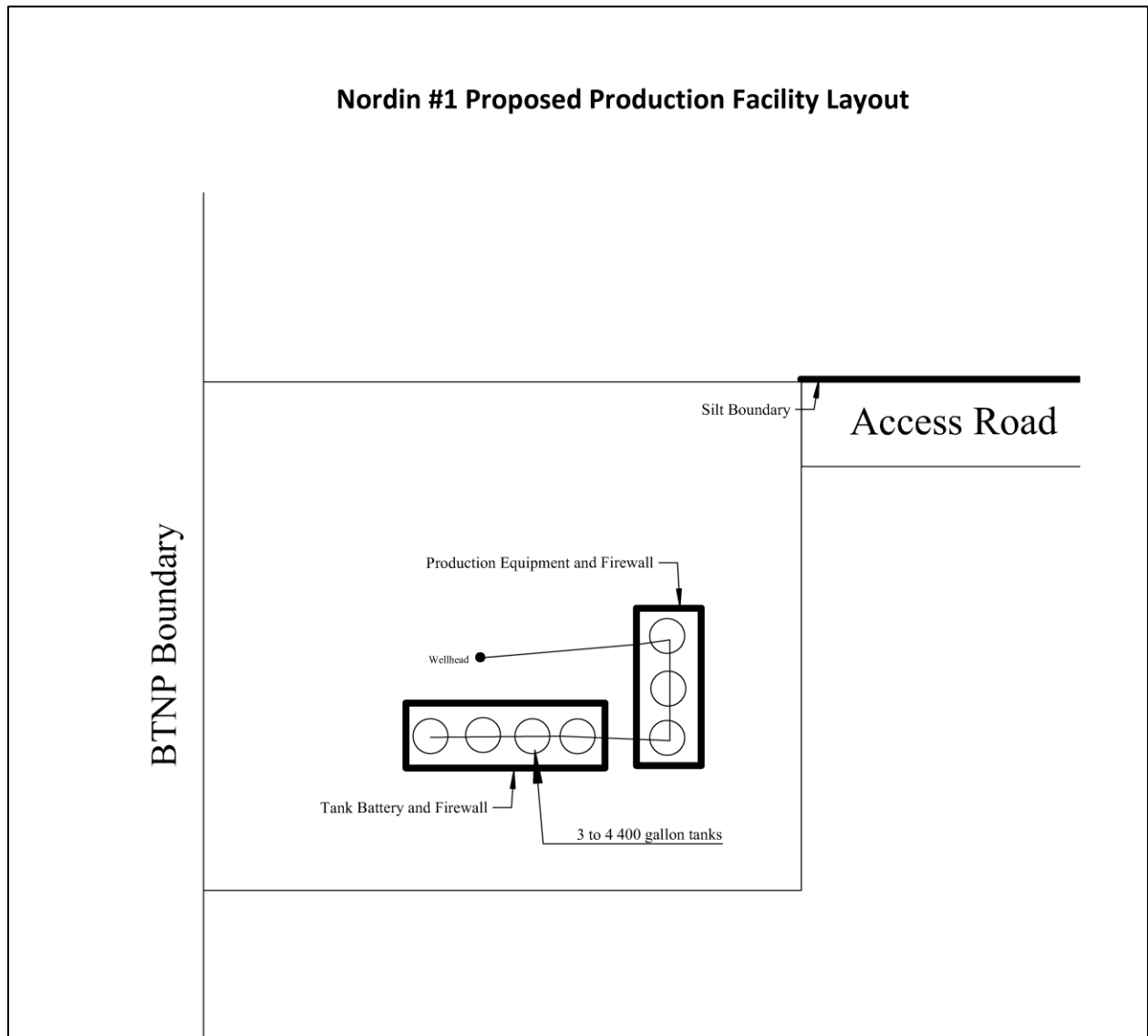
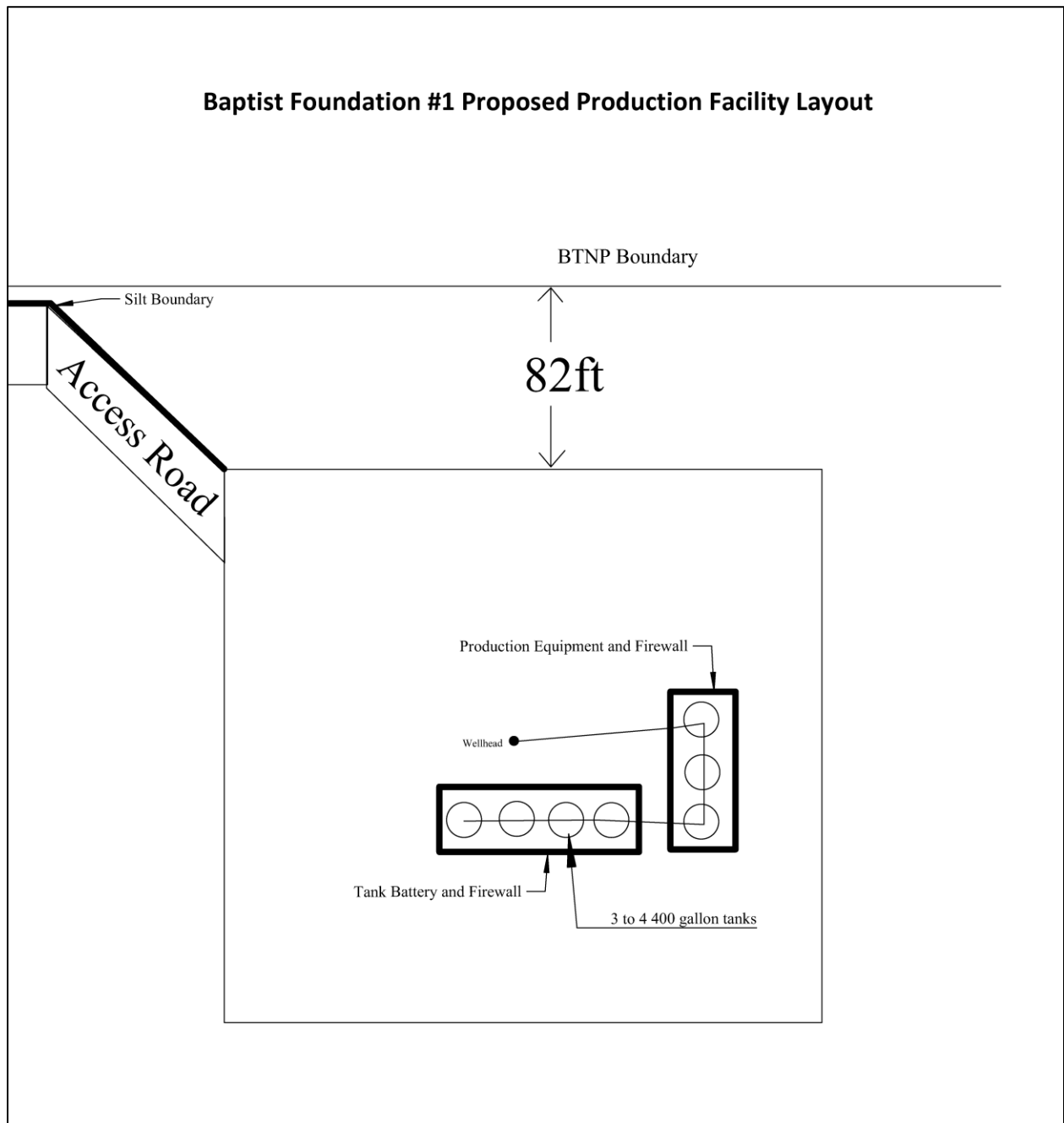


Figure 8. Proposed Baptist #1 Well Production Facility Layout



## 2.2.7 Reclamation Plans

Once drilling and completion operations are finished, or if the wells are not productive, the portion of the drill site no longer needed would be reclaimed, and the washout/emergency and water pits would be filled with native soil in accordance with RRC Statewide Rule 8. Upon final abandonment, the equipment and all related materials would be removed, the area returned to its original contour, and the wells plugged according to RRC Statewide Rules 13 and 14. The site would be reclaimed in conformance with the surface use agreement between the surface owner and Fort Apache. The disposal of excess drill fluids and water would occur off-site or downhole depending on Fort Apache obtaining the necessary permits and approvals.

## 2.2.8. Mitigation Measures

In order to reduce impacts on the human environment, Fort Apache has incorporated the following mitigation measures listed in Table 7 as part of their applications for the proposed operations. While many of the mitigation measures are required by other State and Federal requirements, the NPS does not have the regulatory authority under § 9.32(e) to require mitigation under option #1, Exemption with No Mitigation.

**Table 7. Mitigation Measures for the Nordin #1 and Baptist Foundation #1 Wells Under the Proposed Action (Alternative B).**

<b>No.</b>	<b>Mitigation Measures - Proposed Action (Alternative B)</b>	<b>Resource(s) Protected</b>	<b>Reference in § 9.32(e) Application</b>	<b>Required or Voluntary</b>
<b>Project Planning and Site Construction</b>				
1	Prepare and comply with a Spill Prevention Control and Countermeasure (SPCC) Plan	all natural resources, and human health and safety	Section 6	EPA requirement as per 40 CFR, Chapter 1, Subchapter D, Part 112 – Oil Pollution Prevention
2	Site the wellpads, access road, pipeline and production facilities outside of the Turkey Creek Unit boundary.	all natural resources and values in Big Thicket National Preserve	Section 4, p.1; Section 6, p. 1; and Section 7, p. 1	Required to qualify for NPS exemption under 36 CFR § 9.32(e)
3	Use existing openings to the extent possible and use existing roads to minimize construction of access road (at Nordin)	soils, water resources, floodplains, wetlands, vegetation	Section 6, pp. 1 & 2	Voluntary
4	Schedule construction to avoid rain events	soils, vegetation	Section 7, p. 1	Voluntary
5	Construct ditch 3-foot deep ditch and 2.6-foot high packed earth/rock ring levee around the wellpads	water resources, vegetation, soils	Section 4, page 6	Voluntary



<b>No.</b>	<b>Mitigation Measures - Proposed Action (Alternative B)</b>	<b>Resource(s) Protected</b>	<b>Reference in § 9.32(e) Application</b>	<b>Required or Voluntary</b>
6	Construct 100-foot x 100-foot washout/emergency pit lined with clay	water resources, soils, vegetation	Section 4, page 1	Construction, design and maintenance of pit in conformance with RRC Statewide Rule 8, liner would be voluntary
<b>Well Drilling</b>				
7	Directionally drill wells so that wellbores intercepts useable quality groundwater outside of the Preserve	groundwater in Preserve	Section 4, drilling diagram	Required to qualify for NPS exemption with no mitigation measures
8	Use a closed-loop, mud tanks system	water resources, soils, vegetation	Section 4, pp. 1-2	Voluntary
9	Install construction grade silt fencing around construction site and treat vegetation between wellpad and roadsides with herbicide	vegetation and groundwater	Section 4, pp. 2	Voluntary
10	Set surface casing according to State of Texas RRC requirements	groundwater	Section 4, pp. 3 and 4	RRC requirement as per Statewide Rule 13(b)(2)
11	Dispose of drilling mud and well cuttings off-site or downhole	all natural resources located on and adjacent to wellpads	Section 4, pp 1-2	Disposal in accordance with RRC Statewide Rule 8
<b>Production</b>				
12	Reduce size of wellpads after drilling completion and fill in washout/emergency and water pits with native soil in accordance with Statewide Rule 8	soils, vegetation, water resources	Section 4, p. 2	Reduction in wellpad size voluntary, fill in washout/emergency and water pits required by RRC Statewide Rule 8(d)(4)(G)
13	Construct a 2-foot earthen, rock covered berm around the tank battery with a capacity 1.5 times the largest tank	water resources, soils, vegetation	Section 4, p. 2	EPA requirement as per 40 CFR, Chapter 1, Subchapter D, Part 112.9(c)(2) to construct secondary containment capable of holding the volume of largest tank plus sufficient freeboard to contain precipitation, voluntary to build capacity for holding 1.5 times volume of largest

No.	Mitigation Measures - Proposed Action (Alternative B)	Resource(s) Protected	Reference in § 9.32(e) Application	Required or Voluntary
				tank
14	Install a safety drip device on the off-load connection	soils	Section 4, p. 2	Voluntary
15	Use mulching, seeding, silt fences, and hay bales	water resources, soils	Section 4, p.1	Voluntary
16	Wind-erosion preventive measures would include watering if dust conditions are determined to be detrimental during construction	air quality, vegetation, water resources	Section 4, p. 1	Voluntary
17	Use 26 hp compressor and muffler.	soundscapes	Section 4, pp. 2	Voluntary
18	Notify regulatory authorities and Big Thicket Superintendent within 24 hours in the event of a release or spill of hydrocarbon condensate, crude oil, or other contaminating substance exceeding five barrels	all natural resources	Section 4, p. 3	RRC requirement to report well blowout/well control problems or spills exceeding 5 barrels as per Statewide Rules 20 and 91(e), in the event of any condensate spill, operator must consult with RRC as per Statewide Rule 91(b) and any spills of crude oil into water must be reported to the RRC as per Statewide Rule 91(e)(3), spills of other contaminating substances may require reporting to the TCEQ or EPA under a variety of laws and regulations depending on the substance released, the amount, whether or not the release was into soil, water or air, whether the release was ongoing, etc., notification to NPS voluntary
<b>Well Plugging</b>				
19	Consult RRC district office regarding well plugging, plug wells to	all natural resources	Section 4, pp. 2 and 4	RRC requirement as per Statewide Rule 14, compliance with

No.	Mitigation Measures - Proposed Action (Alternative B)	Resource(s) Protected	Reference in § 9.32(e) Application	Required or Voluntary
	isolate each productive horizon and usable water quality strata according to RRC Statewide Rules 13 and 14 and Bureau of Land Management Onshore Oil and Gas Order No. 2, § III.G., Drilling Abandonment Requirements			Onshore Oil and Gas Order No. 2 voluntary
<b>Reclamation</b>				
20	If a well does not produce, equipment and related materials would be removed and the area would be restored to original contours and/or as agreed to with the surface owner.	all natural resources	Section 4, p. 2	RRC requirements as per Statewide Rule 14(d)(12), this section of the Statewide Rules requires an operator to "contour the location to discourage pooling of surface water at or around the facility site," restoration of original contour voluntary
21	Reclamation in conformance with the Land Entry Permit or surface agreement between surface owner and Fort Apache	all natural resources	Section 4, p. 2	RRC requirements as per Statewide Rule 14(d)(12), required by landowner as per surface use agreement

### 2.3 Alternatives Considered but Dismissed from Further Analysis

During the scoping process, alternative locations were considered for siting the wells. These alternative locations were discussed in consultation with Fort Apache, BIO-WEST, Inc. (Fort Apache's contracted consultant), and NPS staff at the Preserve, Regional and Washington Offices. NPS acquisition of the mineral rights that are part of Fort Apache's proposal was also considered. For the reasons described below, these alternatives were dismissed from further analysis.

#### 2.3.1 Locate the Well inside the Preserve

Drilling vertical wells from a surface location inside the Unit directly over the bottomhole target was considered. Also considered were directional wells from a surface location(s) within the Unit. This alternative would have entailed access into the Unit and an approved plan of operation. There are no existing roads inside the Unit near the location considered; therefore, a new access road would have been needed. Access through the Unit would have required crossing and potential development within streams, wetlands and floodplains. Although drilling

a well from inside the Unit is technically feasible, this alternative was judged to be unreasonable in terms of economics, logistics, degree of environmental impact, and time required to implement the proposal. Alternative locations for siting the wells within the Unit were dismissed from further analysis because they would not meet the objectives as well as those being evaluated in detail.

### **2.3.2 NPS Acquisition of the Mineral Rights that are Part of Fort Apache's Proposal**

In the event that a proposed operation cannot be sufficiently modified to prevent the impairment of park resources and values, the NPS may seek to extinguish the associated mineral right through acquisition, subject to the appropriation of funds from Congress. With respect to Fort Apache's directional drilling proposal, mitigation measures were identified and applied, most notably directional drilling from a surface location outside the Preserve. These mitigation measures substantially reduced the potential for adverse impacts to Unit resources and values, visitor use and experience, and public health and safety. As a result, the acquisition of mineral rights was dismissed from further consideration in this EA.

## **2.4 Environmentally Preferable Alternative**

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

The environmentally preferred alternative for drilling and producing a directional well is based on these national environmental policy goals. Under Alternative A, No Action, the wells would not be drilled. Because there would be no new impacts, Alternative A would provide the greatest protection of the area and Unit resources and values, thereby making it the environmentally preferable alternative.

Fort Apache's Proposal, Alternative B, would have greater effects on the environment because of the drilling and production activities. Although mitigating measures would reduce effects to Unit resources and values, there would still be effects, and, therefore, this alternative would not meet the Park Service's environmental policy goals as well as the No Action Alternative.

## **2.5 National Park Service Preferred Alternative**

The environmentally preferable alternative is Alternative A because it surpasses Alternative B in realizing the full range of national environmental policy goals as stated in CEQ regulations implementing NEPA (43 CFR 46.30). However, the NPS preferred alternative is Alternative B, Proposed Action, because Fort Apache holds valid oil and gas lease rights which if developed, would not result in major impacts or an impairment of park resources and values. The NPS believes this alternative would fulfill its park protection mandates while allowing Fort Apache to exercise their property right interests.

## 2.6 Summary of Alternatives

The following table assesses the extent to which each alternative meets objectives in taking action.

Table 8. Extent that Each Alternative Meets Objectives

<b>Objectives</b>	<b>Does Alternative A, No-Action, Meet Objective?</b>	<b>Does Alternative B, Proposed Action, Meet Objective?</b>
Avoid or minimize impacts on Unit resources and values, visitor use and experience, and human health and safety.	<b>Yes</b> Without drilling the wells, there would be no impacts.	<b>Yes</b> Directional drill from location outside Preserve would avoid or minimize impacts.
Prevent impairment of Unit resources and values.	<b>Yes</b> Without drilling the wells, there would be no potential for Unit resources and values to be impaired.	<b>Yes</b> Directional drilling below usable quality groundwater within the Unit would result in no impairment of Unit resources and values.
Provide Fort Apache, as the lessee of nonfederal oil and gas mineral interests, access to explore for and develop oil and gas resources in a manner which would assure the natural and ecological integrity of the Preserve.	<b>No<sup>1</sup></b> The wells would not be drilled; precluding Fort Apache access to develop their nonfederal oil and gas mineral interests.	<b>Yes</b> Fort Apache would be issued a § 9.32(e) exemption, enabling them to drill and produce the wells.

<sup>1</sup>No-Action Alternative is required under NEPA to describe baseline conditions. It is acceptable for the no-action alternative to not meet all of the planning objectives.

## 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

### 3.1 Methodology

Based on project scoping and expected impacts, it was determined that the following topics in Table 9 would be carried forward for analysis:

Table 9. Summary of Impacts

<b>Impact Topic</b>	<b>Alternative A No-Action</b>	<b>Alternative B Proposed Action</b>
<b>Natural Soundscapes in and outside the Unit</b>	Under Alternative A, No-Action, the wells would not be drilled; therefore, there would be no new impacts on the natural soundscape in the Unit. Cumulative impacts on the natural soundscape in and contiguous to the Unit from recreational activities in and outside the Unit, park management functions within the Unit, oil and gas activities in and outside the Unit, and	Under Alternative B, Proposed Action, cumulative impacts on the natural soundscape in the Unit would be similar to those described under No Action, with vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, and forestry

Impact Topic	Alternative A No-Action	Alternative B Proposed Action
	timber management activities adjacent to the Unit boundary, would result in long-term but intermittent, negligible to moderate, adverse impacts, localized near sources.	operations adjacent to the Unit. The impacts from these sources, added to the intermittent, short-term, moderate, adverse impacts from the operations, would result in localized, moderate, adverse cumulative impacts to natural soundscapes in the analysis area.
<b>Air Resources in and outside the Unit</b>	Under Alternative A, No-Action, the well would not be drilled; therefore, there would be no new impacts on air quality in or outside the Unit. Cumulative impacts on air quality in and contiguous to the Unit from recreational activities in and outside the Unit, park management functions within the Unit, prescribed fires, oil and gas activities in and outside the Unit, timber management activities adjacent to the Unit boundary, and regional urbanization and industrial sources would result in long-term, minor to moderate, adverse impacts to air quality in the vicinity of the wells.	Under Alternative B, the wells would be drilled and possibly completed to produce hydrocarbons. Construction of the access roads, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate, with intensities greatest close to the sources. The greatest impacts (moderate effects) would occur during the short-term (but continuous) drilling period, which is approximately one month (drilling and completion – two weeks each); construction and plugging/reclamation would result in short-term, moderate effects due mainly from use of heavy equipment and vehicles. Production impacts would be considered long-term and moderate, due to the continued emissions from ongoing operations and occasional workovers. There would be no impacts on air quality from in-park operations. Cumulative impacts would be similar to those described under No Action, with long-term, widespread, to moderate, adverse impacts.
<b>Lightscares and Night Sky in and outside the Unit</b>	Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts to lightscares or night sky. Cumulative impacts to lightscares could occur as a result of development of adjacent properties, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit, and are expected to result in long-term, localized to widespread, negligible to moderate, adverse impacts.	Under Alternative B, Proposed Action, the wells would be drilled and possibly completed to produce hydrocarbons. Construction of the access road, wellpad; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and no effect to moderate. Elevated light levels would be greatest during the estimated month of drilling and completion phases of the wells, and localized from the lighting of the drill rig for 24-hour operations, resulting in moderate short-term adverse impacts. Construction and maintenance of the existing access road and wellpads, and plugging and reclamation could result in localized, short-term, negligible impacts from increases in artificial light associated with vehicle traffic and heavy equipment.

Impact Topic	Alternative A No-Action	Alternative B Proposed Action
		Production impacts could be long-term but negligible to minor from lighting used for on-going operations and during workovers. There would be no effect from in-park operations. Cumulative effects to Lightscapes/Night Sky are expected to be long-term, localized to widespread, negligible to moderate, and adverse.
<b>Wildlife in and outside the Unit</b>	Under Alternative A, No Action, the well would not be drilled, resulting in no new impacts to wildlife in or outside the Unit. Cumulative impacts to wildlife could occur as a result of development of adjacent lands, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit and are expected to result in long-term, localized to widespread, minor and adverse impacts.	Under Alternative B, Proposed Action, the wells would be drilled and may be produced. Construction of the access roads, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate on wildlife in and outside the Unit, with more intense impacts localized around the wellpads location. Construction of the wellpads and access would remove relatively moderate quality wildlife habitat from use until reclamation occurred, a long-term, minor, adverse impact. However wellpad construction and access at Baptist #1 will remove cultivated pasture, resulting in a negligible loss of habitat. Reclamation will likely improve wildlife habitat suitability. Construction and plugging/reclamation activities would cause localized and short-term increases in artificial noise and light associated with vehicle traffic and heavy equipment, resulting in short-term, negligible to moderate adverse impacts. The greatest impacts (moderate effects) would occur during the short-term (but continuous) drilling period, which is approximately one month. Production impacts would be short- to long-term and minor due to the ongoing disturbance at the site and occasional workovers. There would be no impacts to wildlife from in-park operations. Cumulative effects to wildlife are expected to be long-term, localized to widespread, negligible to moderate, and adverse.
<b>Recreation resources including supply, demand, visitation activities, etc.</b>	Under Alternative A, No-Action, the wells would not be drilled; therefore, there would be no new impacts on recreation resources inside the Unit. It is expected that existing and reasonably foreseeable uses in the analysis area would continue with short- to long-term, negligible to moderate, adverse	Under Alternative B, Proposed Action, the wells would be drilled and may be produced. Construction of the access roads, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and minor to moderate on recreation resources ,

Impact Topic	Alternative A No-Action	Alternative B Proposed Action
	cumulative impacts on geology and soils and vegetation.	and uses outside the Unit. The expected effects on light and soundscapes on adjacent lands are expected to be confined to the direct area of impact by the application of mitigation measures at the site. Therefore, the adverse impacts on these adjacent resources are expected to be localized and minor, with long-term impacts during production. Cumulative impacts to these adjacent resources and uses would continue, with long-term, localized, minor to moderate, adverse cumulative impacts to lightscapes and soundscapes outside the Unit.
<b>Adjacent Landowners, Resources and Uses</b>	Under Alternative A, No-Action, the wells would not be drilled; therefore, there would be no new impacts on adjacent land uses and resources outside the Unit. It is expected that existing and reasonably foreseeable uses in the analysis area would continue with short- to long-term, negligible to moderate, adverse cumulative impacts on geology and soils and vegetation.	Under Alternative B, Proposed Action, the wells would be drilled and may be produced. Construction of the access roads, flowlines, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate on adjacent landowners, resources , and uses outside the Unit. The expected effects on geology and soils and vegetation on adjacent lands are expected to be confined to the direct area of impact by the application of mitigation measures at the site. Therefore, the adverse impacts on these adjacent resources are expected to be localized and minor, with long-term impacts during production and lasting until site reclamation restores soils and vegetation cover. There would be no impacts on soils or vegetation from in-park oil and gas operations. Cumulative impacts to these adjacent resources and uses would continue, with long-term, localized, negligible to moderate, adverse cumulative impacts to soils and vegetation outside the Unit.

This section is organized by impact topic. Under each impact topic, the affected environment is described, the methodology for assessing impacts is presented, the impacts under each alternative are described, a cumulative impact analysis is provided, and a conclusion is stated. The conclusion section summarizes all major findings.

This section describes direct, indirect, and cumulative impacts under the two alternatives. Impacts are described in terms of context and duration. The context or extent of the impact may be localized (generally, the footprint for access road and wellpads, including immediately adjacent lands) or widespread (affecting other areas of the Preserve and/or the project area).



The duration of impacts could be short-term, ranging from days to three years in duration, or long-term, extending up to 20 years or longer. Generally, short-term impacts would apply to construction activities and long-term impacts would apply to roads and production operations. The intensity and type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. Impact intensity threshold definitions are provided for negligible, minor, moderate and major. Where the intensity of an impact can be described quantitatively, numerical data are presented. However, most impact analyses are qualitative.

The impact analysis under the action alternative (Alternative B, Proposed Action) for each Preserve resource or value describes “in-park operations” and “connected actions.” The analysis of impacts from in-park operations contains the analysis and documentation required under § 9.32(e). The analysis of impacts from connected actions satisfies a broader NEPA requirement to assess impacts on the human environment.

- In-park Operations would consist of the wellbore crossing into the Unit at a substantial depth so as to not cross usable quality groundwater to reach the bottomhole target beneath the Unit to extract hydrocarbons and other associated fluids from beneath the Unit.
- Connected Actions would consist of activities associated with access road maintenance; construction and maintenance of the wellpads, production facilities, drilling and completion, hydrocarbon production and transportation and well plugging and surface reclamation outside the Unit.

To clearly describe the potential impacts under the action alternative (Alternative B, Proposed Action), the impact analysis for connected actions is organized under the following headings:

- Construction and upgrading involves the initial construction of the access road (if there is no existing access) and the wellpads to drill the wells.
- Drilling involves drilling the wells.
- Production involves the development of production facilities and producing the wells.
- Plugging/Reclamation involves plugging the wells and reclaiming the areas that were developed as per agreements with the landowners.

### **3.2 Cumulative Impacts**

This section also assesses cumulative impacts. 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).

The following descriptions of park development and operations, and adjacent land uses provide the basis for analyzing cumulative impacts in this EA. These descriptions should be used in conjunction with the discussion under the “Socioeconomics” discussion in Section 3 of this EA that describes past, present, and reasonably foreseeable oil and gas development in the analysis area.

**Park Development and Operations.** Park developments that support visitor uses in the Turkey Creek Unit is limited to nearby designated hiking trails and picnicking at the Turkey Creek picnic area.

Park management functions in the Turkey Creek Unit include facility management of visitor use developments, prescribed burning, and interpretation of resources.

**Adjacent Land Uses.** Of the land uses immediately adjacent to the Preserve and within 0.5 mile of the wellpads, urbanization, primarily residential with an industrial development (abandoned well), account for approximately 30 percent of the land area, with the remainder being timberland of various age classes and species composition. Within 0.5 mile of the Baptist Foundation #1 wellbore, there is a rural community to the south. The Nordin #1 wellbore is situated within a rural community, with a previously abandoned well location (industrial development) to the north. Additional uses related to timberlands include encroachment onto Preserve lands, public safety concerns regarding hunting clubs on adjacent timberlands, and public use of timber company roads to access the Preserve (Harcombe and Callaway, 1997).

**Visitor Uses and Developments.** An average of 100,000 visitors enter the Preserve each year (NPS Public Use Statistics Office, 2009). Spring and fall are the primary visitor use seasons. High temperatures limit visitor use during the summer. In creating the Preserve, Congress limited the construction of roads, vehicular campgrounds, employee housing, and other public and administrative facilities in the interest of maintaining the ecological integrity of the Preserve. Therefore, development is limited. There are 26 day-use areas located in 9 Unit, 9 hiking trails in 5 Units, 4 canoe routes, and 8 birding hot spots. Hunting is allowed during specific seasons in a total of about 47,400 acres in the Beaumont, Beech Creek, Big Sandy Creek, Lance Rosier, and Neches Bottom and Jack Gore Baygall Unit. Trapping is permitted in a total of about 35,000 acres in the Beaumont, Lance Rosier, and Neches Bottom and Jack Gore Baygall Unit. Backcountry camping is light (approximately 1,315 overnight stays per year over the last seven years), however it is popular in the Turkey Creek Unit. In addition to visitor uses and developments, there are 3 cemeteries and two inholding homesites located in the Preserve.

### 3.3 Impacts on Natural Soundscape in and outside the Turkey Creek Unit

#### Background

The natural soundscape is defined as the aggregate of all natural sounds that occur in parks, absent human-caused noise, together with the physical capacity for transmitting the natural sounds (NPS *Management Policies* 2006). It includes all of the sounds of nature, including such “non-quiet” sounds as birds calling, waterfalls, thunder, and waves breaking against the shore. Some natural sounds are also part of the biological or other physical resource components of parks (e.g., noise and sounds made by natural processes such as wind in trees, thunder, running water). It is important to distinguish between the intrinsic value of the soundscape as part of wildlife habitat, as part of cultural (i.e., historic, ethnographic) resource.

In accordance with soundscape policy from NPS mandates, the NPS will preserve to the greatest extent possible, natural soundscapes. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through water, air or solid material.

The NPS will restore degraded soundscapes to the natural condition wherever possible, and will protect natural soundscapes from degradation due to noise or inappropriate noise.

Inappropriate sound can adversely impact wildlife in a variety of ways by interfering with or masking sounds important for animal communication, including territory establishment, courtship, nurturing, predation, avoiding predators, migration, and foraging functions. When noise interferes with hearing natural sounds, the noise is said to mask the natural sounds, and this affects the extent of the listening area. Listening areas can be defined as the area in which an organism can hear sounds, i.e. the area in which an owl can hear a mouse scurrying across a forest floor. For example, if the ambient sound pressure level is 30dB, and a noise source raises the ambient to 33dB (a 3dB increase), the listening area or auditory horizon for humans (and many birds and mammals) would be reduced by 50%. Increasing the ambient sound pressure level an additional 3dB (to 36dB) would reduce the listening area by half again, to 25% of the initial area

Certain types and levels of noise can cause animals to use avoidance mechanisms. Avoidance, initiated as it may be by annoyance or stress, can cause individual animals to alter normal behavior, move to less preferred habitats, and to unduly use energy during critical times of the year.

Inappropriate noise can adversely impact park visitor experiences. Managing parks for “visitor experience” provides the opportunity for visitors to enjoy a park's resources and values in a manner appropriate to the park's purpose and significance, and supports the Park's resource protection goals. Visitors usually have expectations about the experience being offered in National Park System Unit. The impacts of inappropriate noise on visitor experience can be especially evident when visitor expectations include solitude, serenity, tranquility, contemplation, or a completely natural or historic environment. Many visitors have great expectations for national parks in this regard, since daily life for many people consists of high and constant levels of noise in urban/suburban settings.

Another value that can be adversely impacted by noise is any resource, location, or structure having cultural, historic, or religious significance. In the same way that visitor experience or natural resources can be affected, cultural, historic or religious sites are impacted by noise out of character for the resource. Maintaining the context also benefits the visitor who wishes to engage in and appreciate these resources.

### **Guiding Laws, Regulations and Policies**

A variety of laws, regulations and policies direct and guide the management of natural soundscapes as an inherent value of national parks to be conserved, and as a resource to be enjoyed. Some of the laws are explicit to sound, or noise, as an impact to national parks or to specific sources of noise. Similarly, some regulations are specific to sources and levels of noise, and they provide a regulatory standard. Two statements of policy are directed at noise and the natural soundscape: NPS Management Policies 2006, Section 4.9, and NPS Director's Order #47, Soundscape Preservation and Noise Management.

NPS Management Policies 2006, Section 4.9, states that the NPS will preserve to the greatest extent possible the natural soundscapes of parks and restore to the natural condition wherever

possible those park soundscapes that have become degraded by unnatural sounds. It also requires NPS to protect natural soundscapes from unacceptable impacts and prevent or minimize all noise that adversely affects the natural soundscape.

Director's Order #47 emphasizes policy and requires "to the fullest extent practicable, the protection, maintenance, or restoration of the 81 natural soundscape resources in a condition unimpaired by inappropriate or excessive noise sources... The fundamental principle underlying the establishment of soundscape preservation objectives is the obligation to protect or restore the natural soundscape to the level consistent with park purposes, taking into account other applicable laws."

## **Affected Environment**

The BTNP is crossed by, or adjacent to, many roads, pipelines and power lines of varying size. The lands adjacent to the BTNP are mostly commercial timberlands, but residences and some commercial development are also located near the BTNP boundary. There are also a few residences inside the boundary or surrounded by NPS lands. Improvements inside the BTNP related to visitor experience are limited, for the most part, to trails, parking and picnic areas, information kiosks and boat ramps. There are two cemeteries located within the BTNP boundary or surrounded by BTNP lands. Hunting and trapping are allowed within some Unit of the BTNP. Improvements related to BTNP administration within the BTNP consist of seasonal employee housing and several radio tower installations. The main visitor contact and administrative facilities are outside of the BTNP proper due to a recent boundary expansion. They are adjacent to the Village Creek Corridor Unit. BTNP management involves the use of on and off-road vehicles, boats, aircraft, heavy equipment and prescribed fire, and potentially involves firearms. Several oil and gas production facilities exist within the BTNP, and many more are located just outside the boundary.

A reasonable amount of noise from the proposed operations is considered to be appropriate to the operations area, as the exercise of nonfederal mineral rights is provided for in the enabling legislation of the BTNP. Following the BTNP's *General Management Plan* (1980), areas within the Unit boundaries that could be affected by elevated noise generated by the proposed drilling and production of the directional wells would be part of the exploration/mining subzone for the duration of operations. Park managers recognize that soundscapes in the exploration/mining subzone could be affected by continuous noise during drilling operations and well production.

The primary reason for the discussion of noise impacts is the potential effects of noise on visitor use and experience and wildlife. A study of the desired experiences of BTNP visitors determined that the desire to "escape the crowd/noise" was very important (Gulley, 1999).

Sources of noise within the BTNP are generally localized and/or seasonal in duration and include maintenance vehicles and equipment, firearms (during hunting season), prescribed fire operations, hikers, and other visitors. Noise in surrounding areas includes trucks and automobiles, aircraft, boat motors, motorcycles, all-terrain vehicles, various types of equipment (e.g., tractors, log skidders and feller bunchers, chainsaws, lawn mowers, oil and gas separation and treatment vessels, compressors, etc.), power lines/transformers and firearms.

Sound levels are measured in decibels (dB), and most noise levels are weighted based on thresholds of human hearing (dBA). L<sub>90</sub> is a percentile representing the sound level where sounds exceed the value 90% of the time. This number is usually considered to be analogous to the natural ambient sound level. The natural ambient is the sound level generated only by natural sound sources in the absence of human caused noise. According to NPS Management Policies, “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 will be measured and evaluated.”

The natural soundscape of the Preserve was studied in the spring of 1998 by Foch (1999) to determine ambient sound levels. Sound levels were measured at 11 locations across the Preserve, and both short- and long-term data were collected. Sound measurements were also collected by NPS Preserve staff during the summer of 2011 in the Lower Cypress area of the BU. The measurements included the L<sub>90</sub>, L<sub>50</sub>, and L<sub>10</sub> values measured for night and day during a 30 day period. The measurements also included frequency calculations for sound pressure levels by hour, including a truncation to frequencies that are commonly known to show transportation noise. The range of sound levels was between 36.5 and 55.0 dBA, 80% of the time (NPS 2012). **Figure 7** compares sound levels recorded in various Unit of the Preserve by the Foch (1999) study with other common sounds.

**Figure 9. Sound Level Comparison Chart\***

<b>Equivalent Sounds</b>	<b>Decibels</b>	<b>Sound Levels at Various Locations in the BTNP</b>
Large caliber rifles	140-160	
.22 caliber weapon	130-140	
Air compressor @ 20 ft. Garbage trucks and city buses Power Lawnmower	100	
Diesel truck @ 25 ft.		
Steady flow of freeway traffic 10 HP outboard motor Bulldozer or grader at 50'	90	
Near drilling rig Automatic dishwasher Muffled jet ski @ 50 ft. Vacuum cleaner	80	
Window air conditioner outside @ 2 ft.	70	
Window air conditioner in room	60	
Normal conversation		
	50	Quiet home in evening
Bird calls		
	40	Big Sandy Creek along Big Sandy Horse Trail Neches Bottom and Jack Gore Baygall Unit Lance Rosier Unit— end of Church House Rd. Turkey Creek Unit on Turkey Creek Trail and at NPS Ranch House Beech Creek Unit along Beech Woods Trail
Library		
Soft whisper		
	30	
In a quiet house at midnight Leaves rustling	20	

\*Modified from Final Environmental Impact Statement, Miccosukee 3-1 Exploratory Well, Broward County, Florida (U.S. Department of the Interior).

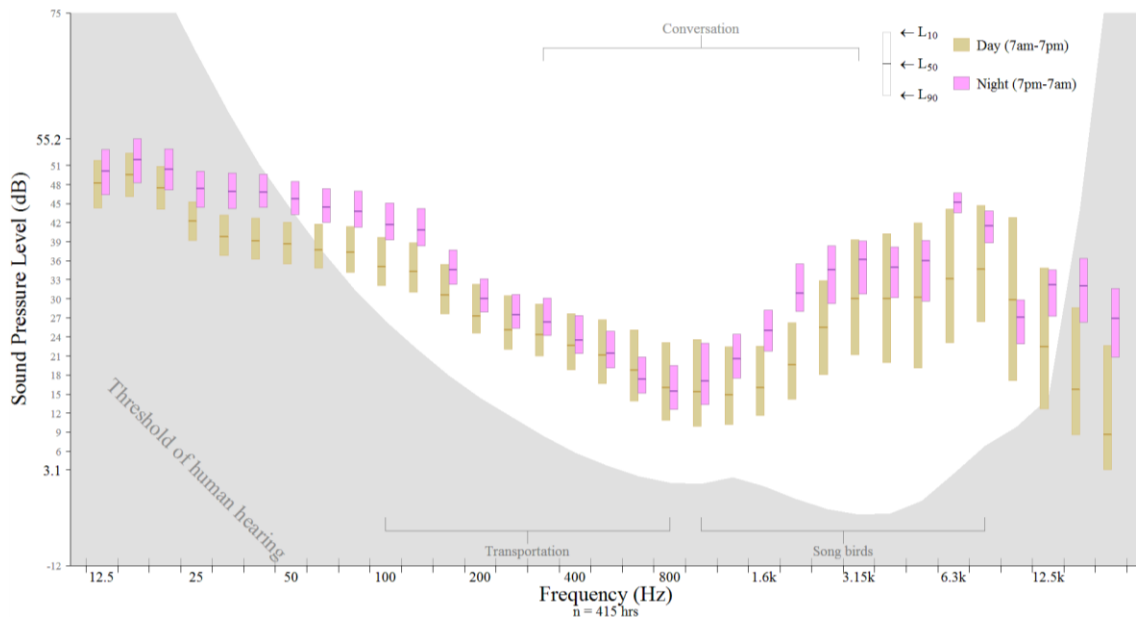
For the comparison, Table 10 summarizes sound level values that relate to human health and speech, as documented in the scientific literature. Human responses can serve as a proxy for potential impacts to other vertebrates because humans have more sensitive hearing at low frequencies than most species (Dooling and Popper, 2007, p. 5).

<b>Table 10. Explanation of Sound Level Values</b>	
<b>Sound Levels (dBA)</b>	<b>Relevance</b>
35	Blood pressure and heart rate increase in sleeping humans (Haralabidis et al., 2008)
45	World Health Organization's recommendation for maximum noise levels inside bedrooms (Berglund, Lindvall, and Schwela, 1999)
52	Speech interference for interpretive programs (U.S. Environmental Protection Agency, 1974)
60	Speech interruption for normal conversation (U.S. Environmental Protection Agency, 1974)

Exceedence levels ( $L_x$ ) are metrics used to describe acoustical data. They represent the level of sound exceeded x percent of the time during the given measurement period (e.g.  $L_{90}$  is the level that has been exceeded 90% of the time). Table 11 reports the Daytime (700-1900) and Nighttime (1900-700)  $L_{90}$ ,  $L_{50}$ , and  $L_{10}$  values for the site(s) measured in the Turkey Creek Unit of the BTNP.

<b>Table 11. Exceedence Levels for Existing Conditions in the Turkey Creek Unit</b>			
<b>Period of Day</b>	<b><math>L_{90}</math> (dBA)</b>	<b><math>L_{50}</math> (dBA)</b>	<b><math>L_{10}</math>(dBA)</b>
<b>700-1900</b>	<b>36.5</b>	<b>42.9</b>	<b>55.0</b>
<b>1900-700</b>	<b>48.5</b>	<b>49.9</b>	<b>53.0</b>

Figure 10 plots the dB levels for 33 one-third octave band frequencies over the day and night periods at the Beech Creek Unit location. The gray area represents sound levels outside the typical range of human hearing. The frequency levels for transportation, conversation, and songbirds are presented on the figure as examples for interpretation of the data. These ranges are estimates and are not species, habitat, or vehicle specific.



**Figure 10. Day and Night dB Levels for 33 One-third Octave Bands in the Beech Creek Unit of the BTNP**

In July, 2008 the Natural Sounds Program monitored a gas production site (Ergon Energy Partners LP's Mason 1 site) and an operating drilling rig (Unit Texas Drilling Company Rig #237). The Mason #1 site is a production site, without a drilling rig (post-platform). There were high and low-pressure separators, a dehydrator, and heater treator. A compressor was the main noise source. Production specifications for this site were 700 barrels of oil per day, 100 million cubic feet of natural gas per day, and 400 barrels each per holding tank. Unit Texas Drilling Company Rig #237 was drilling the Bluff #1 well. There were a large number of noise sources, but noise levels were dominated by 3 diesel powered generator packages, which operate concurrently. Using the resulting data, noise models were produced to estimate the impact of the above listed oil and gas equipment within the Preserve boundary.

The Nordin #1 well would be located approximately 135 feet from the Preserve boundary on private land. The Baptist Foundation #1 well would be located approximately 200 feet from the Preserve boundary on private land. The wellpads would be located in an area with residential development, including houses and associated structures, agricultural and land management, county roads, and residential roadways within two miles. A 26.0 horsepower compressor with a muffler.

## Environmental Consequences

**Area of Analysis.** The area of analysis for soundscapes is defined as the well operations area plus the area within 2,000 – 4,000 feet of the wellpads, since drilling noise is expected to decrease to about the background level recorded for quiet areas in similar areas of the Preserve (Turkey Creek Unit) at that distance.

**Methodology and Assumptions.** After reviewing all of the results of the Foch study, the NPS Natural Sounds Program study, and considering adjacent land uses, BTNP visitor use and



management activity, as well as the existing legislative, regulatory and policy framework for the BTNP, the NPS developed the following impact intensity thresholds for soundscapes:

- Negligible:** Impacts on natural soundscapes would result in a negligible change, but natural sounds would prevail; unnatural noise would be very infrequent or absent.
- Minor:** Natural sounds would predominate in areas where management objectives call for natural processes to predominate, with infrequent noise. In areas where noise is consistent with park purpose and objectives, noise could be heard frequently throughout the day and natural sounds could be heard occasionally. Mitigation measures if needed to offset adverse effects would be simple and successful.
- Moderate:** In areas where management objectives call for natural processes to predominate, natural sounds would predominate, but noise could occasionally be present. In areas where noise is consistent with park purpose and objectives, noise would predominate and natural sounds could still be heard occasionally. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.
- Major:** In areas where noise is inconsistent with park purpose and objective, noise would persistently dominate the soundscape. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

#### *Impacts on Natural Soundscapes in and outside the Unit under Alternative A, No Action*

Under Alternative A, Fort Apache would not drill the Nordin #1 and Baptist Foundation #1 wells, resulting in no new impacts on natural soundscapes.

#### *Cumulative Impacts under Alternative A, No Action*

Under Alternative A, cumulative impacts to natural soundscapes would result from vehicle traffic in and outside the Unit, development (including oil and gas activity) in and outside the Unit, recreational activities, and commercial timber activities outside the Unit boundary.

Elevated noise from existing activities would include the use of vehicles; chainsaws, log skidders, tractors, and prescribed fires used as part of commercial timber activities; as well as aircraft and firearms. The use of chainsaws during clearcutting of the timber and the discharge of firearms in the land adjacent to the Unit would introduce elevated noise levels that could potentially reach up to 140 decibels (dBA) within the analysis area (please see Figure 8).

Noise levels from all the sources of noise mentioned above would range from 41 dBA up to 160 dBA (for gunfire). As a result of these various existing and future activities, cumulative impacts on natural soundscape within and contiguous to the Unit are anticipated to result in long-term but intermittent, negligible to moderate, adverse impacts on the natural soundscape in and outside the Unit, localized near sources.

#### *Conclusion for Alternative A, No Action*

Under Alternative A, No Action, the Nordin #1 and Baptist Foundation #1 wells would not be drilled, resulting in no new impacts to natural soundscapes. Existing vehicle use, park maintenance activities, recreational uses (including hunting), oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit would result in localized, short-term, negligible to moderate, adverse impacts. Cumulative impacts to natural soundscapes to the

Unit from recreational uses (including boating), park maintenance activities, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit would be short- to long-term, localized to widespread, negligible to moderate, adverse impacts.

**Impacts on Natural Soundscapes in and outside the Unit under Alternative B, Proposed Action.** Under Alternative B, the Nordin #1 and Baptist Foundation #1 wells would be drilled and may be completed to produce hydrocarbons. Existing impacts on the natural soundscape within the Unit would be similar to Alternative A, No Action, with localized, short-term, negligible to moderate, adverse impacts.

**Impacts from In-Park Operations.** In-park operations would consist of 1) the wellbores for Nordin #1 and Baptist Foundation #1 crossing into the Unit at a depth of approximately 2,100 feet (Nordin #1) and 3,250 feet (Baptist Foundation #1) true vertical depth (TVD) to a target depth of 8,200 feet TVD; 2) extracting hydrocarbons and associated fluids from beneath the Unit. There would be no impact to the natural soundscape in the Unit from in-park operations.

**Impacts from Connected Actions.** Elevated noise would be generated by the connected actions, which would consist of construction and/or maintenance of the well/production pad and the sales/transportation pipelines, the drilling and completion of the wells, hydrocarbon production and transportation, and well plugging and reclamation outside the Unit. These activities would result in localized and short-term increases in noise associated with vehicle traffic, heavy equipment, and ground-disturbing activities. Elevated noise would be greatest during the short-term (approximately one month) drilling period. Drilling is a 24-hour, 7-day a week operation, so noise would be continuous during the drilling periods. The drilling rig generates noise levels reaching approximately 96dBA (NPS 2009), while some diesel trucks have been reported at 88 dBA at 50 feet from the source (FHWA 2007). Sound dissipates with distance from the source, with noise levels reaching near background levels at 2,000 feet. Elevated noise during the drilling phase would result in localized, short-term, minor to moderate, adverse impacts on natural soundscapes within 2,000 feet of the drilling rig. Utilizing data from studies performed in similar areas of the Preserve (NPS 2009), noise levels are expected to be slightly less than 96 dBA at the Preserve boundary during drilling operations. This increased sound level would result in short-term moderate adverse impacts to the natural soundscape of the Preserve. If the wells were productive, production operations would result in noise levels of approximately 51 dBA at the nearest preserve boundary if an unmitigated compressor is used. Currently, a 26 horsepower generator with noise reducing muffle is proposed to be installed. This would result in short- to long-term, negligible to minor, adverse impacts on the natural soundscapes.

#### **Cumulative Impact under Alternative B, Proposed Action**

Under Alternative B, cumulative impacts to natural soundscapes in the Unit would be similar to those described for Alternative A. Noise sources would include existing and future oil and gas operations in and outside the Unit, routine park maintenance operations, recreational activities including hunting in and outside the Unit, and forestry operations adjacent to the Unit, which would result in localized, short- to long-term, negligible to moderate, adverse cumulative impacts to natural soundscapes.

### *Conclusion for Alternative B, Proposed Action*

Under Alternative B, Proposed Action, the Nordin #1 and Baptist Foundation #1 wells would be drilled and may be produced. Use and maintenance the well/production pad and drilling and producing the wells, and eventual plugging and reclamation activities would result in short- to long-term, localized, negligible to moderate, adverse impacts on natural soundscapes in the Unit. Cumulative impacts would be similar to those described for Alternative A, with short-to long-term, localized to widespread, negligible to moderate, adverse impacts.

## **3.4 Impacts on Air Quality in and outside the Turkey Creek Unit**

### **Background**

NPS air resource management policy has been developed in conjunction with requirements in the Clean Air Act (CAA) and the Environmental Protection Agency's regulations. The level of protection afforded some park resources and values by the CAA may be the determining factor when deciding whether air quality impacts are acceptable. Air pollution sources within park boundaries, must, by law, comply with all Federal, State, and local regulations. Air pollution sources outside park boundaries are subject to varying Federal, State and local regulations depending upon the land ownership and type and size of pollution source. Impairment determinations are not linked to exceeding the national ambient air quality standards (NAAQS), but mitigation measures would likely be required under the CAA if emissions from an activity caused or contributed to a NAAQS violation.

### **Guiding Laws, Regulations, and Policies**

The CAA established national ambient air quality standards to protect the public health and welfare from air pollution. The act also established the prevention of significant deterioration (PSD) of air quality program to protect the air in relatively clean areas – i.e. those areas that are in attainment with the NAAQS. One purpose of the PSD program is to protect public health and welfare, including natural resources, from adverse effects that might occur even though NAAQS are not violated. Another purpose is to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic or historic value (42 U.S.C. 7401 *et seq.*). The PSD program includes a classification approach for controlling air pollution.

Big Thicket is a Class II area and the Clean Air Act allows only moderate air quality deterioration in these areas. In no case, however, may pollution concentrations violate any of the national ambient air quality standards.

Areas that do not meet the NAAQS for any pollutant are designated as “non-attainment areas.” Areas that were once designated non-attainment, but are now achieving the NAAQS are termed “maintenance areas.” In non-attainment areas, states must develop plans to reduce emissions and bring the area back into attainment of the NAAQS, and proposed actions must “conform” to the State Implementation Plan (SIP), which establishes *de minimis* values for certain pollutants which cannot be exceeded, so as to limit pollution and reach attainment.

Under the Clean Air Act, § 176, the NPS is prohibited from permitting any activity that does not conform to the State of Texas' implementation plan. This proposed action is located in Tyler

County, Texas. Tyler County is one of three counties (Orange County and Hardin County being the other two) that the EPA has temporarily designated the attainment status for Hardin, Tyler, and Orange Counties as unclassifiable for the 2008 eight-hour ozone standard.

Under its *Management Policies* 2006 the National Park Service will seek to perpetuate the best possible air quality in parks to (1) preserve natural resources and systems; (2) preserve cultural resources; and (3) sustain visitor enjoyment, human health, and scenic vistas (sec. 4.7.1).

The *Management Policies* 2006 further state that the National Park Service will assume an aggressive role in promoting and pursuing measures to protect air quality related values from the adverse impacts of air pollution. In cases of doubt as to the impacts of existing or potential air pollution on park resources, the National Park Service “will err on the side of protecting air quality and related values for future generations.”

### **Affected Environment**

Big Thicket National Preserve is located generally north of the Beaumont/Port Arthur airshed and northeast of the Houston airshed. “The primary pollutants transported from airsheds affecting the Preserve are volatile organic compounds (VOCs), and nitrogen oxides (NO<sub>x</sub>). Other air pollutants that could affect the Preserve include carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and particulate matter (PM) (including heavy metals and lead)” (NPS, 2006b). Industrial activities and urbanization account for the majority of impacts to air quality in the Preserve when compared to nonfederal oil and gas operations or Preserve management activity (Ibid.).

The Preserve is designated a Class II area under the PSD provisions of the CAA. Portions of the Preserve lie within four Texas counties (Hardin, Tyler, Liberty and Orange) that the EPA has temporarily designated as in compliance with the NAAQS for eight-hour ozone. Ground-level ozone (sometimes referred to as smog) is formed by the reaction of VOCs and NO<sub>x</sub> in the atmosphere in the presence of sunlight. These two pollutants, often referred to as ozone precursors, are emitted by many types of pollution sources, including on-road and off-road motor vehicles and engines, power plants and industrial facilities, and smaller sources, collectively referred to as area sources. Like many areas in Texas, the ozone season in the Beaumont/Port Arthur maintenance area is typically eight months long, lasting from March through October with peak high ozone events occurring generally late August and September (Ibid.). Regulatory standards inside non-attainment areas for ozone precursors are 100 tons per year (TPY) of VOCs, and 100 TPY of NO<sub>x</sub> (TCEQ, 2007b).

Other values may be affected by air quality. These are referred to as “air quality-related values” and include such things as vegetation that may be sensitive to a variety of air pollutants, especially ozone; visibility; and fish and wildlife resources that can be affected by air quality and effects of pollutant deposition in water. The analysis in this document focused on the emissions of ozone precursors that can affect Preserve vegetation, as well as emissions of sulfur compounds that may affect plant growth and species composition and water quality by acidifying surface waters. Since it is difficult to relate these effects to a single oil and gas operation, and because the actual impacts to air quality related values depends on their chronic exposure to air affected by many industrial activities and urbanization in the area, a specific analysis of these values is not included, but the potential effects can be indirectly assessed by an analysis of emissions and impact levels.

Air quality in the region is influenced by activities occurring in the Beaumont/Port Arthur/Orange and Houston/Galveston airsheds. Industrialization and urbanization in these airsheds are major sources of emissions. The primary pollutants transported by the Beaumont/Port Arthur/Orange airshed are VOCs and NO<sub>x</sub>. Other air pollutants that could affect the Unit and public health include CO, SO<sub>2</sub>, hydrogen sulfide (H<sub>2</sub>S), and particulate matter.

## Environmental Consequences

**Area of Analysis.** The area of analysis for air quality impacts includes the immediate location of the proposed well sites and access road and the surrounding area where air pollutants may accumulate in and outside the Unit.

**Methodology and Assumptions.** To assess air quality impacts resulting from a given management alternative, the following methods and assumptions were used:

1. The national ambient air quality standards and state regulatory emissions thresholds in both non-attainment and attainment areas were examined. The State implementation plan was reviewed.
2. Air quality designations for the subject areas were determined. The Fort Apache wells are in an attainment area subject to PDS requirements (Tyler County).
3. The air quality impacts of the alternatives were assessed by considering the existing air quality levels and using the estimated ozone precursor emissions from the operation of the drilling rig and existing point and area sources in Tyler County, Texas. Drilling rig ozone precursor emissions were estimated based on work by Russell and Pollack (2005) and Pollack et al. (2006) which used survey information from oil and gas operators in Wyoming and New Mexico to estimate oil and gas emissions in reference oil and gas fields. These reference values may be used along with well depth and drilling duration estimates provided by applicants to establish a range of application specific, per-well, emissions factors for VOCs and NO<sub>x</sub> using the equation:

$$EF_A = EF_{San\ Juan\ Basin} \times \left( \frac{D_A}{D_{San\ Juan\ Basin}} \right) \times \left( \frac{T_A}{T_{San\ Juan\ Basin}} \right)$$

...where EF is the emissions factor, D is the drilling depth (measured depth) and T is the drilling duration. Subscript A refers to the application, and subscript San Juan Basin refers to the Blanco-Mesa Verde Field in northwestern New Mexico. Emissions factors regarding both NO<sub>x</sub> (1.484 tons/well) and VOCs (0.042 tons/well) are available for the San Juan Basin. The average depth of wells drilled in this area is 5,436 feet according to data from the Oil and Gas Division of the New Mexico Energy, Minerals and Natural Resources Department (Pollack, 2007). The average drilling duration reported by oil and gas producers was 12 days in this field (Ibid.). No information of this kind from oil and gas fields in southeast Texas was available at the time of research. By using data from the San Juan Basin, the NPS has assumed that similar rigs would be used to drill the wells.

4. Impacts from emissions of other pollutants of concern were addressed qualitatively, with reference made to typical emissions reported by operators or in the literature as appropriate.
5. For cumulative impacts, the assessment was completed qualitatively. Other sources of air pollutants in the area were also considered in the cumulative analysis through a review of the state implementation plan, annual NO<sub>x</sub> and VOC emissions for existing point (2004) and area sources (2001) in Hardin and Polk Counties ( as summarized by the NPS Air Resources Division using data made available by the TCEQ and EPA (NPS, ARD, 2007), and the use of best professional judgment.

Impact intensity thresholds used for the air quality analysis are defined below:

**Negligible:** Impacts would result in a change to local air quality, but the change would be so slight that it would not be of any measurable or perceptible consequence. These changes would not affect the attainment status of the airshed, and would be consistent with the airshed designation at the park. Emissions would be substantially less than any applicable or relevant air emissions regulatory thresholds.

**Minor:** Impacts would result in a detectable change to local air quality, but the change would be small and of little consequence. These changes would not affect the attainment status of the airshed, and would be consistent with the airshed designation at the park. Emissions would be considerably less than any applicable or relevant air emissions regulatory thresholds. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

**Moderate:** Impacts would result in a change to local air quality that would be readily detectable. Emissions could approach applicable or relevant air emissions regulatory thresholds, could affect the attainment status of the airshed, and could be inconsistent with the airshed designation at the park. Mitigation measures could be required, and would likely be successful.

**Major:** Impacts would result in a change(s) to regional air quality that would be severe. These changes would cause exceedences of applicable or relevant air emissions regulatory thresholds, would affect the attainment status of the airshed, and/or be inconsistent with the airshed designation at the park. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

#### **Impacts on Air Quality in and outside the Turkey Creek Unit under Alternative A, No Action**

Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts on the natural soundscape either in or outside the subject Unit.

**Cumulative Impacts.** Impacts on air quality from other sources would continue as the result of vehicle use on lands in and outside of the Unit, recreational activities in and outside of the Unit

(including use of all-terrain vehicles, and burning of campfires), park facility management, oil and gas activities in and outside the Unit, and commercial timber activities occurring adjacent to the Unit. The use of vehicles and other combustion engines, and fires would emit PM, NO<sub>x</sub>, CO, CO<sub>2</sub>, and SO<sub>2</sub>. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005). No "major" adverse impacts were identified for this impact topic. However, the primary source of cumulative impacts to air quality in the analysis area would be contaminants from the Beaumont/Port Arthur/Orange airshed, as well as from the Houston/Galveston and Lake Charles, Louisiana airsheds. Various industrial facilities, pipelines, and vehicular traffic in these airsheds are major sources of emissions. All of these sources would result in long-term, minor to moderate adverse cumulative impacts to air quality in the study area.

**Conclusion.** Under Alternative A, No-Action, the wells would not be drilled; therefore, there would be no new impacts on air quality in or outside the Unit. Cumulative impacts on air quality in and contiguous to the Unit from recreational activities in and outside the Unit, park management functions within the Unit, prescribed fires, oil and gas activities in and outside the Unit, timber management activities adjacent to the Unit boundary, and regional urbanization and industrial sources would result in long-term, minor to moderate, adverse impacts to air quality in the vicinity of the well.

#### **Impacts on Air Quality in and outside the Turkey Creek Unit under Alternative B, Proposed Action**

**Impacts from In-Park Operations.** Under the Proposed Action, the wells would be drilled from two wellpads located outside the Unit. In-park operations consist of the directionally drilled wellbores into the plane of the Unit at several thousand feet below the surface and extracting hydrocarbons and other fluids from beneath the Unit. These subsurface actions would have no impact on the surface air quality regardless of what methods and materials Fort Apache uses to drill, case, cement, or plug and abandon the section of the hole inside the Unit. Therefore, there would be no impact to the air quality in or outside the Unit from in-park operations.

**Impacts from Connected Actions.** Impacts are described by phase of activity, below.

**Construction.** Ground-disturbing activities associated with the construction and maintenance of the access roads and wellpads would result in increased emissions of particulates in the vicinity of the activities. Greater use of motor vehicles during construction of the access road and pad would increase particulate matter from vehicle exhaust and dust from paved and unpaved surfaces. Exhaust from machinery and equipment used intermittently during construction would also contribute to an increase in PM, as well as emissions of hydrocarbons (HC), NO<sub>x</sub>, and CO. Prevailing winds would carry some pollutants into the Unit and the surrounding adjacent lands. Construction would result in short-term, negligible to minor adverse effects on air quality in and outside the Unit, localized near the well sites.

**Drilling.** The use of vehicles and other machinery used to drill the wells would result in increased particulates in the vicinity of the activities. Emissions of particulate matter, NO<sub>x</sub>, CO, CO<sub>2</sub>, and SO<sub>2</sub> would be greatest during the short-term (one month) drilling operations due to

increased use of vehicles and large gasoline and diesel engines used to power the drill rig, pumps, and auxiliary equipment during the entire period of drilling. Large diesel engines which are used to power the drill rig, pumps, and auxiliary equipment emit NO<sub>x</sub>, and smaller amounts of CO and HC. Some SO<sub>2</sub> would be emitted due to the burning of gasoline and diesel fuels (which contain minor amounts of sulfur). The amount of engine emissions would depend on the drill rig size, percent sulfur in the fuel used, gallons of fuel burned per hour, the hours per day, number of days the rig operates, and the use of any emissions control devices.

Hydrogen sulfide could be encountered and released during drilling operations. Past operations in the Preserve have not encountered H<sub>2</sub>S bearing zones. Texas RRC Statewide Rule 36 applies to operations in H<sub>2</sub>S areas. The rule does not apply where concentrations in the system are less than 100 ppm, and the amount projected is much less than this limit. For all wells, if zones containing H<sub>2</sub>S under pressure are encountered, the drilling mud system is adjusted to prevent the release of H<sub>2</sub>S and drilling is discontinued until the pressure is stabilized and there is no gas entering the hole. The small amount of gas that could reach the surface is vented and flared.

Depending on atmospheric conditions, the effects to air quality from the proposed operation could travel beyond the analysis area and affect the air quality in the Unit or other surrounding areas. Therefore, the effects from drilling are expected to be short-term, localized, to widespread, negligible to moderate, and adverse. These impacts are not expected to exceed NAAQS established under the Clean Air Act.

**Production.** If a well becomes productive, emissions would continue but at much reduced levels due to the operation of separation and treatment vessels, trucks to transport fluids from the site and possibly gas compression equipment with localized, long-term, negligible, adverse impacts on air quality in the Unit. Routine maintenance activities during production would result in increased particulates in the vicinity of the activities. Emissions of PM, NO<sub>x</sub>, CO, CO<sub>2</sub>, and SO<sub>2</sub> would occur during workover operations due to increased use of vehicles and large gasoline and diesel engines used to power the drill rig, pumps, and auxiliary equipment, with localized, short-term, minor, adverse impacts on air quality in and outside the Unit.

**Plugging/Reclamation.** Plugging/abandonment/reclamation of the wells would result in increases in particulate matter during ground-disturbing activities, and the use of vehicles and other machinery, resulting in localized, short-term, negligible to minor, adverse impacts on air quality in and outside the Unit.

**Cumulative Impacts.** Similar to the effects discussed above under Alternative A, cumulative impacts to air quality in the area of analysis would result primarily from contaminants from the Beaumont/Port Arthur/Orange airshed, as well as from the Houston/Galveston and Lake Charles, Louisiana airsheds. Industrialization and urbanization in these airsheds are major sources of emissions. Vehicle use, recreational activities, development (including the proposed action and other oil and gas activity), and commercial timber activities would also contribute to air quality impacts in the analysis area. All of these existing and reasonably foreseeable activities/pollution sources, in combination with the emissions expected from well development under the proposed action, would result in long-term, widespread, minor to moderate, adverse cumulative impacts on air quality.



**Conclusion.** Under Alternative B, the wells would be drilled and possibly completed to produce hydrocarbons. Construction of the access roads, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short to long-term, and negligible to moderate, with intensities greatest close to the sources. The greatest impacts (moderate effects) would occur during the short-term (but continuous) drilling period, which is expected to last approximately two weeks. Construction and plugging/reclamation would result in short-term, negligible to minor effects due mainly from use of heavy equipment and vehicles. Production impacts would be considered long-term and minor, due to the continued emissions from ongoing operations and occasional workovers. There would be no impacts on air quality from in-park operations. Cumulative impacts would be similar to those described under No Action, with long-term, widespread, minor to moderate, adverse impacts.

### 3.5 Impacts on Lightscares/Night Sky in and outside the Turkey Creek Unit

#### Background

Light, visible electromagnetic radiation streaming through the atmosphere, has a tremendous amount of natural variation. From the brightest day to the darkest night spans over 8 orders of magnitude (NPS, NRPC, 2003). Disruption of this cycle can have significant ecological effects. Darkness is an important habitat component, providing cover, security, navigation, or predatory advantage to both nocturnal and diurnal species. Light pollution, defined as stray unwanted light outside the range and timing of natural variation, is not only an ecological disrupter, but also adversely affects the natural scenery of the night. The NPS mission to “conserve scenery” extends to night and the sky above. The ability to view a pristine night sky where thousands of stars are visible has diminished with increasing development. The loss of this resource represents a direct reduction in enjoyment for park visitors who regularly stargaze. It will also reduce the integrity of other resources by a loss in context.

Light pollution has been documented over 200 miles from the light source (Ibid.). The cumulative effect of multiple artificial light sources at varying distance brightens the sky background, drowning out stars and astronomical objects by contrast reduction, and increasing the illuminance of the ground surface. Particularly dark skies are most prone to a degradation of their scenic potential, showing a large reduction in the number of visible stars with a small amount of light pollution. Night skies already brightened by artificial light show a lessening degradation with each incremental increase in light pollution. Within this response function may be embedded thresholds whereupon certain species, ecological processes, or key scenic resources will be affected.

Individual point sources of light can impact Preserve resources, even if they contribute relatively little to overall skyglow. Artificial lights punctuating the landscape can detract from the natural and historic character of the scenery. They can interfere with human dark adaptation and are documented as affecting certain wildlife.

The degree of impact of artificial light is highly dependent on the distance and the type and brightness of the light fixture. Atmospheric characteristics such as humidity and particulates further influence the apparent effect of artificial light. Distance is the most influential, because the brightness of sky glow from a given light sources decreases 6 times for every doubling of

distance (point light sources decrease 4 times for every doubling of distance) (Moore, 2007). Whether the light fixture is fully shielded is also important; fully shielded fixtures can greatly decrease the creation of both point and diffuse source light pollution. The perception of light pollution will vary from one location to another caused by differences in vegetation cover, sight lines and horizon visibility, and even the color of the ground. Atmosphere of greater clarity tends to amplify distant light sources and attenuate nearby light sources, while more humid and polluted air tends to amplify close light sources, especially those within 10 km (6.2 miles) of an observer (Ibid.).

Both the generally flat topography of the Big Thicket area and the prevalence of canopy layer vegetation in most of the Preserve naturally limit the experience of vistas in which a substantial portion of the night sky could be observed. This is especially true at the horizon, the part of the sky in which lightscape impacts are first noted. Air quality considerations can also play a role in the context of lightscape impacts, because the presence of air pollution can increase light scattering. However, visibility as an air quality related value of concern was dismissed from consideration in this EA because of the lack of opportunities to view landscape or other features over long distances at the Preserve.

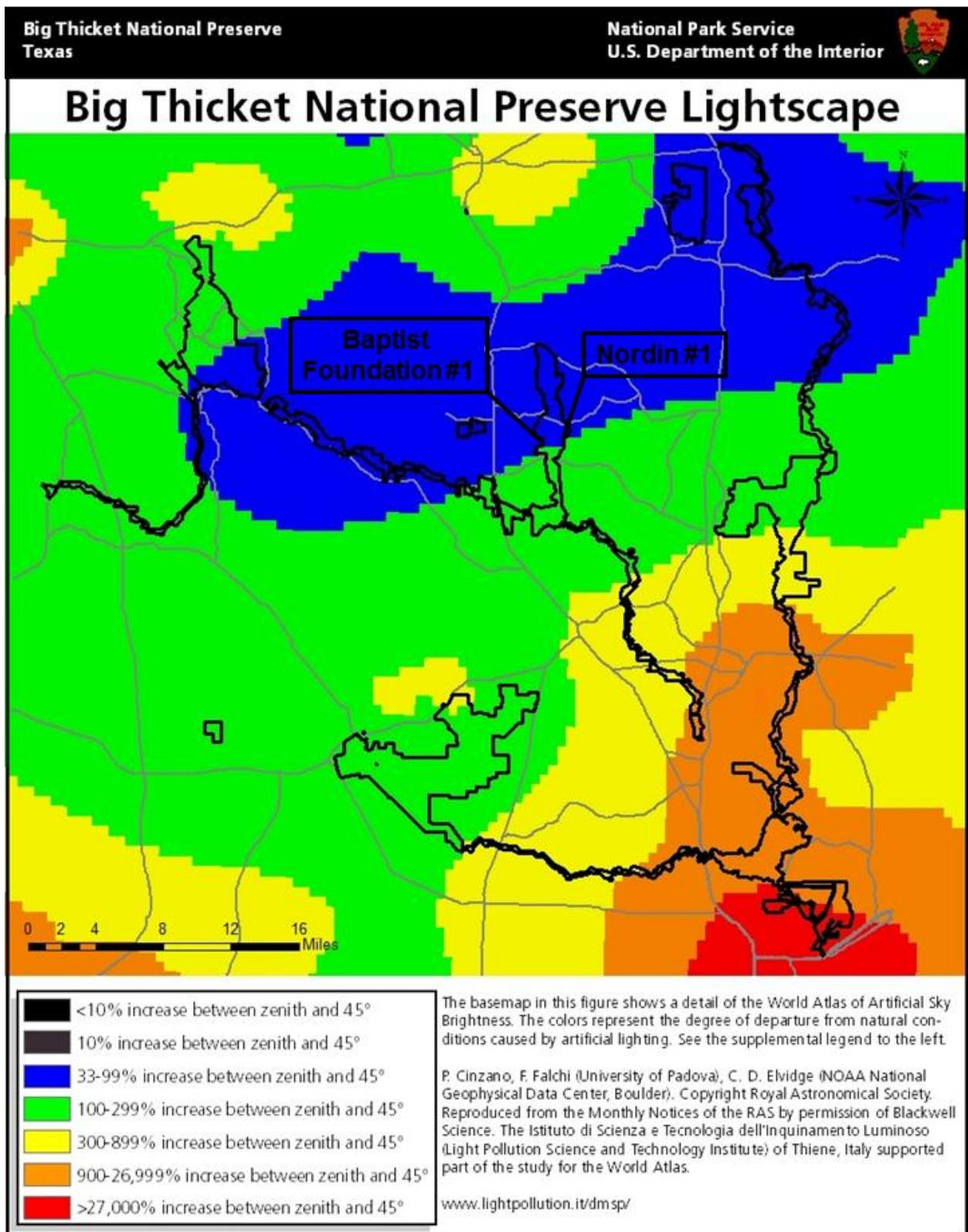
### **Guiding Laws Regulations and Policies**

NPS *Management Policies* 2006 (§ 4.10) emphasize the protection of natural lightscapes not only for the enjoyment and experience of visitors, but also for protection of ecological integrity. Mitigation strategies are identified, including restricting the use of artificial lighting only where necessary, utilizing minimum impact techniques, and shielding lights to prevent unwanted light scatter.

### **Affected Environment**

The existing lightscape surrounding the Nordin #1 proposed project area represents an increase in artificial light of 100-299% from natural conditions between zenith and 45°. Whereas, the existing lightscape surrounding the Baptist Foundation #1 proposed project area represents an increase in artificial light of 33-99% from natural conditions between zenith and 45° (Cinzano, et al., 2001, See Figure 9).

Figure 11. Existing lightscape surrounding on the Big Thicket National Preserve and in the vicinity of the Nordin #1 and Baptist Foundation #1 well site locations.



## Environmental Consequences

**Area of Analysis.** The area of analysis for lightscapes/night sky includes the immediate location of the proposed well sites and about 1,500 feet into the surrounding area (both inside and outside the Unit) where impacts from lighting would be more noticeable.

**Methodology and Assumptions.** NPS has developed the following impact thresholds for lightscapes, based on effects on visitor experience, ecological disruption, and general park context (relation to cultural or historic setting, etc).

**Negligible:** Light conditions cycle as they would within the range of existing variability. The night sky is unchanged by artificial light, leaving the current amount of stars, astronomical objects, and atmospheric phenomena visible. No visible change in light pollution, either bright stationary point source lights, or sky glow from cities would be noticeable (although change may be detectable by a trained observer or instrument).

**Minor:** The cycle of light and dark is largely similar to existing conditions. Changes in the lightscape are visible along the horizon, but are unnoticed at higher angular altitudes. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

**Moderate:** The cycle of light and dark is modified over existing conditions. Changes in lightscape are obvious, and extend perceptibly overhead. Mitigation measures would be extensive and likely successful.

**Major:** The cycle of light and dark is clearly altered from existing conditions. Changes in lightscape are conspicuous overhead. The sky background is noticeably brighter and more colored in appearance. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

### **Impacts on Lightscapes/Night Sky in and outside the Turkey Creek Unit under Alternative A, No Action**

Under Alternative A, the wells would not be drilled, resulting in no new impacts on lightscapes or night sky in or outside the Unit.

**Cumulative Impacts.** Under Alternative A, cumulative impacts to lightscape would result from a variety of light sources in the area of analysis for cumulative impacts, including new development, commercial timber activities, roadway vehicle traffic outside the Unit, and existing oil and gas operations and industrial facilities both inside and outside the Unit. Light from these sources would vary considerably in intensity, wavelength, duration, and hours of operation, but the numerous light sources have increased the background skyglow levels to various extents in the vicinity of the preserve. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005). No major adverse impacts were identified for this impact topic which was analyzed under the heading "Visitor Use and Experience." As a result of all the potential light sources mentioned, cumulative impacts to

the lightscape within the analysis area are anticipated to be long-term, localized to widespread, negligible to moderate, and adverse.

**Conclusion.** Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts to lightscapes or night sky. Cumulative impacts to lightscapes could occur as a result of development of adjacent properties, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit, and are expected to result in long-term, localized to widespread, negligible to moderate, adverse impacts.

### **Impacts on Lightscapes/Night Sky in and outside the Turkey Creek Unit under Alternative B, Proposed Action**

**Impacts from In-park Operations.** Under Alternative B, Proposed Action, the wells would be directionally drilled and the wellbores would cross into the Unit at a substantial depth and extract hydrocarbons and other fluids from beneath the Unit. There would be no impacts on Unit lightscapes from the subsurface oil and gas operations in the Unit.

**Impacts from Connected Actions.** Impacts are described by phase of activity, below.

**Construction.** Construction of the access roads and wellpads, and production activities could result in localized and short-term increases in artificial light associated with vehicle traffic and heavy equipment, although there would not be extensive or constant nighttime lighting. The proposed project location is in a residential area with moderate nighttime illumination. There are no overnight camping facilities or other visitor use developments in any area of the Unit near the well sites, so it is not expected that visitors would be affected by the introduction of artificial lighting. While it is possible that the light from construction activities would travel the distance between the proposed drilling/production location to the Unit boundary and into the Unit, the Unit is heavily vegetated and there is a buffer of woody vegetation over the distance between the pad sites and the Unit boundary, and there is very little elevation change over this distance. However, the distance between the Nordin #1 pad site and the Unit is relatively small (97 feet). The Baptist Foundation #1 pad site is located immediately adjacent to the Unit boundary. The vegetation at Nordin #1 would have the effect of blocking some of the light from the site before it reaches the Unit. Therefore, construction lighting would be expected to cause short-term, localized, negligible, adverse impacts to the lightscape and night sky in the analysis area.

**Drilling.** Elevated light levels would be greatest during the short-term drilling/completion periods estimated for each well (two weeks) from the lighting of the drill rig to allow for 24-hour operations. During the drilling of the well, lighting on the derrick, rig floor, and drill site would be necessary for drilling at night to provide for worker safety. The introduction of artificial lighting during the drilling phase would be more pronounced in the area immediately surrounding the wellhead on the lands adjacent to the Unit; but would be substantially reduced with distance into the Unit and surrounding land. The introduction of artificial light on the dark night sky in the Unit during the short-term drilling phase would result in localized, short-term, but moderate adverse impacts since the lighting would be continuous.

**Production.** During the long-term production life of the wells there could be smaller artificial lighting installed at the drilling/production site. Construction of the production activities, as well as maintenance of the existing access roads, wellpads, and production activities, could result in localized and short-term increases in artificial light associated with

vehicle traffic and heavy equipment. Also, occasional workovers on the wells could occur at 5 to 10-year intervals and take 1 to 2 weeks to complete. Workover rigs could introduce artificial lighting as well, but are expected to be at lower levels relative to the initial drilling operations and would not operate at night. Lighting from these various sources during the production phase would be expected to cause short- and long-term, localized, negligible to minor adverse impacts to the lightscape and night sky in the analysis area.

**Plugging and Reclamation.** Plugging and reclamation would involve the use of heavy equipment and trucks to remove production equipment, plug the wells, and recontour the wellpads in preparation for reseeding. Light sources would include lights on earthmoving equipment and trucks and lighting would be needed only intermittently for the period of plugging and reclamation preparation, usually a period of only a few days, with no nighttime lighting required. Similar to the initial construction phase, these activities would cause short-term, localized, negligible, adverse impacts to the lightscape and night sky in the analysis area.

**Cumulative Impacts.** Under Alternative B, cumulative impacts to Lightscares/Night Sky in the Unit would be similar to those described for Alternative A. Potential impacts to lightscares in the area of analysis would result from development of adjacent private properties, vehicle traffic, existing oil and gas operations both inside and outside the Unit, the routine maintenance of transpark oil and gas pipelines, and recreational activities in and outside the Unit. As a result of these activities and the light contributed by the wells, cumulative impacts to the lightscape within the analysis area are anticipated to be long-term, negligible to moderate, localized to widespread, and adverse.

**Conclusion.** Under Alternative B, Proposed Action, the wells would be drilled and possibly completed to produce hydrocarbons. Construction of the access roads, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate. Elevated light levels would be greatest during the estimated 45 day drilling/completion phase of each well and localized from the lighting of the drill rig for 24-hour operations, resulting in moderate short-term adverse impacts. Construction and maintenance of the existing access roads and wellpads; and plugging and reclamation could result in localized, short-term, negligible impacts from increases in artificial light associated with vehicle traffic and heavy equipment. Production impacts could be long-term but negligible to minor from lighting used for on-going operations and during workovers. There would be no effect from in-park operations. Cumulative effects to Lightscares/Night Sky are expected to be long-term, localized to widespread, negligible to moderate, and adverse.

### 3.6 Impacts on Wildlife in and outside of the Turkey Creek Unit

#### Background and Guiding laws, Regulations and Policies

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the NPS to mean that native animal life should be protected and perpetuated as part of the Preserve'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 except where provided for by individual park statute. According to NPS *Management Policies* 2006, the restoration of native

species is a high priority (§ 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. At Big Thicket National Preserve, the enabling legislation provides for the hunting of game species and the trapping of fur bearing species under a permit system administered by the NPS.

## Affected Environment

The abundant and diverse vegetation of the Preserve supports terrestrial habitats for a variety of wildlife. Wildlife species in the area “are typical deciduous forest assemblages from the eastern and southeastern United States and resemble in some degree wildlife in sub-tropical forest communities. The diverse wildlife assemblages of this region are a result of numerous factors including topography, climate, hydrologic regimes, soil type, and physiography” (Frasier Group, 1998). Between about fifty and sixty species of mammals are either documented or believed to inhabit the Preserve (Cooper, et al. 2004). Birds are the most visible and diverse group of vertebrate fauna found in the Preserve. Currently, while no comprehensive survey of avifauna has been conducted, 176 species have been documented in the Preserve (Ibid). Approximately 85 species of reptiles and amphibians could inhabit the Preserve (NPS, 2005). Typical species that inhabit these areas include amphibians and reptiles such as the northern cricket frog (*Acris crepitans crepitans*), gray tree frog (*Hyla versicolor*), common snapping turtle (*Chelydra serpentina*), and Texas rat snake (*Elaphe obsoleta lindheimerii*); birds such as the great blue heron (*Ardea herodias*), red-shouldered hawk (*Buteo lineatus*), and mourning dove (*Zenaidura macroura*); and mammals such as the Virginia opossum (*Didelphis virginiana*), nine-banded armadillo (*Dasypus novemcinctus*), and eastern cottontail (*Sylvilagus floridanus*).

At the Baptist Foundation #1 well site, all areas of proposed activity are situated within a riparian corridor. At the Nordin #1 well site, all areas of proposed activity are situated in areas with a history of extensive land disturbance, including residential development and land management. Due to the decreased diversity of vegetation in species at the Nordin #1 well site, spatial and temporal composition, periodic clearing, lack of high quality food in the understory, and lack of aquatic habitat, it is anticipated that the project area adjacent to the Preserve would support a low diversity of wildlife.

At the project location, areas immediately adjacent to the wellpads within the Unit would support a more diverse wildlife community, as the Preserve has been protected from commercial timber harvest and agriculture for some time and provides a variety of natural habitats. Animals that inhabit the outer boundaries of the Preserve, however, have become somewhat accustomed to nearby disturbances and noise, since forestry operations and other uses occur in close proximity to the Preserve.

## Environmental Consequences

**Area of Analysis.** The area of analysis for wildlife includes the immediate location of the proposed well sites and about 1,500 feet into the surrounding area (both inside and outside the Unit) where impacts from disturbance (lights, noise) would be more likely to affect wildlife species.



**Methodology and Assumptions.** The assessment of impacts to wildlife was based on staff knowledge of the areas and habitat conditions, the Preserve's *Oil and Gas Management Plan* (2006), and information gathered from the field visits conducted by the applicant. NPS developed the following thresholds for impacts to wildlife:

**Negligible:** Impacts would result in a change to a population or individuals of a species or a resource, but the change would be well within the range of natural fluctuations.

**Minor:** An action that would affect a few individuals of a wildlife species or have very localized impacts upon their habitat. The change would have barely perceptible consequences to the species or habitat function. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside of critical reproduction periods for sensitive species. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

**Moderate:** An action that would cause measurable effects on: (1) a relatively small percentage of the population of a wildlife species, (2) the existing dynamics between multiple species (e.g., predator-prey, herbivore-forage, vegetation structure-wildlife breeding habitat), or (3) a relatively large habitat area or important habitat attributes. A wildlife population or habitat might deviate from normal levels under existing conditions, but would remain indefinitely viable within the preserve. Response to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, or other factors impacting short-term population levels. Sufficient habitat would remain functional to maintain variability of all native wildlife species. Some impacts might occur during critical periods of reproduction or in key habitat for sensitive native species. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

**Major:** An action that would have drastic and permanent consequences for a wildlife species population, dynamics between multiple species, or almost all available unique habitat. A wildlife population or its habitat would be permanently altered from normal levels under existing conditions, and the species would be at risk of extirpation from the preserve. Frequent responses to disturbance by some individuals would be expected, with negative impacts to feeding, reproduction, or other factors resulting in a decrease in population levels. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

#### **Impacts on Wildlife in and outside the Turkey Creek Unit under Alternative A, No Action**

Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts on the wildlife either in or outside the Unit.

**Cumulative Impacts.** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, forestry operations adjacent to the Unit, and residential, commercial, and industrial development, with the associated clearing of vegetation and long-term loss of habitat, would result in minor, adverse impacts on wildlife in the area of



analysis. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005) and up to minor adverse impacts were identified from all actions that could affect wildlife in the cumulative impacts analysis area. Other actions taken within the area of analysis to protect wildlife resources of the Preserve and on adjacent lands through planning and/or permitting requirements are expected to maintain or improve some habitat for certain species, with cumulative beneficial effects. As a result of all these actions, cumulative impacts to wildlife within the analysis area are anticipated to be long-term, localized to widespread, minor, and adverse.

**Conclusion.** Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts to wildlife in or outside the Unit. Cumulative impacts to wildlife could occur as a result of development of adjacent lands, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit and are expected to result in long-term, localized to widespread, minor and adverse impacts.

### **Impacts on Wildlife in and outside the Turkey Creek Unit under Alternative B, Proposed Action**

**Impacts from In-Park Operations.** Under Alternative B, Proposed Action, the wells would be directionally drilled and the wellbores would cross into the Unit at substantial depths and extract hydrocarbons and other fluids from beneath the Unit. There would be no impacts on the wildlife either inside or outside the Unit from the subsurface oil and gas operations in the Unit.

**Impacts from Connected Actions.** Impacts are described by phase of activity, below.

**Construction.** Construction of the wellpads and access roads would have direct adverse impacts on wildlife in the area of the pad outside the Unit boundary due to the removal of vegetation on the site. This would result in the loss and fragmentation of wildlife habitat.

Removal of this habitat on the wellpads could increase predation in open areas, increase edge effects, and result in avoidance of the area by wildlife due to increased noise, lighting, and human presence. Elevated noise, as described under the Natural Soundscape discussion in Section 3, could extend into the Unit and displace wildlife that occupies habitat near the oil and gas facilities. Displaced wildlife could increase competition with other wildlife in adjacent areas over the short-term. Construction and clearing of the site could directly harm or kill the wildlife species that are present, displace wildlife into adjacent habitat, or disrupt wildlife feeding, denning, nesting, and spawning/reproduction, thereby altering wildlife species and composition. The potential for leaks and spills exists for all phases of oil and gas activities; however, the proposed mitigation measures that would be implemented, including an SPCC plan requirement, are anticipated to confine any impacts to the well sites.

All the areas affected directly by construction are considered marginal quality habitat due to the past land management practices. Impacts to wildlife in the Unit, where habitat is more diverse and of higher quality, would be limited to intermittent disturbance due to noise and artificial lighting, and the presence of people, but most wildlife would be expected to return after becoming acclimated to some noise disturbance. Therefore, impacts to wildlife from

construction would be short-term and long-term (clearing effects), negligible to minor, and localized both inside and outside the Unit.

**Drilling.** The greatest impact to wildlife in and outside the Unit would occur during the drilling and completion phase, since noise, artificial lighting, and disturbance would occur continually for approximately one month at each well location, until drilling is completed. Elevated noise could displace wildlife or disrupt wildlife feeding, denning, nesting, and spawning/reproduction, even within the Unit, but most displaced wildlife is expected to return after becoming acclimated to some noise disturbance. Displaced wildlife could increase competition in adjacent areas over the short-term. Because dense vegetation and flat terrain occur in the portions of the Unit potentially affected by the proposed wells, light and noise from the connected actions at the proposed drilling/production location is expected to be partially reduced by the vegetation. As discussed under soundscapes, above, noise levels would decrease to a quiet background level within 2,000-4,000 feet of the drilling operations. These impacts on wildlife in the Unit would be localized, short- to long-term, minor to moderate, and adverse.

Artificial lighting, particularly during drilling of the wells and workovers, would also affect wildlife. “Animals can experience increased orientation or disorientation from additional illumination and are attracted to or repulsed by glare, which affects foraging, reproduction, communication, and other critical behaviors. Artificial light disrupts interspecific interactions evolved in natural patterns of light and dark.” (Longcore and Rich, 2004)

The potential for leaks and spills exists for all phases of oil and gas activities; however, the proposed surface casing and cementing program, site location, site design, and mitigation measures that would be implemented during the drilling activities are anticipated to confine impacts to the well sites. The potential for release and transport of oil or gas, brine water, and other contaminating or hazardous substances would be unlikely, as previously described in Section 1.

Based on the lack of high quality habitat in the area of the proposed action, the short-term nature of high noise drilling operations, and the low potential for leaks or spills to migrate offsite to surrounding habitats, impacts to wildlife inside and outside the Unit would be localized, short- term, minor to moderate, and adverse.

**Production.** Impacts to wildlife would be reduced during the production phase, which has the potential to be long-term. There would be minor impacts from the clearing of the area needed to carry the product to market, but, in each case, this would be a loss confined to a small linear corridor.

Elevated noise, particularly during any workover operations could displace wildlife, as described under Drilling. However, these would be very sporadic and most wildlife is expected to return after becoming acclimated to some noise disturbance. The potential for leaks and spills exists for all phases of oil and gas activities; however, the mitigation measures (plastic liners, berms, etc.) that would be implemented during production phase are anticipated to confine impacts to the wellpads. The potential for release and transport of oil or gas, brine water, and other contaminating or hazardous substances would be unlikely as previously described in Section 1.

Based on the lack of high quality habitat in the area of the proposed action, the short-term nature of high noise operations during production, and the low potential for leaks or spills to migrate offsite to surrounding habitats, impacts to wildlife in and outside the Unit would be localized, short- to long-term, minor, and adverse.

**Plugging and Reclamation.** Plugging and reclamation operations and site preparation during reclamation would involve the use of heavy equipment and have similar impacts as construction, but over a shorter period of time (a few days), with very short-term, minor effects. The long-term effect of the reclamation phase is to return the area to natural conditions, which would bring wildlife back into the area. The potential for leaks and spills exists for all phases of oil and gas activities; however, the mitigation measures that would be implemented (plastic liners, berms etc.) would confine impacts to the wellpads, and reclamation would include cleanup of any remaining site contamination.

**Cumulative Impacts.** Cumulative impacts would be as described for Alternative A, with adverse effects from vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, development outside the Unit boundary, and forestry operations adjacent to the Unit, resulting in localized, minor, adverse impacts on wildlife. Considering the small amount of habitat that would be directly impacted (a total of about 4 acres for the wellpads and access roads), the type of habitat loss and the reclamation that would occur after the site is no longer used, the effects of the proposed action would not contribute more than minor adverse impacts to the overall cumulative impact of all these actions in the region, and cumulative impacts on wildlife would remain long-term, localized to widespread, minor, and adverse.

**Conclusion.** Under Alternative B, Proposed Action, the wells would be drilled and may be produced. Construction of the access road, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate on wildlife in and outside the Unit, with more intense impacts localized around the wellpads location. Construction of the wellpads and access roads would remove relatively low quality wildlife habitat from use until reclamation occurred, a long-term, minor, adverse impact. Construction and plugging/reclamation activities would cause localized and short-term increases in artificial noise and light associated with vehicle traffic and heavy equipment, resulting in short-term, negligible to minor adverse impacts. The greatest impacts (moderate effects) would occur during the short-term (but continuous) drilling period, which is expected to last approximately one month. Production impacts would be short- to long-term and minor due to the ongoing disturbance at the sites and occasional workovers. There would be no impacts to wildlife from in-park operations. Cumulative effects to wildlife are expected to be long-term, localized to widespread, negligible to moderate, and adverse.

### 3.7 Visitor Use and Aesthetic Experience

#### Background and Guiding Laws Regulations and Policies

This section addresses impacts on recreation and visitor use experience, with emphasis on certain resources on the property that could be affected by the proposed operations at noticeable levels. Those resources include the natural soundscape within the park.

According to the NPS's Management Policies (2006), the enjoyment of park resources and values by people is part of the fundamental purpose of all park units. The NPS 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. Additionally, the NPS would provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the natural and cultural resources found in the parks. The Management Policies also state that scenic views and visual resources are considered highly valued associated characteristics that the NPS should strive to protect. The Turkey Creek Unit offers visitor use options including recreation and passive observation of nature.

The Management Policies also emphasize the protection of natural light and soundscapes for protection of visitor experience as well as preservation of ecological integrity.

### **Affected Environment**

Visitors utilize Turkey and Village Creeks for fishing in the Turkey Creek Unit. There are three hiking trails in the unit including the 15 mile long Turkey Creek trail; the Pitcher Plant Trail is a short spur connecting with the Turkey Creek trail; the Kirby Nature Trail 1.7 mile long inner loop; and the Kirby Nature Trail 2.4 mile long outer loop (NPS 2005). The turkey creek trail is situated between the proposed Baptist Foundation #1 and the proposed Nordin #1 well pads. Trailhead access is available approximately 1.15 miles north (straight-line) of the Nordin #1 well pad and approximately 1.5 miles north east (straight-line) of the Baptist Foundation #1 well pad. The Turkey Creek Unit trails are the most popular and highly used trails in the Preserve. The Kirby Nature Trail and the Big Thicket National Preserve Visitor Center are located approximately 6 miles south west of both proposed well pads.

Effects to the lightscape and soundscape as a result of the proposed action are the two most likely issues to impact visitor experience and aesthetics. For the Affected Environment discussion on Natural Soundscape please see Section 3.3. For the Affected Environment discussion on Lightscape, please see Section 3.5.

### **Environmental Consequences**

**Area of Analysis.** The area of analysis for visitor use and recreation includes the immediate location of the proposed well sites and 1,500 feet outside of the well sites (both inside and outside the preserve) where impacts from disturbance (lights, noise) would be more likely to affect visitor use of the Turkey Creek unit recreation facilities.

**Methodology and Assumptions.** The assessment of impacts to visitor use and recreation was based on staff knowledge of the areas and visitor utilization within the unit, the Preserve's *Oil and Gas Management Plan* (2006), a paper on the characteristics, desired experiences, and knowledge of visitors and potential visitors to the Big Thicket National Preserve (Gulley, 2006), and information gathered from the field visits conducted by the applicant. NPS developed the following thresholds for impacts to visitor use and experience:

- Negligible:** Impacts would result in a change to use of recreational trails and facilities within the unit, but the change would affect few visitors.
- Minor:** An action that would have a slightly detectable effect on visitor experience (within the immediate area of the well locations). Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate:** An action that would cause measurable effects on a relatively limited extent of visitor use trails and facilities as well as the existing use levels for trails and visitor facilities, or relatively large visitor use area or important visitor use features. Visitor use of trails and facilities may deviate from normal levels but remain sustainable. Some impacts might occur during peak periods of use. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.
- Major:** An action that would have drastic and permanent consequences for visitor use and experience and would affect many visitors. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

#### **Impacts on Visitor Use and Experience in and outside the Turkey Creek Unit under Alternative A, No Action**

Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts on visitor use either in or outside the Unit.

**Cumulative Impacts.** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, forestry operations adjacent to the Unit, and residential, commercial, and industrial development, with the associated clearing of vegetation and long-term loss of habitat, would result in minor, adverse impacts on visitor use and experience within the area of analysis. An analysis of the cumulative effect of drilling and producing the up to 40 wells projected in the RFD scenario was performed in the Preserve's *Oil and Gas Management Plan Environmental Impact Statement* (NPS, 2005) and up to minor adverse impacts were identified from all actions that could affect visitor use and experience in the cumulative impacts analysis area. Cumulative impacts to visitor use and experience within the analysis area are anticipated to be long-term, localized to widespread, minor, and adverse.

**Conclusion.** Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts to visitor use and experience in or outside the Unit. Cumulative impacts could occur as a result of development of adjacent lands, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit and are expected to result in long-term, localized to widespread, minor and adverse impacts.

#### **Impacts on Visitor Use and Experience in and outside the Turkey Creek Unit under Alternative B, Proposed Action**

**Impacts from In-Park Operations. :** Under the proposed action, the wells would be directionally drilled from surface locations approximately 80 feet from and adjacent to (respectively, Baptist Foundation #1 and Nordin #1) the boundary of the Preserve. The wellbores would cross into the Unit at considerable depth (see “Geology and Soils”). Therefore, there would be no impacts on visitor use and experience within the Unit from the subsurface oil and gas operations in the Unit.

### **Impacts from In-Park Operations**

It is very likely that visitors would be in the vicinity of the proposed drilling and production activities while using the Turkey Creek Trail and/or Turkey Creek. Impacts to Preserve visitors from connected actions could include: direct observation of the Baptist Foundation #1 and Nordin #1 drilling derrick and wellpad; the effects of the accidental release of contaminants from the site; and noise from construction and operations. The potential for contamination of off-site areas is low, as described under “Geology and Soils” and “Vegetation.” The possibility of catastrophic release was determined to be negligible, based on the low frequency of recent occurrences in the area. Also, Fort Apache has included mitigation measures to lessen potential off-site impacts to Preserve visitors, primarily spill prevention and control measures.

**Impacts from Connected Actions.** Impacts are described by phase of activity, below.

**Construction.** Construction of the wellpads and access roads would could result in localized and short-term increases in artificial light associated with vehicle traffic and heavy equipment. Extensive or constant nighttime lighting is not anticipated. The areas of the proposed well locations have minimal artificial lighting from adjacent existing land uses. The distances between the wellpad perimeters, access roads and flowlines, where construction would occur, and the Unit boundary is relatively small. While the light and noise from construction activities would easily travel the distance between the wellpads and the Unit boundary, the Unit itself is heavily vegetated between the boundary and visitor trails. The vegetation would dampen most noise associated with construction of the wellpads, access roads, and flowlines. Therefore, construction lighting and noise would be expected to cause short-term, localized, moderate adverse impacts in the analysis area.

**Drilling.** Elevated noise levels would be greatest during the short-term drilling and completion periods estimated for the two wells (two weeks, each). During drilling and completion of the wells, lighting on the derrick, rig floor, and drill site would be necessary at night to provide for worker safety. The introduction of artificial lighting during the drilling phase would be more pronounced in the area immediately surrounding the the wellhead on the lands adjacent to the Unit; but would be substantially reduced with distance into the Unit and surrounding land. The introduction of artificial light on the dark night sky in the Unit and also the introduction of above-ambient noise levels during the short-term drilling and completion phase would result in localized, short-term, but moderate adverse impacts since these affects would be continuous during this phase.

**Production.** Construction of the flowline and production activities, as well as maintenance of the existing access roads, wellpads, flowlines, and production activities, could result in localized and short-term increases in artificial light and noise associated with the vehicle traffic and heavy equipment. Ft. Apache will install a 26 hp compressor with muffler at

both wells to mitigate and reduce noise emissions. Effects from these sources during the production phase would be expected to cause short- and long-term, localized, and moderate adverse impacts to the lightscape and night sky in the analysis area.

**Plugging and Reclamation.** Plugging and reclamation operations and site preparation during reclamation would involve the use of heavy equipment and have similar impacts as construction, but over a shorter period of time (a few days), with very short-term, minor effects. The long-term effect of the reclamation phase is to return the area to natural conditions. The potential for leaks and spills exists for all phases of oil and gas activities; however, the mitigation measures that would be implemented (plastic liners, berms etc.) would confine impacts to the wellpads, and reclamation would include cleanup of any remaining site contamination.

**Cumulative Impacts:** Vehicle uses, existing and future oil and gas operations in and outside the Unit, maintenance of transpark oil and gas pipelines, routine park operations, recreational activities including hunting in and outside the Unit, and forestry operations adjacent to the Unit are anticipated to result in localized, short- to long-term, negligible to minor, adverse impacts on visitor use and experience. An analysis of the cumulative effect of all phases of activity associated with this alternative within the analysis area are anticipated to be long-term, minor to moderate, localized, and adverse.

**Conclusion:** The two wells would be drilled and possibly completed to produce hydrocarbons. Construction of the access roads, flowlines, and wellpads; drilling, completing and producing the wells; and the eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and minor to moderate. Elevated light levels and noise levels would be greatest during the estimated 45 day drilling/completion phase of each well would result in moderate short-term adverse impacts. Construction and maintenance of the access roads, wellpads, and flowlines; and plugging and reclamation could result in localized, short-term, minor impacts from increases in light and noise associated with vehicle traffic and heavy equipment. Production impacts could be long-term but moderate from on-going operations. There would be no effect from in-park operations. Cumulative effects to visitor experience and aesthetics are expected to be long-term, localized to widespread, minor to moderate, and adverse.

### **3.8 Impacts on Adjacent Landowners, Resources, and Uses**

#### **Background**

This section addresses impacts on adjacent landowners and resources, with emphasis on certain resources on the property outside the Unit that could be affected by the proposed operations at noticeable levels. Those resources include soils and geology and vegetation.

#### **Affected Environment**

##### **Surface Owners and Land Uses.**

The surface location of the proposed pad is entirely within private property. The nearest city is Beaumont, Texas. The 2010 census indicates the population for the city of Beaumont is 118,300

people. The current land use for the project location is a forested area subject to future residential development and a mowed area behind a residence. Within the area of analysis, there are an estimated 20 single family residential homes, the nearest home being about 1,100 feet distant from Baptist Foundation #1 and 388 feet distant from Nordin #1.

### **Geology and Soils.**

The soil at the Baptist Foundation #1 wellpad and access road location is described as Olive-Dallardsville complex (OiA) with slopes of 0 to 1 percent and Kountze very fine sandy loam (KnB) with slopes of 0 to 2 percent. OiA is very poorly to moderately well drained with more than 80 inches to restrictive features and with no frequency of flooding, but frequent ponding and located generally on open depressions (U.S. Department of Agriculture, Soil Conservation Service, 1983). This soil is classed as partially hydric, meaning at least one component of the map unit is rated as hydric, and at least one component is rated as not hydric. In this case, the minor “hydric” criteria are (1) soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that are poorly drained or very poorly drained and have a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches, or (2) soils that are frequently ponded for long or very long duration during the growing season, neither of which are present in the proposed area of the wells. Therefore, the entire area is located within the non-hydric component of the Olive Dallardsville complex. Kountze soils are generally moderately well drained, very deep and nearly level soils on relic meander belt bars and levees. With moderate permeability, these soils perched water table exists between 18 and 48 inches below the surface (U.S. Department of Agriculture, Soil Conservation Service, 1983). This soil is classed as partially hydric also, with the same hydric criteria as described above, neither of which are present in the proposed area of the wells. Therefore, the entire area is located within the non-hydric component of Kountze very fine sandy loam soil.

The soil at the Nordin #1 wellpad and access road location is described as Otanya very fine sandy loam (OtB) with slopes of 1 to 3 percent and Silsbee fine sandy loam (SiD) with slopes of 5 to 15 percent. These soils are classified as well drained with more than 80 inches to restrictive features and with no frequency of flooding or ponding and located generally on flats (U.S. Department of Agriculture, Soil Conservation Service, 1983). These soils are not classified as hydric.

### **Vegetation.**

Impacts on vegetation would occur from the proposed action both outside the Preserve Unit (on the adjacent property where the wellpads and access roads would be constructed), as well as possibly on land located inside the Unit if significant runoff were to occur from the wellsites (similar to impacts to soils and geology in the Preserve, as discussed above). However, the potential for impacts to vegetation within the Unit is not expected to exceed negligible levels, as discussed below. Where the clearing of all vegetation for the construction of the wellpads and access roads corridors would occur, the vegetation or forest type can be generally described as upper and middle slope pine oak forest/wetland baygall thicket. Upper slope pine oak forests generally consist of a dominant canopy of longleaf pine (*Pinus palustris*) and Southern red oak (*Quercus falcata*). The upper slope species transition from longleaf pine and Southern red oak to loblolly pine (*Pinus taeda*) and white oak (*Quercus alba*). Other hardwoods found in this forest



type include Southern magnolia (*Magnolia grandiflora*) and American beech (*Fagus grandiflora*). Wetland baygall thickets are dominated by sweetbay magnolia (*Magnolia virginiana*) and gallberry holly (*Ilex glabra*).

## **Environmental Consequences**

**Area of Analysis.** The area of analysis for this topic is limited to the private adjacent lands outside the Unit in the immediate vicinity of the project location.

**Methodology and Assumptions.** The assessment of potential impacts on adjacent land uses and resources was based on best professional judgment and was developed through discussions with staff from the NPS, review of relevant literature, and field observations. Thresholds of change of the intensity of impacts to adjacent landowners, resources, and uses are defined as follows:

- Negligible:** Impacts would result in a change to land uses or resources, but the change would be so slight that it would not be of any measurable or perceptible consequence.
- Minor:** Operations would cause limited localized change to land uses or resources. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate:** Impacts would have measurable impacts to adjacent land uses or resources that would be consequential, but would be relatively local. Mitigation measures, if needed, to offset adverse effects occurring outside the Preserve, would likely succeed.
- Major:** Operations would cause substantial alteration to land uses or resources on a regional scale. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

## **Impacts on Adjacent Landowners, Resources and Uses under Alternative A, No Action**

Under Alternative A, No Action, the wells would not be drilled, resulting in no new impacts on adjacent land uses and resources outside the subject Unit.

**Cumulative Impacts.** Cumulative impacts on geology and soils and vegetation outside the Unit would result primarily from land development, including oil and gas operations, as well as from leaks and spills from oil and gas operations and transpark pipelines, timber management, and use of vehicles off of roadways. These activities could increase surface runoff; increase soil erosion, rutting and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth and regeneration of vegetation. It is expected that existing and reasonably foreseeable uses in the analysis area would continue with long-term, negligible to moderate, adverse cumulative impacts on geology and soils and vegetation, localized near these uses.

**Conclusion.** Under Alternative A, No-Action, the wells would not be drilled; therefore, there would be no new impacts on adjacent land uses and resources outside the subject Unit as a result of the proposed action. It is expected that existing and reasonably foreseeable uses in the

analysis area would continue with short- to long-term, negligible to moderate, adverse cumulative impacts on geology and soils and vegetation.

### **Impacts on Adjacent Landowners, Resources and Uses under Alternative B, Proposed Action**

**Impacts from In-Park Operations.** Under the Proposed Action, the wells would be directionally drilled into the Preserve at substantial depths under the land surface. Therefore, there would be no impacts on adjacent landowners, resources, or uses outside the Preserve Unit from the in-park subsurface oil and gas operations proposed.

**Impacts from Connected Actions.** Impacts are described by phase of activity, below.

**Construction.** As outlined in the Wildlife section, above, wellpads and access road construction would result in the direct disturbance to site geology and soils and vegetation. To construct the access roads and wellpads, the area would be mechanically cleared and leveled. Rock would be imported to cover the pad. The proposed oil and gas activities would locally affect soil characteristics, by decreasing permeability and increasing erosion and surface runoff. Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. Disturbance of the site could lead to the unintentional spread of non-native plant species transported to or from the site on equipment used to drill and develop the wells. Impacts to soils and vegetation at the project location would be short-term, (except for the long-term clearing effects over the life of the wells), minor, localized, and adverse.

**Drilling.** The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines during drilling operations could alter the chemical and physical properties of the soil in the vicinity of oil and gas activities. Changes in soil properties could result directly from contact with contaminants on site, or indirectly, via runoff from contaminated areas. Mitigation measures to protect soils and vegetation during the drilling (and production) activities include complying with a SPCC Plan, constructing a ditch and levee around the wellpads, constructing a washout/emergency pit lined with 12-mil plastic, using a closed-loop containerized mud system, disposing of drilling mud and well cuttings off-site, constructing a 2-foot firewall around the tank battery with a capacity 1.5 times the largest tank, installing a safety drip device on the off-load connection, and following RRC Statewide Rules for surface casing and well plugging. After drilling the wells, the washout/emergency and water pits would be filled. These measures are intended to minimize and contain any spilled substances. If the wells do not go into production, the area would be reclaimed, resulting in localized, short-term, minor adverse impacts on geology and soils on adjacent lands.

**Production.** If the wells are produced, additional acreage would be disturbed for construction of the flowlines needed to carry the product. Wetland areas crossed would not be disturbed, because the flowline would be installed using horizontal directional drilling under the small wetland areas.

The trenching and boring operations used to install the proposed flowline would directly impact the reported acreages of soils and vegetation, resulting in short-term, minor localized adverse impacts, given the size of the area disturbed and the type of vegetation in these areas. Potential

impacts to soils and vegetation on the wellpads from compaction and possible releases (see Drilling, above) would continue during production, until the wells are plugged and abandoned.

**Plugging and Reclamation.** Plugging and reclamation operations and site preparation during reclamation would involve the use of heavy equipment and have similar impacts as construction, but over a much shorter period of time (a few days), with very short-term, minor, localized effects. The long-term effect of the reclamation phase is to return the area to natural conditions, which would restore soils and vegetation on the site. The potential for leaks and spills exists for all phases of oil and gas activities; however, the mitigation measures (plastic liners, berms, etc.) that would be implemented would confine impacts to the wellpads, and reclamation would include cleanup of any remaining site contamination.

**Cumulative Impacts.** Cumulative impacts would be similar to those described for alternative A. Land development, including existing and future oil and gas operations, maintenance of transpark oil and gas pipelines, and forestry operations adjacent to the Unit could contribute to cumulative impacts on soils and vegetation. Considering the small amount of acreage that would be directly impacted, the type of vegetation loss, and the reclamation/replanting that would occur after the site is no longer used, the effects of the proposed action would not contribute more than minor adverse impacts to the overall cumulative impact of all these actions in the region.

**Conclusion.** Under Alternative B, Proposed Action, the wells would be drilled and may be produced. Construction of the access roads, flowlines, wellpads; drilling and producing the wells; and eventual plugging and reclamation activities would result in adverse impacts ranging from short- to long-term, and negligible to moderate on adjacent landowners, resources, and uses outside the Unit. The expected effects on geology and soils and vegetation on adjacent lands are expected to be confined to the direct area of impact by the application of mitigation measures at each site. Therefore, the adverse impacts on these adjacent resources are expected to be localized and minor, with long-term impacts during production and lasting until site reclamation restores soils and vegetation cover. Ground disturbing activities associated with the construction of the proposed drilling/production pads and flowlines, unless avoided or mitigated, could result in long-term, localized, negligible to moderate, adverse impacts to cultural resources on adjacent lands. There would be no impacts on soils, vegetation, or cultural resources from in-park oil and gas operations. Cumulative impacts to these adjacent resources and uses would continue, with long-term, localized, negligible to moderate, adverse cumulative impacts to soils, vegetation, and cultural resources outside the Unit.

## 4.0 CONSULTATION AND COORDINATION

Following the 30-day public review and comment period, NPS will consider written comments received. Copies of the decision document will be sent to those who comment on the EA during the public review period, or request a copy.

#### **4.1 Internal Scoping**

Internal scoping was conducted by an interdisciplinary team of professionals from Big Thicket National Preserve and representatives from Fort Apache and BIO-WEST. Interdisciplinary team members met on May 1, 2013 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 project planning, team members from Big Thicket National Preserve have conducted a site visit to view and evaluate the proposed project site.

#### **4.2 External Scoping**

A scoping brochure was sent out to several federal and state agencies, the Alabama Coushatta Tribe of Texas and other interested parties on May 22, 2013, initiating a 30-day public scoping period, which ended on June 23, 2013. Comments in response to the scoping brochure were received from the Sierra Club.

Persons and agencies contacted for information, or that assisted in identifying important issues, developing alternatives, or analyzing impacts are listed below:

Fort Apache Energy, Inc.

David Pfeffer, Landman/Pilot, Southern Star Exploration, LLC, Houston, TX

#### **4.3 Agency Consultation**

Under NPS policy, the proposed operations would qualify for an exemption with no mitigation. Under this scenario, actions by the NPS with respect to the Endangered Species Act (1973) are non-discretionary. The wells would originate on lands located outside of the Unit, and the wellbores would cross through the Unit at a sufficient depth to preclude any effect on surface resources (species or habitat). Therefore, the NPS has no Endangered Species Act § 7 responsibility or authority associated with the proposed wells, other than assessing potential impacts to threatened and endangered species from connected actions outside the Unit.

Because the in-park operations would have no effect on cultural resources inside the Unit, the NPS has no § 106 responsibility, nor authority, associated with the wells for the proposed in-park operations for which a 9.32(e) exemption is being evaluated.

The NPS sent a scoping notice to the USFWS and the Texas SHPO on May 22, 2012.

#### **4.4 Native American Consultation**

A scoping notice was sent to the Alabama-Coushatta Tribe of Texas on May 22, 2012.

#### 4.5 Environmental Assessment Review and List of Recipients

During the 30-day public review period, the public is encouraged to submit their written comments to NPS, as described in the instructions at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the EA, as needed.

During the public review and comment period, a copy of this environmental assessment will be sent to each of the following agencies, organizations, and businesses.

##### Tribal Government

Bryant Celestine, Alabama-Coushatta Tribe of Texas

##### Federal Government

###### National Park Service

Linda Dansby, Regional Minerals Coordinator, Intermountain Region, Santa Fe, NM

Dan Niosi, Acting Regional Environmental Quality Coordinator, Intermountain Region, Denver, CO

Lisa Norby, Chief, Branch of Planning, Evaluation and Permits, Geologic Resources Division, Lakewood, CO

Bruce Bennett, North Evaluation Unit Leader, U.S. Army Corps of Engineers, Galveston District, Galveston, TX

Charrish Stevens, Fish and Wildlife Biologist, U. S. Fish and Wildlife Service, Clear Lake Field Office, Houston, TX

##### State Government

Guy Grossman, Director, Railroad Commission of Texas, District 3, Houston, TX

Jeff Durst, Archeologist, State Historic Preservation Office, Austin, TX

Amy Turner, Texas Parks and Wildlife Department

##### Oil and Gas Industry and Consultants

David Pfeffer, Southern Star Exploration, LLC

Dyer Schlitzkus, BIO-WEST, Inc.

##### Organizations and Businesses

Bruce Drury, President, Big Thicket Association

Kevin Cronin, Cronin Appraisal Services, Beaumont, TX

Brandt Mannchen, Chair, Big Thicket Committee, Sierra Club, Lone Star Chapter and Houston Regional Group, Houston, TX

Janice Benzanson, Executive Director, Texas Conservation Alliance

#### 4.6 List of Preparers

Stephanie Burgess, Biologist, Oil & Gas Program Manager, Big Thicket National Preserve

Dyer Schlitzkus, Consultant, BIO-WEST, Inc., Rosenberg, TX

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**APPENDIX A – Federally listed threatened, endangered or candidate species in  
Tyler County, Texas.**

<b>FEDERALLY LISTED SPECIES (USFWS, SOUTHWEST REGION 2), TYLER CNTY, TX</b>				
<b>Common Name</b>	<b>Scientific Name</b>	<b>Group</b>	<b>Description</b>	<b>Fed. Status</b>
Louisiana pine snake	<i>Pituophis ruthveni</i>	Reptile	Mixed deciduous-longleaf pine woodlands; breeds April-September	C
Red-cockaded woodpecker	<i>Picoides borealis</i>	Bird	Cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, and loblolly	E
Texas trailing phlox	<i>Phlox nivalis ssp. texensis</i>	Plant	Texas endemic; relatively open fire- maintained pine or pine-hardwood forests on soils with a deep, sandy surface layer and clayey subsurface layers; flowering late March-early April (-May)	E

STATUS CODE: E = Endangered, C = Candidate

## APPENDIX B – State listed threatened and endangered species in Tyler County, Texas.

TEXAS STATE LISTED SPECIES (TPWD), TYLER COUNTY, TEXAS				
Common Name	Scientific Name	Group	Description	State Status*
Pig frog	<i>Lithobates grylio</i>	Amphibian	prefers permanent bodies of open water with emergent vegetation; active mainly at night; eats insects and crustaceans; mating and egg-laying March-September; male vocalization a pig-like grunt	
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Bird	year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.	T
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	Bird	migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.	
Bachman's Sparrow	<i>Aimophila aestivalis</i>	Bird	open pine woods with scattered bushes and grassy understory in Pineywoods region, brushy or overgrown grassy hillsides, overgrown fields with thickets and brambles, grassy orchards; remnant grasslands in Post Oak Savannah region; nests on ground against grass tuft or under low shrub	T
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Bird	found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	T
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Bird	wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking	
Peregrine Falcon	<i>Falco peregrinus</i>	Bird	both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.	T
Piping Plover	<i>Charadrius melodus</i>	Bird	wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats	T
Red-cockaded Woodpecker	<i>Picoides borealis</i>	Bird	cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, and loblolly	E
Sprague's Pipit	<i>Anthus spragueii</i>	Bird	only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.	
Swallow-tailed Kite	<i>Elanoides forficatus</i>	Bird	lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees	T
Wood Stork	<i>Mycteria americana</i>	Bird	forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding	T

			records since 1960	
American eel	<i>Anguilla rostrata</i>	Fish	coastal waterways below reservoirs to gulf; spawns January to February in ocean, larva move to coastal waters, metamorphose, then females move into freshwater; most aquatic habitats with access to ocean, muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries; diet varies widely, geographically, and seasonally	
Blue sucker	<i>Cycleptus elongatus</i>	Fish	larger portions of major rivers in Texas; usually in channels and flowing pools with a moderate current; bottom type usually of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles	T
Creek chubsucker	<i>Erimyzon oblongus</i>	Fish	tributaries of the Red, Sabine, Neches, Trinity, and San Jacinto rivers; small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks	T
Paddlefish	<i>Polyodon spathula</i>	Fish	prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir	T
Western sand darter	<i>Ammocrypta clara</i>	Fish	Red and Sabine River basins; clear to slightly turbid water of medium to large rivers that have moderate to swift currents, primarily over extensive areas of sandy substrate	
Black bear	<i>Ursus americanus</i>	Mammal	bottomland hardwoods and large tracts of inaccessible forested areas; due to field characteristics similar to Louisiana Black Bear (LT, T), treat all east Texas black bears as federal and state listed Threatened	T
Louisiana black bear	<i>Ursus americanus luteolus</i>	Mammal	possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas	T
Plains spotted skunk	<i>Spilogale putorius interrupta</i>	Mammal	catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie	
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	Mammal	roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures	T
Red wolf	<i>Canis rufus</i>	Mammal	extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies	E
Southeastern myotis bat	<i>Myotis austroriparius</i>	Mammal	roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures	
Creeper (squawfoot)	<i>Strophitus undulatus</i>	Mollusks	small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins	
Fawnsfoot	<i>Truncilla donaciformis</i>	Mollusks	small and large rivers especially on sand, mud, rocky mud, and sand and gravel, also silt and cobble bottoms in still to swiftly flowing waters; Red (historic), Cypress (historic), Sabine (historic), Neches, Trinity, and San Jacinto River basins.	
Little spectaclecase	<i>Villosa lienosa</i>	Mollusks	creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins	
Louisiana pigtoe	<i>Pleurobema riddellii</i>	Mollusks	streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins	T

Sandbank pocketbook	<i>Lampsilis satura</i>	Mollusks	small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River	T
Southern hickorynut	<i>Obovaria jacksoniana</i>	Mollusks	medium sized gravel substrates with low to moderate current; Neches, Sabine, and Cypress river basins	T
Texas heelsplitter	<i>Potamilus amphichaenus</i>	Mollusks	quiet waters in mud or sand and also in reservoirs. Sabine, Neches, and Trinity River basins	T
Texas pigtoe	<i>Fusconaia askewi</i>	Mollusks	rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas River basins, Sabine through Trinity rivers as well as San Jacinto River	T
Wabash pigtoe	<i>Fusconaia flava</i>	Mollusks	creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow	
Wartyback	<i>Quadrula nodulata</i>	Mollusks	gravel and sand-gravel bottoms in medium to large rivers and on mud; Red, Sabine, Neches River basins	
Alligator snapping turtle	<i>Macrochelys temminckii</i>	Reptile	perennial water bodies; deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October	T
Louisiana pine snake	<i>Pituophis ruthveni</i>	Reptile	mixed deciduous-longleaf pine woodlands; breeds April-September	T
Northern scarlet snake	<i>Cemophora coccinea copei</i>	Reptile	mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial; active April-September	T
Sabine map turtle	<i>Graptemys ouachitensis sabinensis</i>	Reptile	Sabine River system; rivers and related tributaries, ponds and reservoirs with abundant aquatic vegetation; basks on fallen logs and exposed roots; eats insects, crustaceans, mollusks, and aquatic plants; breeding and egg-laying March-May, with hatchlings appearing in early fall	
Timber/Canebrake rattlesnake	<i>Crotalus horridus</i>	Reptile	swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto	T
Chapman's orchid	<i>Platanthera chapmanii</i>	Plant	in Texas, appears restricted to wetland pine savannas and savanna swales in hillside seepage bogs, two very restricted and declining habitats in the State; flowering July-August	
Florida ladies-tresses	<i>Spiranthes brevifolia</i> var. <i>floridana</i>	Plant	Moist to wet, relatively open sites of pine-dominated landscapes, mesic pine uplands, open scrub pinelands with saw palmetto, Catahoula sandstone barrens, meadows, open grassy lawns, pitcher plant and seepage bogs, wet prairies, wet savannas, and flatwoods. Delicate, nearly ephemeral, orchid with winter rosette. Flowers Apr-May.	
Long-sepaled false dragon-head	<i>Physostegia longisepala</i>	Plant	relatively open areas on poorly drained, acid loams on level terrain over Beaumont, Deweyville, and Montgomery formations; probably originally found in fire-maintained wetland pine savannas or in the transition zone between such flatwoods and adjacent coastal prairies, now found primarily in secondary habitats, such as wet borrow ditches along roadsides and moist areas in human-made clearings in pine woodlands; flowering early May-early July	
Navasota false foxglove	<i>Agalinis navasotensis</i>	Plant	Texas endemic; relatively sparsely vegetated, shallow, sandy soils on calcareous sandstone outcrops of the Oakville Formation, with associated surrounding species more typical of Edwards Plateau, than Post Oak Savanna or Blackland Prairie; also, Catahoula Formation barrens in pine savanna; flowering September-October	

Panicked indigobush	<i>Amorpha paniculata</i>	Plant	A stout shrub, 3 m (9 ft) tall that grows in acid seep forests, peat bogs, wet floodplain forests, and seasonal wetlands on the edge of Saline Prairies in East Texas. It is distinguished from other <i>Amorpha</i> species by its fuzzy leaflets with prominent raised veins underneath, and the flower panicles, which are 8 to 16 inches long and slender, held above the foliage.	
Texas ladies'-tresses	<i>Spiranthes brevilabris</i> var. <i>brevilabris</i>	Plant	Sandy soils in moist prairies, incl. blackland/Fleming prairies, calcareous prairie pockets surrounded by pines, pine-hardwood forest, open pinelands, wetland pine savannahs/flatwoods, and dry to moist fields, meadows, and roadsides. Delicate, nearly ephemeral orchid, producing winter rosettes, flowers Feb-Apr. Historically endemic to SE coastal plain.	
Texas screwstem	<i>Bartonia texana</i>	Plant	in and around acid seeps in Pine-Oak forests on gentle slopes and baygall shrub thickets at spring heads; often on clumps of bryophytes at tree bases, on roots, and on logs; flowering September-November, can be identified in mid to late October when its in fruit	
Texas trailing phlox	<i>Phlox nivalis</i> ssp. <i>texensis</i>	Plant	Texas endemic; relatively open fire-maintained pine or pine-hardwood forests on soils with a deep, sandy surface layer and clayey subsurface layers; flowering late March-early April (-May)	E
White firewheel	<i>Gaillardia aestivalis</i> var. <i>winkleri</i>	Plant	Texas endemic; open pine-oak woodlands and farkleberry sandhills in deep, loose, well-drained whitish sands; flowering late spring (May-June) and sporadically through early fall	