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Environmental Assessment

Old Colony Road Sewer V & VI

Sam Houston Ranger District, Sam Houston National Forest
Walker County, Texas
Compartment 58

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Summary

The Sam Houston National Forest proposes to grant an easement to the City of Huntsville under the auspice of a previous Special Use Permit (Amendment No. 7 to the Special-Use Authorization FS-2700-23 [4/97]; OMB No. 0596-0082; granted on August 31, 1999) that was obtained to construct the initial phase of the City of Huntsville's Waste Water Master Plan. The result of the proposed action will allow the City to connect a low-income residential area to an existing sanitary sewer infrastructure and replace independent, failing septic systems within the watershed. The proposed project, Old Colony Road (OCR) Sewer 5 & 6 will provide for the placement of approximately 2,450 feet of pipeline on a total of 2.81 acres (1.12 acres of permanent corridor and 1.69 acres of construction corridor) of National Forest land. The proposed OCR 5 & 6 sanitary sewer lines will tie into the Fish Hatchery Road Sewer Improvement lines on Forest Service property. The project area is located in Compartment 58, at the northern boundary of the Sam Houston Ranger District of the Sam Houston National Forest in Walker County, Texas.

The proposed action may improve watershed soil and water quality through the replacement of degrading septic systems, cause temporary soil disturbance of approximately 2.81 acres during pipeline construction, replace 1.56 acres of woodland habitat with herbaceous maintained right-of-way, and is not likely to adversely affect endangered, threatened or sensitive species in Sam Houston National Forest.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- *No Action Alternative*
- *Topography-Based Action Alternative*

Based upon the effects of the alternatives, the responsible official will decide that the preferred alternative is consistent with a finding of no significant impact.

The best available science was considered in making this decision. The project record demonstrates a thorough review of relevant scientific information, consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk. Effects of this project on climate change, as well as the effects of climate change on this project, were also considered. Any resulting greenhouse gas emission would not be measurable on a global scale.

Introduction

Document Structure

The proposed action is an easement requested by the City of Huntsville, Texas under the auspice of an existing Special Use Permit in Compartment 58 of the Sam Houston National Forest (Figure 1). The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by environmental components (e.g., physical factors, biological factors, social and economic factors). Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Sam Houston Ranger District Office in New Waverly, Texas.

Background

On May 5, 1980, the U.S. Department of Agriculture, Forest Service (hereafter, Forest Service) issued a Special-Use Permit to the City of Huntsville to construct a sewer treatment plant on Forest Service property. In June 1995, the City of Huntsville's Wastewater System Master Plan: "The Huntsville Plan" was implemented to provide sanitary sewer service needs through 2020 (document available upon request). As part of this plan, on May 8, 1997, the City of Huntsville submitted the initial Wastewater Interceptor and Fish Hatchery Road Collection Line Project (hereafter FHRC project) layout information to the Forest Service. This project would require the construction, operation and maintenance of gravity-operated sewer lines, lift station, force mains and other related facilities across Tract J-12a, Compartment 58 of the Sam Houston National Forest. Following the preparation of an Environmental Assessment, public review, and decision notice, Amendment No. 7 to the Special-Use Authorization (FS-2700-23 [4/97]; OMB No. 0596-0082) was granted on August 31, 1999. This Amendment authorized the rights-of-way for new sewer lines and related facilities in the Sam Houston Nation Forest as described in the Special-Use Authorization document (Appendix A) and the Final Environmental Assessment Report for the City of Huntsville, Texas Wastewater Interceptor and Fish Hatchery Road Collection Lines (September 1998; document available upon request).

Amendment No. 7 of the Special Use Permit was sought to facilitate both current and future growth in and around the project area. As stated in the Environmental Assessment "The proposed project would also provide sanitary sewer system capacity to serve presently undeveloped areas in the headwaters of the Tan Yard Branch watershed when and if demand develops." One of the goals of the Huntsville Master Plan is to provide sanitary sewer service to residences currently utilizing on-site septic systems for waste disposal which are now considered within the corporate limits of the City of Huntsville. Many of the existing septic systems within this area are suspected to be impaired and may potentially be degrading local water quality.

The OCR 5 & 6 sanitary sewer line project will be a continuation of the implementation of the original Huntsville Wastewater System Master Plan and providing sanitary sewer service to residences located south of the initial FHRC project. This project will consist of installing two gravity wastewater line systems that will tie into the existing FHRC project as originally intended (Figure 2). The two critical arteries of this system that traverse the National Forest will consist of approximately 850 linear feet of 8-inch high-density polyethylene (HDPE) pipe (OCR 5) and approximately 1,600 linear feet of 18-inch HDPE pipe (OCR 6).

The two routes of the OCR 5 & 6 project proposed to extend through the National Forest property have been carefully chosen based on several parameters. Because these systems rely on gravity for transport, the two lines initially were routed based on existing topography by following the lowest-lying areas in order to provide maximum depth. Based on these alignments, the project team conducted a preliminary literature and database search (TPWD - Texas Natural Diversity Database) to identify any known threatened, endangered or sensitive resources. This research concluded that the

project area was free of these resources, and the project team then began adjusting the proposed alignments to minimize impacts to natural resources including known wetlands, waters of the U.S. (National Wetland Inventory Maps) and forested areas (recent color aerial photography). These efforts resulted in the route depicted in Figure 2, which provides the most direct path avoiding known natural resources and utilizes an existing cleared Entergy overhead power utility easement in an effort to significantly reduce the footprint of the project through forested areas. Correspondence with Entergy has been initiated and documentation of these efforts is provided in Appendix B.

Since the inception of this proposed phase of the Wastewater System, representatives from the City of Huntsville have been coordinating with Mr. Frank Stranimier from the Sam Houston National Forest, and have attended three meetings. A biological evaluation (BE) was conducted for the proposed alternative (BE #04-08-11) and concluded that the proposed action will have no effect on threatened and endangered species, and no impact on sensitive species in Sam Houston National Forest.

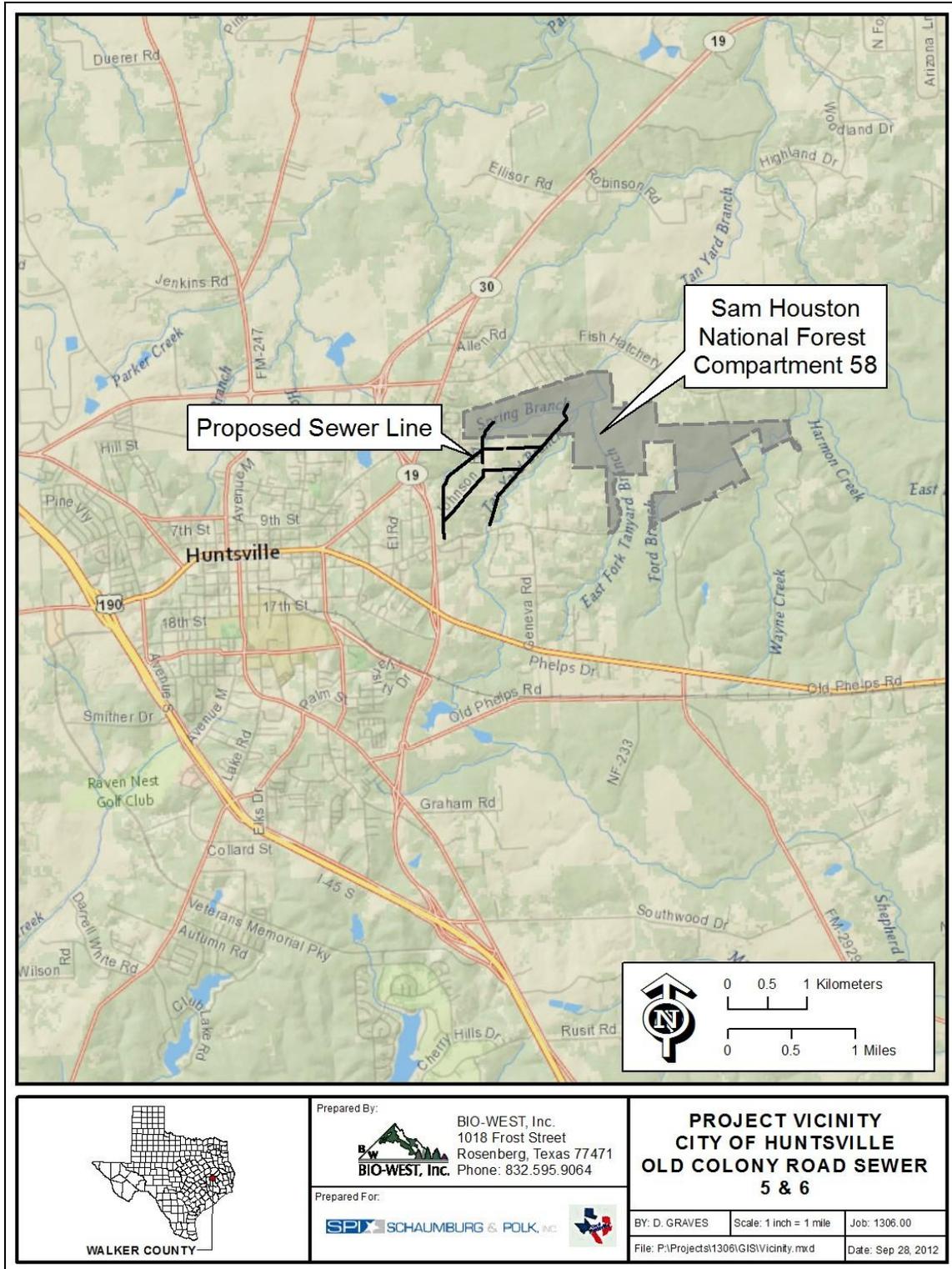


Figure 1. Vicinity map of the proposed project location in Huntsville, Texas.

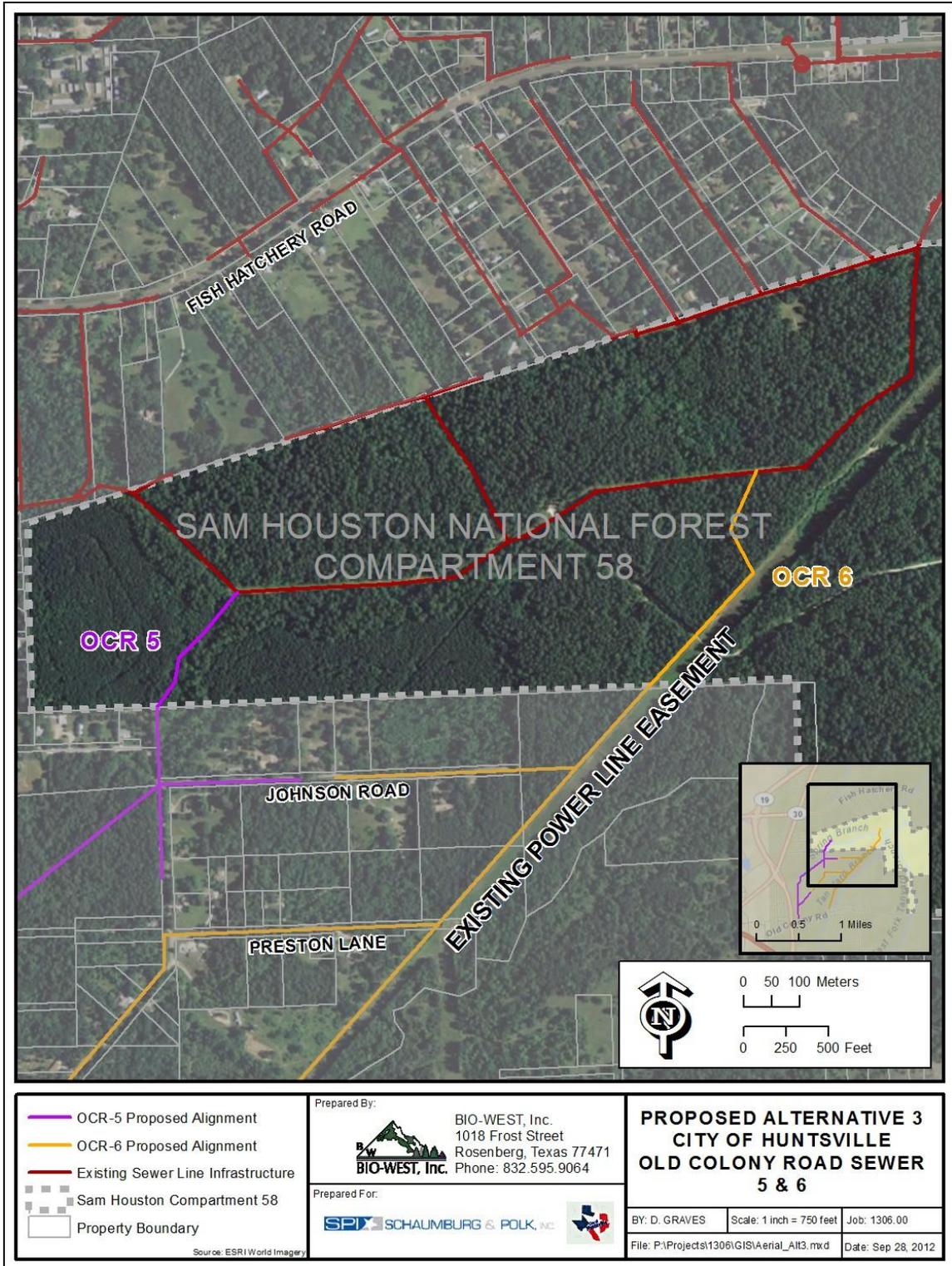


Figure 2. Location map of the proposed action (Alternative 3), illustrated on 2008 aerial imagery.

Purpose and Need for Action

The purpose of this initiative is to enable the City of Huntsville, Texas to provide a secure source of municipal wastewater collection and treatment as part of the City of Huntsville's Wastewater System Master Plan. This action is needed, because many of the existing on-site disposal systems located within the project area currently are exhibiting an unacceptably high frequency of failure due to their age, poor soil conditions, hydraulic overloading, and inadequate maintenance (PPA 1998). Malfunctioning septic systems may result in public health threats and potential degradation to area surface waters, shallow groundwater, and surrounding habitats. This action responds to the goals and objectives outlined in the National Forests and Grasslands in Texas Revised Land and Resource Management Plan, and helps move the project area towards desired conditions described in that plan (NFGT 1996). Specifically, this action will likely improve the water quality and soil quality of the local area, addressing the NFGT mission "To maintain, improve, or restore, healthy and naturally diverse ecosystems which sustain those resources and values that contribute to the ecological, social, and economic needs of the public" (NFGT 1996).

Proposed Action

The Forest Service proposes to grant an easement to the City of Huntsville under the auspice of an existing Special Use Permit (Amendment No. 7 to the Special-Use Authorization FS-2700-23 [4/97]; OMB No. 0596-0082; granted on May 5, 1980) to construct and maintain wastewater interceptor and collection lines on Sam Houston National Forest land. The proposed project consists of adding 2,423 linear feet of permanent easement averaging 20 feet in width for two new gravity wastewater pipelines occupying 1.04 acres in Compartment 58 of the Sam Houston National Forest. During the construction phase of the City's proposed wastewater system improvements, an additional 1.56 acres (30 feet x 2,423 feet less creek crossing buffers) parallel to and contiguous with the permanent rights-of-way (ROW) will be needed to accommodate equipment access and temporary storage of excavated soil, pipe joints, and other materials and equipment. Clearing within this additional temporary workspace will be selective and the removal of mature trees will be avoided to the maximum extent practical. In an effort to further minimize potential impacts, both of the creek crossings will be bored underground and not require the removal of any vegetation along the riparian corridor or disturb the existing creek channel. For this, it is anticipated a minimum buffer of 75 feet (centered on the creek) would remain undisturbed. Additional efforts will be employed to minimize impacts including the utilization of an existing power line easement as much as possible. This will result in 38 % of the proposed new right-of-way to be co-located within an existing easement.

Following construction, the temporary workspace will be restored to preconstruction contours, seeded with appropriate ground covers, and woody vegetation allowed to revegetate naturally. The 20-foot permanent easement (total 1.04 acres) would also be restored accordingly, but will be maintained by the City, free of woody vegetation as a utility access easement. The system components discussed in this report and the easements requested are summarized in Table 1. The total footprint of the

proposed action during construction will be 2,423 feet in length and 50-feet in width (2.60 acres) on Forest Service property.

Table 1. Summary of the Facilities Proposed for Installation on U.S. Forest Service Property Compartment 58 of the Sam Houston National Forest.

Facility	Diameter (inches)	Approximate Length (linear feet)	Approximate Maintenance Area of 20-ft. Easement (acres)	Approximate Construction Area of 15-ft. Easement on Both Sides (30-ft. total easement) (acres)
Gravity Line 5	8	843	0.36	0.54
Gravity Line 6	18	1,580	0.68	1.03
Total Easements		2,423	1.04	1.56

Location and Land Management

Walker County encompasses 801 square miles of rolling hills and open prairies in the Piney Woods vegetation area. The area rests at the extreme western end of the Coastal Plain region; approximately 70 % of the county consists of forests of loblolly, short-leaf and long-leaf pine, and hardwoods. Elevations in Walker County range from 140 to 404 feet above sea level. Walker County is drained by two major rivers, the Trinity River in the north and the San Jacinto River in the south. Temperatures range from an average low of 38° F in January to an average high of 95° F in July; the growing season lasts 265 days. Clay deposits (ceramic and brick clays and Fuller's earth) have been mined commercially, as have other minerals, including sand, gravel, lignite, volcanic ash, and petroleum (University of Texas 2010).

The approximately 3,350 acre Compartment 58, located at the northern boundary of the Sam Houston Ranger District of the Sam Houston National Forest, encompasses approximately 850 acres of National Forest land, the remainder being private property, much of it within the corporate boundary of the City of Huntsville, Texas. Compartment 58 is predominantly maintained as pine/hardwood forest and improved grassland. Water and gas pipeline and power line right-of-ways cross the affected portion of the compartment from southwest to northeast in the area of the proposed project action.

Compartment 58 is within Management Area 1 – Upland Forest Ecosystem, vegetated primarily by upland pine and hardwood species. Parts of Compartment 58 are managed for timber production and include several management techniques that emphasize both even-aged, and/or uneven-aged timber cutting to provide a range of timber products. Although subject to encroachment by people and animals from the surrounding areas, the U.S. Forest Service actively manages Compartment 58 to meet the objectives of the forest plan (NFGT 1996). However, most of this compartment and the

upper Tan Yard Branch watershed are located on private property in an expanding urban area. Existing patterns of disturbance are expected to intensify as adjacent pastures and woodlands in the headwaters of the Tan Yard Branch are replaced by residential subdivisions.

The proposed project occurs within a peninsula of Compartment 58 that is surrounded by existing residential development within the City of Huntsville on three sides. This segment of Compartment 58 occupies a linear tract that extends approximately 4,500 feet west with an average width of 1,700 feet (Figure 1).

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the following decisions:

Whether or not to grant the City of Huntsville a special use permit to construct and maintain wastewater interceptor and collection lines across compartment 58 of the Sam Houston National Forest.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on January 1, 2012. The proposal was provided to the public and other agencies for comment during scoping September 27, 2011 to November 1, 2011. On November 2, 2012, the pre-decisional EA was made available to the public for comment. Additionally, as part of the public involvement process, the Forest Service coordinated with the Texas Historical Commission and Tribes known to have ancestral ties located within the Sam Houston National Forest.

Issues

Issues were defined as those consequences that are directly or indirectly caused by implementing the proposed action. Indirect issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. A list of indirect issues and reasons regarding their categorization may be found in the project record.

As for direct issues, The Forest Service identified two topics as the result of public scoping. These issues include:

1. The effects of fragmentation wildlife and habitat.
2. The effects of water quality as a result of sewer line breaks and leaks.
3. The effects of permanent loss of wildlife habitat, timber, and biodiversity.

Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the OCR 5 & 6 project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., pump stations versus the use of gravity lines) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the amount of erosion or cost of installing pump stations versus gravity lines).

Alternatives

Alternative 1 (No Action)

Alternative 1 is the No Action alternative. Under the No Action alternative, current management plans would continue to guide management of the project area. No gravity sanitary sewer line construction would be implemented to extend wastewater services to developing areas to meet project goals, and individual septic systems in the Tan Yard Branch watershed would remain in place.

Alternative 2 (Topography-based Action)

Alternative 2 involves the alignment and construction of the OCR 5 & 6 gravity sewer lines across private and public lands based on the topography of the area, to maximize the efficiency of the system since it relies on gravity for transport. Alternative 2 would place approximately 2,155 feet of pipeline on a total of approximately 2.47 acres of Forest Service property (0.99 acres of permanent easement and 1.48 acres of temporary construction easement) within Compartment 58 of the Sam Houston National Forest, where both OCR 5 and OCR6 would tie into the existing Fish Hatchery Road Sewer Improvement lines (Figure 3). Under Alternative 2, both pipelines OCR 5 & OCR 6 would be placed across a wooded portion of the national forest land to tie into existing pipelines, and only a portion of OCR 6 would then run parallel to an existing maintained power line right of way south of the national forest on private land. Potential impacts to wooded habitat would be approximately 1,655 linear feet (1.90 acres).

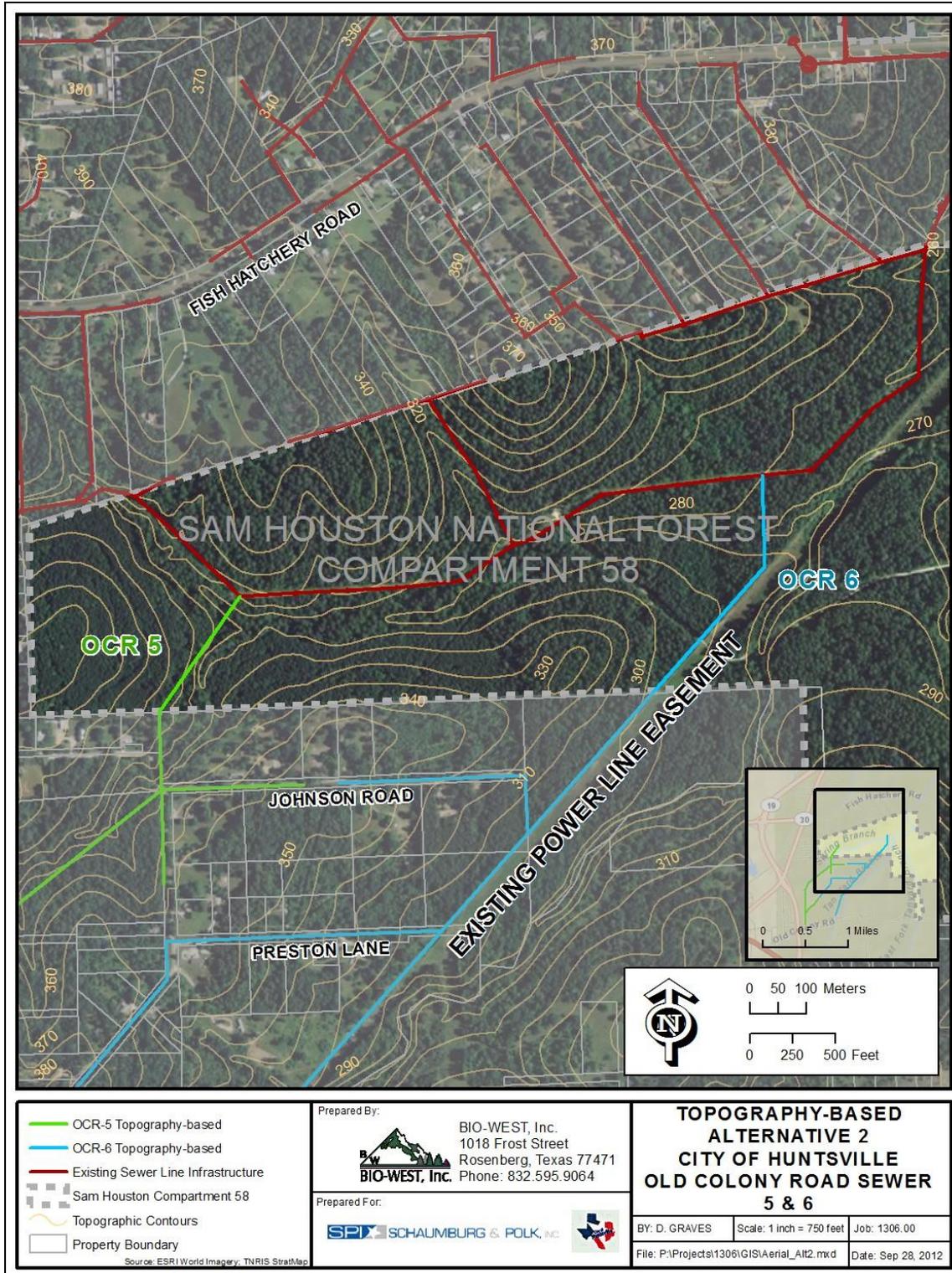


Figure 3. Location map of Alternative 2 (Topography-based Action), illustrated on 2008 aerial imagery.

Alternative 3 (Proposed Action)

Alternative 3 is the proposed action and considers both topography and natural resources in the alignment and construction of the OCR 5 & 6 sanitary sewer lines. Alternative 3 would place approximately 2,423 feet of pipeline on a total of approximately 2.60 acres of Forest Service property (1.04 acres of permanent easement and 1.56 acres of temporary construction easement) within Compartment 58 of the Sam Houston National Forest, where both OCR 5 and OCR6 would tie into the existing Fish Hatchery Road Sewer Improvement lines (*see* Figure 2). Under Alternative 3, the pipeline OCR 5 would be placed across a wooded portion of the national forest land to tie into an existing pipeline, while OCR 6 would cross only a small portion of wooded national forest land and then run parallel to an existing maintained power line right of way. Potential impacts to wooded habitat would be reduced to approximately 670 linear feet (0.31 acres of permanent easement) by locating the line within an existing power line easement. Additionally, potential impacts to mature mixed pine woodlands are reduced on OCR 6 by adjusting the easement further west into an area of largely immature plantation forest. Several bends in the alignments of both OCR 5 and OCR 6 are provided to reduce potential visual impacts and to reduce potential impacts to waters of the U.S. by crossing streams at a perpendicular angle. In addition, boring the two creek crossings at Spring Branch Creek will ensure the vegetation and stream characteristics will remain intact.

Alternatives Not Considered In Detail

Alternative 4 (Previously Explored Alternative)

Alternative 4 refers to additional alternatives that previously were explored during the development of the City of Huntsville's Wastewater System Master Plan, but were not chosen (PPA 1998). The original City of Huntsville's Wastewater System Master Plan indicated an alignment for future sanitary sewer lines (Figure 4) that does not account for the current location of the Fish Hatchery Road Sewer Improvement lines. This previously explored alternative alignment does not incorporate the use of an existing power line right-of-way to reduce woodland impacts on Forest Service property. Since the adoption of the current City of Huntsville's Wastewater System Master Plan and the construction of the Fish Hatchery Road sanitary sewer line, this alternative is not considered a viable alternative to connect the developed areas within the headwaters of the Tan Yard Branch watershed to the existing water and wastewater infrastructure.

Alternative 5 (Utilizing Forest Service Boundaries)

Alternative 5 would utilize the perimeter of the Forest Service property boundaries to route the proposed pipeline. This alternative was considered, but due to the existing infrastructure and design, the topography would not support this option. In order to overcome the existing topography, pressurized mains and lift stations would be required. This infrastructure would not only exceed the financial capacity for the project, it would also greatly increase the liability of sewage spills and

perpetual maintenance cost. Additionally, this option would require a greater right-of-way width, the construction of more permanent roads, electrical easements, and increased traffic for scheduled maintenance of the lift stations. Although not feasible, an engineer would have to design the sewer line infrastructure in order to provide an accurate location of lift stations, power easements, access roads and property access. Therefore, a route for this alternative was not depicted on a figure and impacts were interpreted.

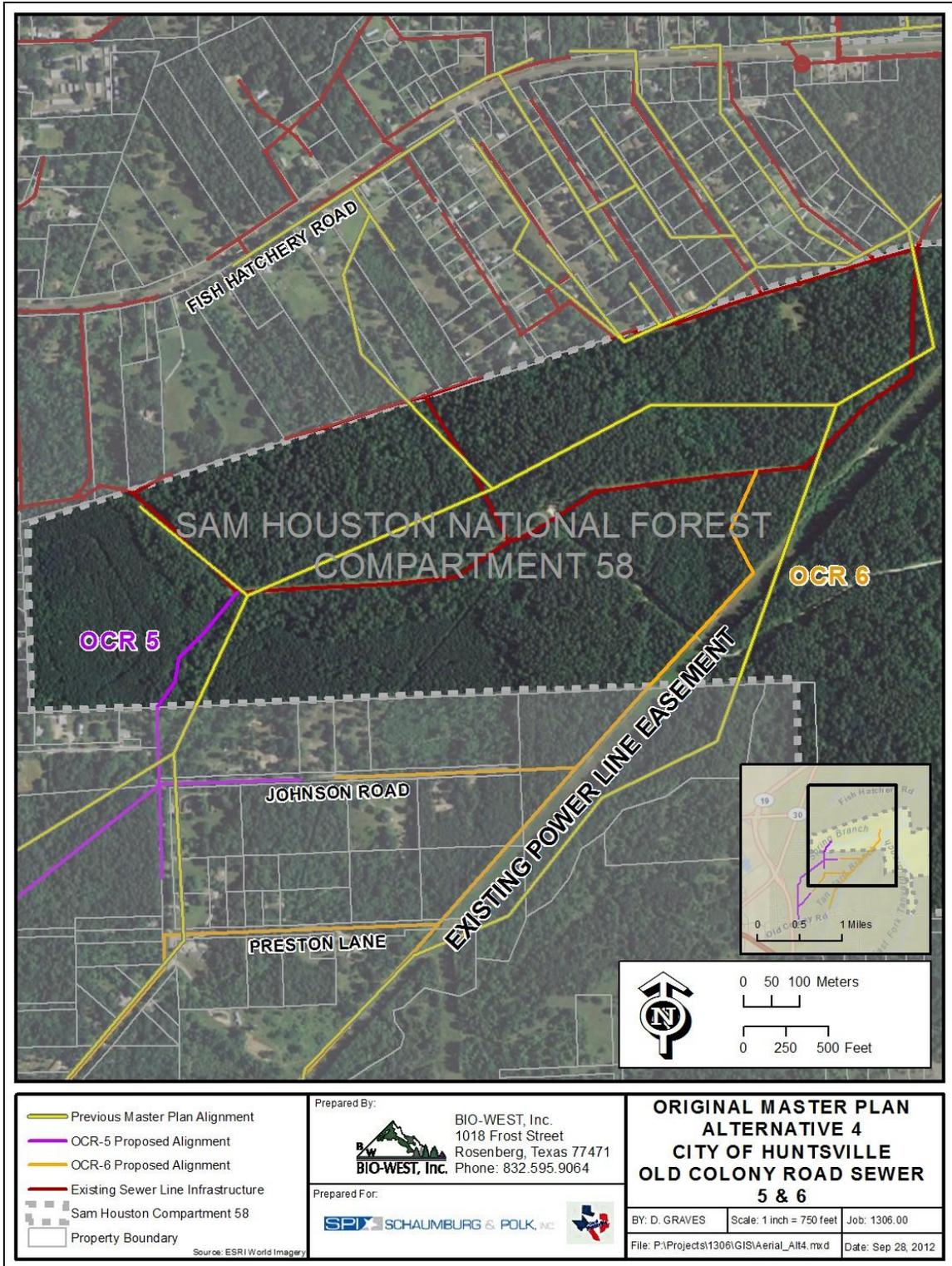


Figure 4. Location map of Alternative 4 (Previously Explored Alternative), illustrated on 2008 aerial imagery.

Design Criteria

Design criteria were developed to ease some of the potential soil disturbance and woodland habitat impacts the various alternatives may cause. The design criteria measures may be applied to any of the action alternatives.

Mitigation for the potentially adverse impacts of Alternative 3 (Proposed Action) focus on three areas: 1) the minimization of the project easement, 2) the provision of sufficient erosion control and revegetation to maintain soil/bank stability along the pipeline right-of-way (and/or at pipeline crossings and prevent significant deterioration of downstream water quality and aquatic habitats from deposition of sediments derived from erosion at stream crossings or construction disturbance of steep slopes), and 3) limitation of vehicular access to the right-of-way following construction.

Sewer line construction will be restricted in wet weather. The authorized officer will monitor conditions and promptly shut down operations when erosion and soil compaction will be unacceptable.

If previously undiscovered archaeological or historical resources are encountered during the implementation of this project, work in that area will cease immediately until the resources can be assessed and evaluated by a member of the Heritage Management Team, and the State Historic Preservation Office (SHPO) has been afforded the opportunity to review the findings. The site area will be excluded from all treatments until this review can be completed. Known archaeological and historical sites which are considered eligible for listing on the National Register of Historic Places (NRHP), and those which have not been fully evaluated in order to determine their eligibility for the NRHP, will be removed from the area of potential effect by adjusting the appropriate boundaries of the proposed actions.

If previously undocumented RCW activity is discovered during implementation of this project, the project will be stopped. The District Wildlife Biologist will evaluate the situation and determine appropriate management actions to take that would be consistent with US Fish and Wildlife Service guidelines.

Typical sewer line project construction requires access for equipment ingress and egress to the permanent project easement along temporary construction easements that run parallel along both sides of the installation corridor. The construction footprint of this project has been minimized from a typical 80-foot to 100-foot corridor down to a proposed 50-foot easement (20-foot permanent easement and 30-foot temporary construction easement). By minimizing the proposed project easement width, the potential impacts associated with this project are reduced by 35-50%.

Aquatic resources will be minimized to the maximum extent practical. In addition to minimizing the easement to 50 feet, impacts to larger stream crossings will be avoided by using conventional subterranean boring. It is proposed the crossings of Spring Branch Creek and an associated tributary will be avoided by minimum buffer of 37.5 feet on either side of the creek. These efforts will result in an undisturbed 75-foot riparian corridor along these creeks.

As a result of minimal forest clearing and right-of-way maintenance, a possibility exists for the introduction of Non-Native Invasive Plant Species (NNIPS). In an effort to prevent the introduction and spread of NNIPS, the City will work with the Forest Service to develop a maintenance plan to treat any non-native plant species that may be detected. The proposed action will rely on Early Detection and Rapid Response (EDRR) to minimize the threat of NNIPS infestations along the proposed easement. The construction activity during pipeline installation will involve a trench cut and backfill of soil to preconstruction contours, which will maintain the existing seedbed of the easement. Additionally, the easement will be monitored annually for NNIPS.

Standard Forest Service erosion control and revegetation plans will be utilized throughout all phases of construction and maintenance and will be made available to the City of Huntsville for inclusion as an enforceable part of the construction contracts to be awarded by the city. A variety of methods and materials are available for erosion control and revegetation, which must be selected based on factors that include nature of construction, expected uses of revegetated areas, soil and vegetation characteristics, slope, initial bank stability, climate, season of disturbance, and the hydrologic characteristics of the affected water bodies. Typical erosion control measures to be considered include soil retention blankets, hay bale dikes, sediment control fencing, rock filter dams, and sack gabions.

The requested easements are not likely to result in opportunities for vehicles, including light trucks and off highway vehicles, access to previously closed portions of the forest. However, vehicular barricades (e.g., pipe gates) may be used to exclude unauthorized vehicular access, while still allowing access for maintenance vehicles. As part of this mitigation, informative signage describing prohibited activities will be placed at the easement interfaces with private property.

Monitoring

Before, during, and after the implementation of the selected alternative, the project area will be monitored to determine whether the project is carried out as designed.

During construction, an authorized officer will inspect operations regularly to ensure compliance with design criteria and contract provisions. During periods of wet weather or marginal conditions, at the beginning of contract operations, and at other critical periods, inspections will be done on a daily basis when contractors are working. These inspections will be documented, and violations will be promptly reported to the District Ranger.

Following construction, the project area would be monitored for NNIPS, which would conform to that which is being conducted as part of the *Plan* and 2008 NNIPS EA. Monitoring of environmental conditions would occur during direct NNIPS treatment. Monitoring of non-target resources, including wildlife, plant and animal abundance, and aquatic resources would also occur.

Effectiveness monitoring would be implemented during the next growing season following treatment. Inventories for new NNIPS infestations, as a result of the tree removal, would be conducted every

growing season. The monitoring and inventories would be conducted by qualified Forest Service invasive species, range, and/or botany personnel.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives (Table 2).

Table 2. Summary of the effects of each OCR 5 & 6 project alternative on Forest Service property.

Effect	Alternative 1	Alternative 2	Alternative 3
Potential soil disturbance (acre)	-	2.47	2.61
Potential waters of the U.S. disturbance (acre)	-	0.019	0.005
Potential wooded habitat disturbance (acre)	-	1.90	1.73
Anticipated impacts to threatened or endangered species	No	No	No
Allows replacement of septic systems with a sanitary sewer system	No	Yes	Yes

Environmental Consequences

This section summarizes the physical, biological, cultural, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. The effects can be direct, indirect, or cumulative. Direct effects occur at the same time and in the locations of the actions that cause them. Indirect effect may occur at a later time, or in a different location than the actions that were their cause. Cumulative effects result from the integrated impacts of past, present, and reasonably foreseeable actions in the area. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Compartment 58 has been managed historically for timber with portions of the compartment having been altered as recently as the 1980's. Currently these areas are undergoing early to mid-successional stages. The immature mixed pine woodlands have an overstory dominated by loblolly pine with a moderate to well-developed midstory and shrub layer.

Alternative 1 (No Action) will not result in any anticipated soil disturbance, disturbance to waters of the U.S., or disturbance to threatened, endangered, or sensitive species or their habitat in Sam Houston National Forest. However, improvement in soil quality and water quality and increase in property value associated with a gravity sanitary sewer system improvement project in the Tan Yard Branch watershed also would not occur.

Alternatives 2 and 3 would result in several acres of temporary soil disturbance during construction, the clearing of a small acreage of mixed pine woodlands along the pipeline easement, and would allow the replacement of individual septic systems in the area with a central sanitary sewer system, meeting project goals. The proposed project alternative (Alternative 3) would minimize the acreage of disturbed woodlands on Forest Service property. The proposed project easement would be allowed to revegetate with grasses and herbaceous vegetation, and the temporary construction easement would be allowed to revegetate naturally with woody species. Additionally, Alternative 3 incorporates several bends in the proposed pipeline alignment to allow perpendicular crossings of streams and a decrease in impacts to visual quality.

Physical Factors

Soil Descriptions

According to the Natural Resource Conservation Service (NRCS) web soil survey data for Walker County, there are seven soils mapped within the overall proposed project easement (Table 3; Figure 5) (NRCS 2010a). The frequently flooded Nugent soils and frequently flooded Kanebreak soils are considered hydric soils by the NRCS. The Depcor-Huntsburg-Gunter association (map unit 10) and Kanebreak soils (map unit 27) are the two soils that occur on Forest Service property within the proposed action easement.

Table 3. Summary of soils present within the proposed action easement.

Map Symbol	NRCS Map Unit Name	Characteristics	NRCS Hydric Soil	USDA Soil Series Description
9	Depcor-Huntsburg association	Gently undulating	No	The Depcor series consists of deep, moderately well drained, slowly permeable soils that formed in unconsolidated loamy sediments. These gently sloping to strongly sloping soils are on uplands. The Huntsburg series consists of deep, moderately well drained, very slowly permeable soils on uplands. These nearly level to sloping soils formed in thick coastal plain sediments.
10	Depcor-Huntsburg-Gunter association	Gently rolling	No	The Gunter series is a member of the loamy, siliceous, thermic family of Grossarenic Plinthic Paleudults.
27	Kanebreak soils	Frequently flooded	Yes	The Kanebreak soils are frequently flooded soils on floodplains and are somewhat poorly drained.

Soil disturbance within the proposed right-of-way is anticipated to be temporary in nature. Top soil will be segregated and replaced to maintain the organic layer and native seed bank. Equipment used for construction will minimize travel along the construction easement and thus minimize soil compaction and reduce rutting. Following construction, the area of impact will be restored to preconstruction contours and BMPs will be implemented to prevent erosion.

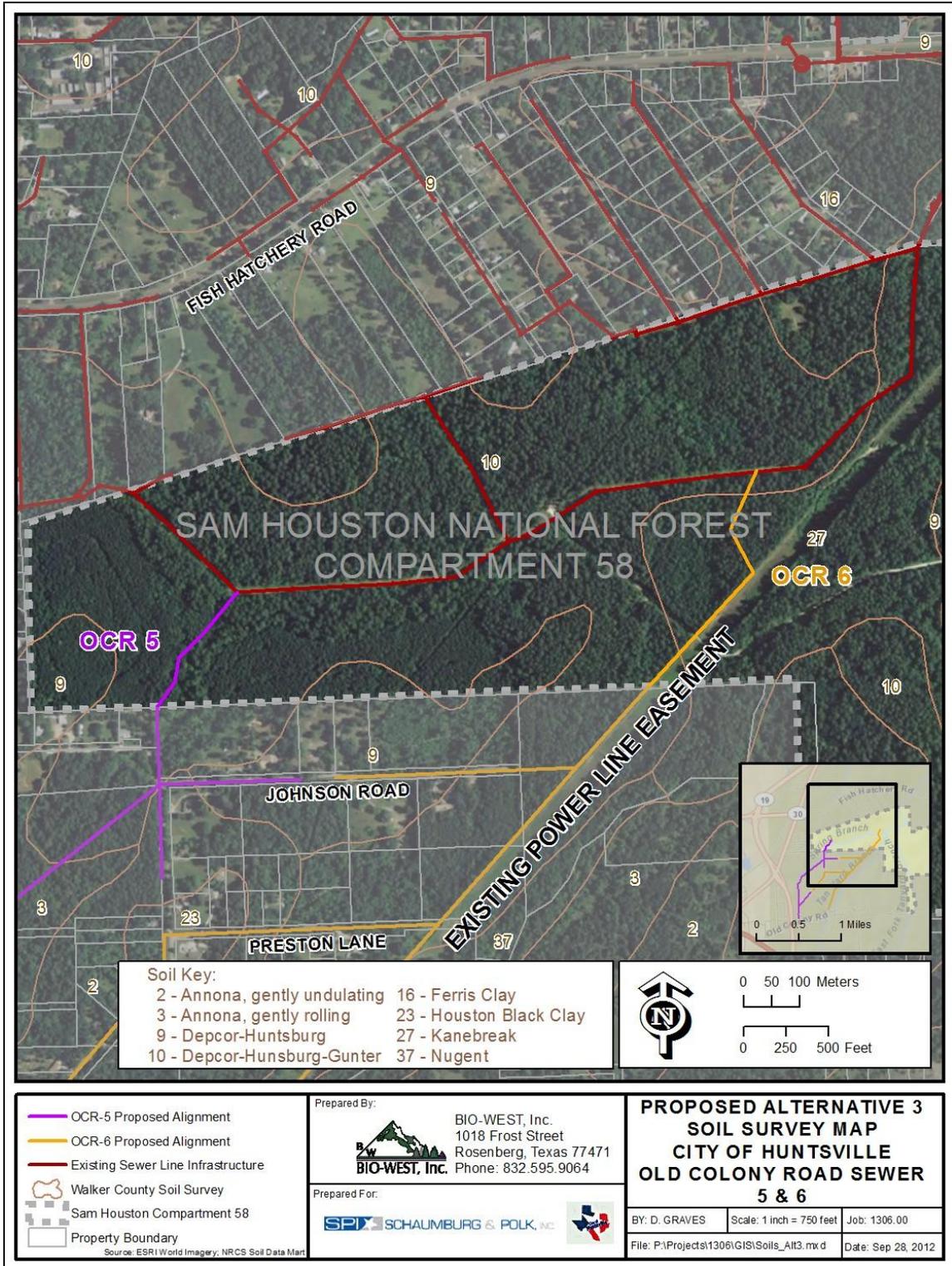


Figure 5. NRCS soil survey map of the proposed action (Alternative 3).

Streams and Waters of the U.S.

Spring Branch flows in a northeasterly direction to join with the Tan Yard Branch stream, which ultimately terminates into the Trinity River near the headwaters of Lake Livingston. Within national forest land, Spring Branch is an intermittent, second order stream beginning at the confluence of two intermittent first order tributaries. Based on a review of the USGS topographic map for the proposed project area (Figure 6) and USGS site inventory for Texas (USGS 2010) Spring Branch and Tan Yard Branch do not have flow gages and no records of water quality measurements from these streams have been identified. Incidental field observations on Forest Service land during field visits indicated that under normal to low flow conditions within the proposed project corridor, aquatic habitats included intermittent stream channels that consisted of sections of dry stream bed and sections of shallow (<6 inches depth) pools with bedrock and clay substrates.

An on-site jurisdictional waters of the U.S. determination was conducted within the project area on September 15, 2010. Aerial photography (TNRIS 2010), FEMA flood insurance rate maps (FEMA 2010), and web-based soil survey information (NRCS 2010a) were used to characterize the project area conditions, and the delineation of potential jurisdictional waters of the U.S. (PJW) was conducted in the field using a Trimble® GPS unit with sub-meter accuracy.

A total of 0.023 acres of PJWs occur within the 50-foot proposed project corridor (20-foot permanent easement, plus 30-foot construction easement) on Forest Service property (Table 4). However, creek crossings PJW 7 and PJW 9 will be bored and therefore not impacted. As a result, only 0.001 acres of a stream tributary (PJW 6) and 0.004 acres of emergent wetland (PEM1) will be temporarily disturbed, for a cumulative impact of approximately 0.005 acres (Table 4). The proposed project is considered authorized under Nationwide Permit 12 (NWP 12) for utility line activities without pre-construction notification, since impacts to potential waters of the U.S. is less than 0.1-acre and the entire proposed project action involves less than 0.5-acre of potential waters of the U.S. crossings (USACE 2010). Due to the magnitude of the watershed as compared to the 0.005 acres of disturbance to potential jurisdictional waters of the U.S., impacts to the watershed as a whole are considered negligible.

Table 4. Summary of potential jurisdictional waters of the U.S. within the proposed action right-of-way on Forest Service property.

Potential Jurisdictional Water	Project Segment	Feature	OHWL (ft.)	Length (ft.)	Potential Impact (acre)
PJW 6	OCR 5	Ephemeral stream	1	50	0.001
PEM1*	OCR 6	Emergent Wetland	n/a	15	0.004
TOTAL					0.005

* Feature does not extend through entire 50-ft. ROW.

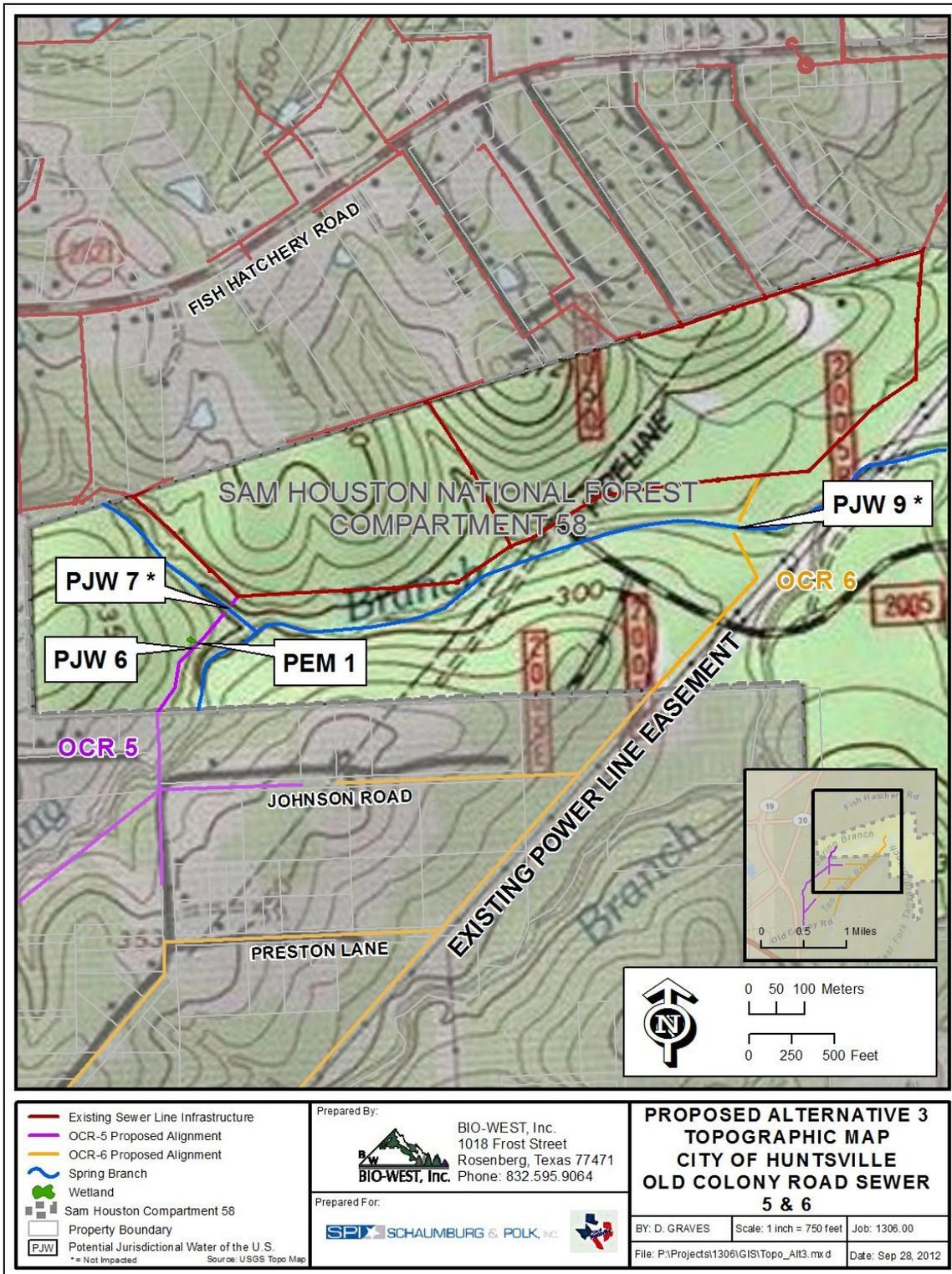


Figure 6. USGS topographic map of the proposed action (Alternative 3).

Watershed Description

The project is located in a sub-basin of the Trinity River basin, U.S.G.S. hydrologic unit code 12030202 (TWDB 2001). Based on a review of the Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM) for the project area (FEMA 2001, City of Huntsville 2011), the proposed OCR 6 easement crosses the current 100-year floodplain at one location on Forest Service property (Figure 7). This crossing is approximately 24 feet in total width across the floodplain, and is located at the upstream end of a floodplain segment that connects to Tan Yard Branch. The proposed action (Alternative 3) eliminates this disturbance by boring the proposed pipeline beneath the creek and floodplain. Additionally, the project design includes the use of proper BMPs and the backfill of soil to preconstruction contours across the entire easement, and is therefore not expected to result in alterations to the existing floodplain.

The proposed project easement crosses the current 100-year floodplain of Tan Yard Branch at one location on private property south (upstream) of Forest Service property. This crossing is approximately 60 feet in total width across the floodplain, and was also minimized during a review of the project alternative alignments. The proposed project design includes the use of proper BMPs and the backfill of soil to preconstruction contours across the easement. Therefore, cumulative effects to the floodplain in this sub-basin of the Trinity River basin are expected to be minimal. Again, BMPs previously discussed will be implemented and include construction activities to cease during rain events.

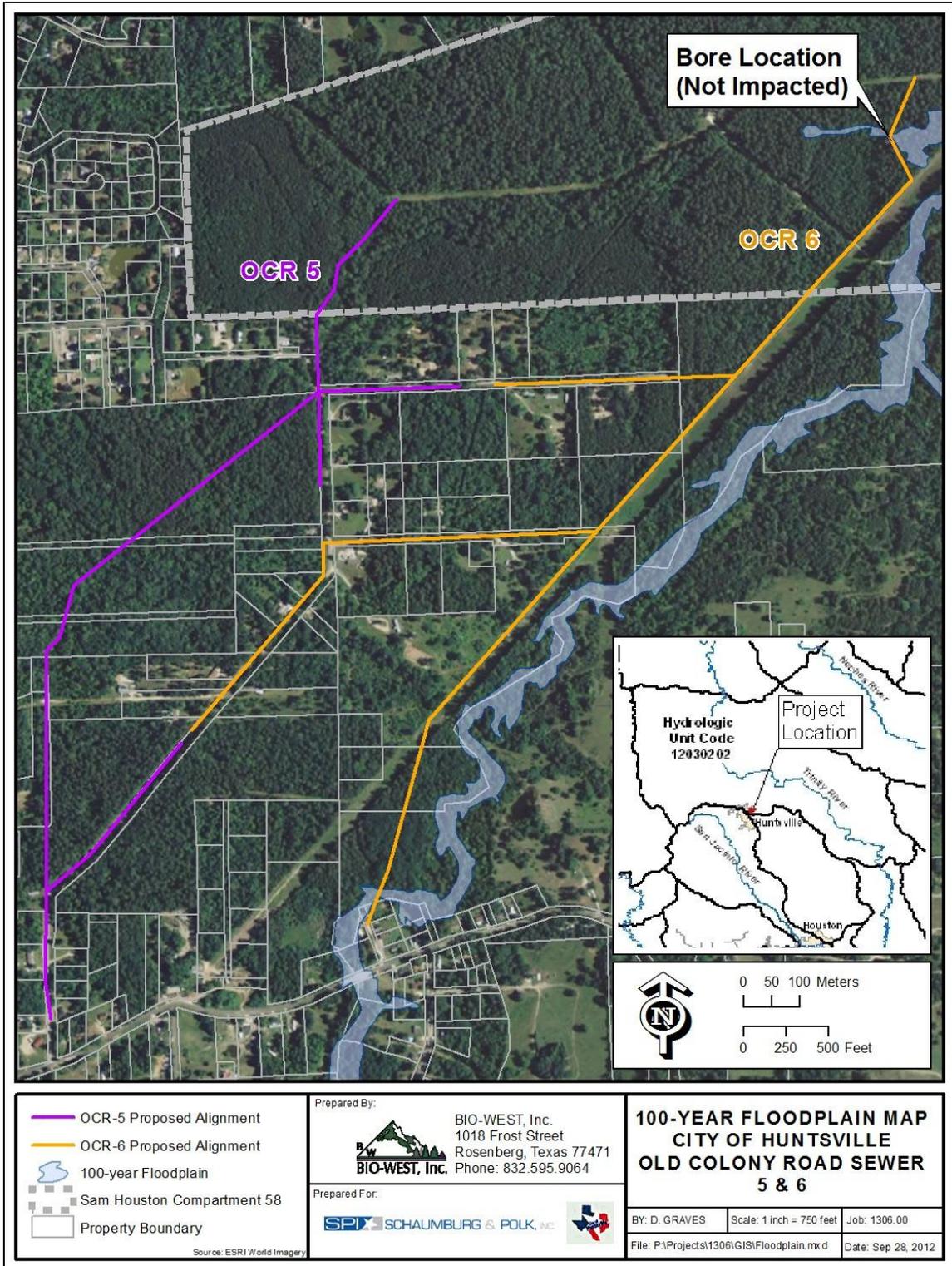


Figure 7. Floodplain map of the proposed action (Alternative 3).

Biological Factors

A biological evaluation (BE) was conducted to document the literature, site investigation, and methods used to evaluate potential biological effects of the proposed action (BE #04-08-11). A list of sensitive, threatened and endangered species potentially occurring within the proposed project area was evaluated along with the existing environmental conditions within the proposed project easement and a review of available biological reference material. Based on this information, it is determined that the proposed action will have no effect on threatened and endangered species. Additionally, the proposed action will have no impact on sensitive species listed by the Forest Service as potentially occurring in Sam Houston National Forest. The following sections provide a summary of the information provided in the BE.

Regional Biological Description

According to the Ecological Classification System for the National Forests and Adjacent Areas of the West Gulf Coast Plain (Van Kley et al. 2007), the Sam Houston National Forest is located in the Raven Hills Land Type Association. A land type association (LTA) is defined as an area with similar vegetation, soils and often occurs on closely related geologic formations (Van Kley et al. 2007). The Raven Hills LTA is further classified into six Land Type Phases supporting pine-hardwood forest vegetation characterized by shortleaf pine (*Pinus echinata*), loblolly pine (*Pinus taeda*) along with principal hardwood species that include post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*) sweetgum (*Liquidambar styraciflua*), and southern red oak (*Quercus falcata*).

Some of the typical wildlife species in this region include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), fox, nutria (*Myocastor coypus*), raccoon, skunk, cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), mink (*Mustela vison*), armadillo, wood rat (*Neotoma floridana*), white-footed mouse (*Peromyscus leucopus*), eastern harvest mouse (*Reithrodontomys humulis*), cotton mouse (*Peromyscus gossypinus*), golden mouse (*Ochrotomys nuttalli*), hispid cotton rat (*Sigmodon hispidus*), hispid pocket mouse (*Chaetodipus hispidus*), marsh rice rat (*Oryzomys palustris*), turkey, quail, and mourning dove (NRCS 2010b). Scientific names of the aforementioned species were cross-referenced based on Manning et al. (2008) and Texas Ornithological Society (1995).

Species of Concern

The species considered in this document are categorized into the following groups: A) federally listed species which appear on the U.S. Fish and Wildlife Service (USFWS) county list; and B) those species listed for the SHNF as Sensitive, on the Regional Forester (R8) approved list, updated September 2010 (USFS 2010).

A. Federally Listed Threatened or Endangered Species

The USFWS has determined that these species are threatened or endangered. Species in this category are protected under the Endangered Species Act (ESA).

B. Sensitive Species

These are species identified by the Regional Forester for which there is concern for population viability across their range, and all occurrences contribute significantly to the conservation of the species.

Habitat Description

Habitats located within the proposed action right of way were assessed during field visits on June 22, 2010, September 15, 2010 and March 10, 2011. Habitats with 100 feet of the proposed construction easement centerline were systematically surveyed for potential threatened, endangered, or sensitive (TES) species' habitats. Prior to the field surveys, information regarding the national forest setting, land use, vegetation and habitats were assessed and documented. A review of historical aerial photography (Appendix B), recent aerial photography (Google Earth 2011), Level IV ecoregion maps, and agency lists of sensitive, threatened and endangered species for the project area was performed. Species of concern as listed by the U.S. Forest Service for Sam Houston National Forest were obtained from the contractor website (USFS 2010). All wildlife species encountered were noted. These encounters included direct observation as well as other signs such as tracks or scat.

Habitat types within the project area were characterized according to vegetation community types. Vegetation communities often are a result of soil types, topographic elevation, hydrology and possible disturbance. Photographs of representative habitat types within each property from the March 2011 site visit are presented in Appendix C. Three main habitat types were observed within the survey corridor on Forest Service property, including two separate mixed pine woodlands – one mature (Habitat 1) and one immature (Habitat 2), and a maintained, herbaceous right of way (Habitat 3). Representative photographs of habitats along the proposed OCR-5 and OCR-6 easements on Forest Service property are provided in Appendix C.

Three main habitat types were observed within the survey corridor on Forest Service property, including: mixed pine woodlands - mature (Habitat 1), mixed pine woodlands - immature (Habitat 2), and a maintained, herbaceous right-of-way (Habitat 3). Representative photographs of habitats along the proposed OCR-5 and OCR-6 easements on Forest Service property are provided in Appendix C. The plant community for **Habitat 1** included an overstory, midstory, shrub layer and herbaceous layer. The overstory was dominated by tall loblolly pine trees (*Pinus taeda*) with interspersed shortleaf pine (*Pinus echinata*) with average trunk diameter at breast height (dbh) of 15-25 inches and approximately 60-80 feet tall. There was a well-developed midstory of winged elm (*Ulmus alata*), water oak (*Quercus nigra*), American elm (*Ulmus americana*) and young southern red oak interspersed, along with a well-developed shrub community dominated by yaupon (*Ilex vomitoria*). The herbaceous layer was dominated by scattered longleaf woodoats (*Chasmanthium sessiliflorum*) on leaf-littered soil. Other associated species in the community included parsley hawthorn

(*Crataegus marshallii*), crossvine (*Bignonia capreolata*), roundleaf greenbrier (*Smilax rotundifolia*), saw greenbrier (*Smilax bona-nox*) and laurelleaf greenbrier (*Smilax laurifolia*). The plant community of **Habitat 2** was dominated by a less mature, denser, mixed pine and hardwood woodland. Dominant species included loblolly and shortleaf pine trees with average trunk dbh of 3-8 inches and approximately 20-60 feet tall. This community had a moderately dense midstory with American hophornbeam (*Ostrya virginiana*), southern red oak, and roughleaf dogwood (*Cornus drummondii*). The herbaceous layer was supported by scattered longleaf woodoats over leaf-littered soils. **Habitat 3** is a maintained, herbaceous power line right-of-way. Species observed in the maintained right-of-way include Bahia grass (*Paspalum notatum*), goldenrod (*Solidago* sp.), croton (*Croton* sp.), woodsorrel (*Oxalis* sp.), dandelion (*Taraxacum officinale*), rosette grass (*Dichanthelium* sp.), dewberry (*Rubus* sp.), boneset (*Eupatorium* sp.), and roundhead rush (*Juncus validus*).

All three habitats identified were assessed for their potential to support endangered, threatened, or sensitive species. Additionally, a presence/absence survey for endangered, threatened, or sensitive species within the proposed action right-of-way was conducted during the June 2010, September 2010 and March 2011 field assessments. Some of the common wildlife encountered during the field visits include: pine warbler (*Dendroica pinus*), northern cardinal (*Cardinalis cardinalis*), red-bellied woodpecker (*Melanerpes carolinus*), American crow (*Corvus brachyrhynchos*), Carolina chickadee (*Parus carolinensis*), banded water snake (*Nerodia fasciata*), and cricket frog (*Acris crepitans*). At the time of the field investigations, intermittent streams crossed by the proposed project corridor were mostly dry with some small shallow pools. Investigations of these shallow pools did not reveal the presence or signs of any fish or mussels. No sensitive, threatened, or endangered taxa were encountered during the field investigations.

Evaluation of Effects

Habitat surveys conducted in June 2010, September 2010 and March 2011 evaluated the potential for the TES species identified by the U.S. Forest Service to occur within the proposed project easement. The following species descriptions provide information regarding each of these species, and whether the species or its habitat may be impacted (sensitive species) or affected (threatened or endangered species). Overall, no adverse impacts are anticipated to any of the listed species described below.

FEDERALLY LISTED SPECIES

Red-cockaded Woodpecker (*Picoides borealis*)

The red-cockaded woodpecker (RCW) is a federally and state-listed endangered species, known to occur in the Sam Houston National Forest. RCW inhabits mature pine forests of the southeastern United States and nests almost exclusively in old living pines infected with a fungus called red heart disease (USFWS 1995, USFWS 2011a). A high correlation exists between the occurrence of the red-cockaded woodpecker and the distribution of the longleaf pine (*Pinus palustris*), for which the bird has a particular affinity, and also slash pine (*P. elliotti*), loblolly pine, shortleaf pine, pitch pine (*P.*

rigida) and pond pine (*P. serotina*) (Thompson and Baker 1971). The historical range of the red-cockaded woodpecker extends from Texas, primarily east of the Trinity River, east to the Atlantic and as far north as Maryland (Hooper et al. 1980). Habitat loss is the major contributing factor responsible for the red-cockaded woodpecker's endangered status (USFWS 2011a).

Field investigations were conducted in June and September 2010 and in March 2011. BIO-WEST, Inc. currently maintains a U.S. Fish and Wildlife Scientific Permit (No. TE216075-0) that authorizes Mr. Martin Heaney, biologist, to conduct presence/absence surveys for Red-cockaded woodpecker (RCW) within Texas. Each of the field investigations involved pedestrian surveys to assess the entire project corridor on foot. The main habitats observed within the project construction easement included existing maintained herbaceous easements along a power line, mixed woodlands with a predominantly loblolly pine dominated overstory, a developed midstory with young red oaks, sweetgum, water oak, and yaupon, and immature mixed woodlands with pine, oaks, American hophornbeam and yaupon. While the mature mixed woodlands have tall pine trees that could serve as foraging habitat, it is not likely preferred RCW nesting habitat due to the established midstory and shrub layer in the forest community. A transect within the habitat survey corridor (100-feet in width) was surveyed within sight of all trees in the corridor to identify the potential presence of RCWs using appropriate methodology (vocalizations, observation of individuals, cavities and/or resin wells in live pine trees, start holes). No evidence of RCWs was observed in the project area during the field investigations.

Based on communication with the Sam Houston National Forest biologists, the proposed project easement does not cross identified RCW nesting habitat and is located in Management Area 1. Management Area 1 is managed to provide quality wildlife habitat and dispersed recreation activities. Based on the most recent mapped data from spring 2011 and provided by the Sam Houston National Forest, the nearest RCW stands appear to be approximately 8 miles distant from the project area. Consultation with the Sam Houston Ranger District biologist, Mr. Daniel Jauregui (pers. comm. 3/3/2011), confirmed that no recorded RCW stands were located in Compartment 58, where the proposed project is located. Based on this information and the lack of evidence of red-cockaded woodpeckers or cavity nest trees in the project area indicates that the RCW is not likely to occur within the proposed project corridor. Therefore, the proposed action or any of the alternatives identified are anticipated to have no effect on the red-cockaded woodpecker. As a result, no cumulative impacts are expected to this species.

SENSITIVE SPECIES

Texas Bartonian (*Bartonia texana*)

The Forest Service considers Texas bartonian to be a sensitive species with the potential to occur in Sam Houston National Forest. Texas bartonian, also known as Texas screwstem, is a slender, erect, glabrous annual plant that grows to 30-cm tall. Its leaves are alternate and reduced to scales approximately 1-mm long and flowers from September-November. Texas bartonian may occur in and

around acid seeps in pine-oak forests on gentle slopes and baygall shrub thickets at spring heads, often on clumps of bryophytes on tree bases, roots, and logs. As mentioned previously, Texas bartonia is listed as a sensitive species by the Forest Service in Sam Houston National Forest, although its range in Texas includes only Angelina, Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, San Jacinto and Tyler counties (Poole et al. 2007).

Field investigations were conducted during June, September and March to identify potential Texas bartonia habitat within the proposed project corridor. The project area consisted mainly of maintained existing right-of-way with herbaceous vegetation along the OCR 6 right-of-way, and mixed woodlands along the remainder of OCR 6 and OCR 5 right-of-ways. Spring heads and acid seeps were not observed in the forested areas of the proposed project easement, and Texas bartonia was not observed within the survey area during field investigations. Therefore, the proposed action or any of the alternatives identified are anticipated to have, no impacts to Texas bartonia are anticipated. As a result, no cumulative impacts are expected to this species.

Big Thicket Emerald Dragonfly (*Somatochlora margarita*)

The Forest Service considers the Big Thicket emerald dragonfly to be a sensitive species with the potential to occur in Sam Houston National Forest. The Big Thicket emerald dragonfly had not been observed in the western half of the Sam Houston National Forest but has been found more east of I-45 near the Big Creek Scenic Area (Price et al. 1989). The adults are generalists, often foraging over small forest openings such as narrow road right-of-ways. Preferred habitat for larvae is associated with small, clear, sandy-bottomed streams and boggy seeps within loblolly and longleaf pine stands (NatureServe2010c). Because of its specific needs, the larval stage is considered to be the critical life stage.

Due to the lack of water and the presence of intermittent streams supporting only shallow, stagnant ephemeral pools, the stream crossings in the proposed project corridor are not considered to be high quality potential habitat. The proposed construction easement will cross several small intermittent sandstone and clay bottomed streams, although habitat for this species could potentially occur elsewhere in the watershed. Due to the lack of high potential habitat for larval emerald dragonflies, the proposed boring of the creek crossings, the use of Best Management Practices (BMPs), and the mobility of adults of this species, no impacts to Big Thicket emerald dragonfly are anticipated from any of the alternatives investigated. As a result, no cumulative impacts are expected to this species.

Louisiana Pigtoe (*Pleurobema riddellii*)

The Forest Service considers the Louisiana pigtoe to be a sensitive species with the potential to occur in Sam Houston National Forest. The Louisiana pigtoe mussel is an aquatic species that ranges from eastern Texas drainages into Louisiana, but has been exceptionally rare in recent decades. Since the mid-1990's, small numbers of living specimens have been found in the Neches River and some of its tributaries and the Angelina River (TPWD 2010). The Louisiana pigtoe is found in streams, although not much is known about the preferred flow requirements and substrates used (Howells et al. 1996).

Although it is not known whether the Louisiana pigtoe is found in this part of Walker County, there is a possibility that it may exist within perennial streams. Field investigations occurred in June, September and March and documented the aquatic habitats within the proposed project easement are intermittent streams. The stream channels were visually inspected on foot and no mussels were observed within any of the aquatic habitats. Due to the lack of preferred habitat and installation of BMPs, none of the proposed alternatives identified are expected to impact this aquatic mussel. As a result, no cumulative impacts are expected to this species.

Sandbank Pocketbook (*Lampsilis satura*)

The Forest Service considers the sandbank pocketbook to be a sensitive species with the potential to occur in Sam Houston National Forest. The Sandbank pocketbook mussel is an aquatic species known from southern portions of the Mississippi interior basin and western Gulf drainages of Arkansas, Mississippi, Louisiana, and Texas. It is considered rare in all states from which it has been recorded (TPWD 2010).

Although it is not known whether the sandbank pocketbook is found in this part of Walker County, there is a possibility that it may exist within perennial streams. Field investigations occurred in June, September and March and documented the aquatic habitats within the proposed project easement are intermittent streams. The stream channels were visually inspected on foot and no mussels were observed within any of the aquatic habitats. Due to the lack of preferred habitat and installation of BMPs, none of the proposed alternatives identified are expected to impact this aquatic mussel. As a result, no cumulative impacts are expected to this species.

Texas Heelsplitter (*Potamilus amphichaenus*)

The Forest Service considers the Texas heelsplitter to be a sensitive species with the potential to occur in Sam Houston National Forest. The Texas Heelsplitter mussel is an aquatic species known to be restricted to the Sabine, Neches, and Trinity rivers of Texas (TPWD 2010). Little is known about the habitat requirements of the Texas heelsplitter. Some have reported finding the Texas heelsplitter in quiet waters on sand and mud bottoms (Howells et al. 1996).

Although it is not known whether the Texas heelsplitter is found in this part of Walker County, there is a possibility that it may exist within perennial streams. Field investigations occurred in June, September and March and documented the aquatic habitats within the proposed project easement are intermittent streams. The stream channels were visually inspected on foot and no mussels were observed within any of the aquatic habitats. Due to the lack of preferred habitat and installation of BMPs, none of the proposed alternatives identified are expected to impact this aquatic mussel. As a result, no cumulative impacts are expected to this species.

Sabine Shiner (*Notropis sabinae*)

The Forest Service considers the Sabine shiner to be a sensitive species with the potential to occur in Sam Houston National Forest. The Sabine shiner occurs along the Gulf coast from the San Jacinto

River drainage (Texas) east to the Calcasieu River and a small section of the Red River drainage in Louisiana. In Texas, it inhabits small Austroriparian streams of eastern Texas from San Jacinto drainage northward along the Gulf coast to the Sabine River basin (Hubbs et al. 1991). Banita Creek and LaNana Bayou (tributaries of the Angelina River) in Nacogdoches County, historically and presently support a large population of this species (Dickens 1950, Williams and Bonner 2006).

The Sabine shiner was discovered on July 22, 1998 to be present in the Sam Houston National Forest in Peach Creek (Carrie 2009). The Sabine shiner typically is found in spotty occurrences in streams and rivers with fine, silt-free, sand substrates with slight to moderate currents (Robison and Buchanan 1992). This type of habitat does not occur in the small tributaries within the proposed project easement. Field investigations in June, September and March documented the aquatic habitats that occur in the proposed project easement are intermittent streams that are shallow (<6 inches depth) with bedrock and clay substrates, and included sections that were pooled or were dry at the time of the field visit. The stream channels were visually inspected and no fish were observed. Due to the lack of preferred habitat and installation of BMPs, none of the proposed alternatives identified are expected to impact this fish. As a result, no cumulative impacts are expected to this species.

Bachman's Sparrow (*Aimophila aestivalis*)

The Forest Service considers the Bachman's sparrow to be a sensitive species with the potential to occur in Sam Houston National Forest. Habitats described for this species include open pine or oak woods and brushy pastures (Peterson 1980; Scott 1987) and tall pines intermixed with grasses, wildflowers, scattered oaks and shrubs (Oberholser 1974). Males of the species defend its territory by singing from an open perch in territories (Stokes and Stokes 1996) that are used for both nesting and feeding (Dunning 1993).

The habitat described for Bachman's sparrow is not particularly unique habitat in Sam Houston National Forest and in East Texas. Habitats observed within the proposed project easement consisted of maintained herbaceous right-of-way and mixed pine/hardwood forest. Field investigations occurred in June, September and March when this species is typically active. Bachman's sparrow was not observed and its song was not heard by the biologists during the habitat surveys. Potential habitat in the project easement is also limited. The proposed action would result in an herbaceous corridor that may provide additional foraging habitat for this species. Based on this information and the mobility of the species, no effects to Bachman's sparrow are anticipated from any of the alternatives investigated. As a result, no cumulative impacts are expected to this species.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle is considered a sensitive species by the Forest Service with the potential to occur in Sam Houston National Forest. Bald eagle populations have increased significantly over the past few decades and are now considered to be de-listed throughout their range by the U.S. Fish and Wildlife Service (USFWS 2011b). The bald eagle inhabits coastal areas, rivers, and large bodies of water throughout North America. Proximity to open water is an important feature of this species' nesting

habitat (Green 1985) and foraging activities. Bald eagles prey mainly on fish and waterfowl; therefore, nests are rarely far from a river, lake, bay, or other water body. Nests typically are built in the dominant trees of woodlands, woodland edges, or open areas, and are positioned such that a clear flight path exists between the nest and the nearest body of water (Green 1985). Bald eagles also nest on cliffs and rock pinnacles, but nests on man-made structures are rare. Concentrations of wintering eagles are highest in the eastern part of Texas, often occurring around the shores of reservoirs. Although wintering bald eagles use habitats adjacent to open water, areas with little or no open water also are used if rabbits, carrion, or other food items are regularly available (Green 1985). Several eagles may often use winter roosting sites.

The field investigations occurred in June, September and March. Habitat within the proposed easement consists of herbaceous right-of-way and mixed pine/hardwood forest. Additionally, no bald eagles or nests were encountered during the habitat surveys and the proposed project easement is not located near large open bodies of water or perennial streams that would provide foraging and nesting habitat. Based on this information, no effects to bald eagles are anticipated from any of the alternatives investigated. As a result, no cumulative impacts are expected to this species.

Migrant Loggerhead Shrike (*Lanius ludovicianus migrans*)

The migrant loggerhead shrike is considered a sensitive species in Sam Houston National Forest. It historically occurred throughout the United States from southern Canada to southern Mexico. It has been known to breed from Canada south to eastern Texas, central Louisiana, western North Carolina and Virginia. This subspecies is migratory and overwinters in the southern half of its breeding range (Yosef 1996). Habitat for this species consists of grasslands and open, agricultural areas characterized by short vegetation and scattered trees, shrubs or hedgerows for nesting cover and hunting and lookout perches (Evers 1994). This species typically prefers pastures, old fields and orchards, roadside fencerows, and native prairies and grasslands (Evers 1994). This bird also utilizes riparian areas and open woodlands as well as agricultural fields with row crops, mowed roadsides, parks, cemeteries and golf courses. Shrikes often impale or wedge prey (e.g., insects, reptiles, small rodents and birds) on thorns of shrubs or barbed wire. This practice serves to mark males' territories, and the cached food serves as reserves when meals are scarce.

The field investigations occurred in June, September and March. Habitat within the proposed easement consists of herbaceous right-of-way and mixed pine/hardwood forest, and is not considered preferred migrant loggerhead shrike habitat. Migrant loggerhead shrikes were not encountered during the habitat surveys and their nesting and hunting/perch habitat (grasslands with scattered trees or shrubs) were not present in the proposed project easement. Based on this information, no effects to migrant loggerhead shrikes are anticipated from any of the alternatives investigated. As a result, no cumulative impacts are expected to this species.

Southeastern myotis (*Myotis austroriparius*)

The Southeastern myotis bat is considered a sensitive species potentially occurring in Sam Houston National Forest. This species is a small bat that occurs in the Southeastern United States as far westward as the Pineywoods region of East Texas (Davis and Schmidly 1994). The Southeastern myotis is predominantly a cave bat, but in Texas it seeks out roosts in human habitations and structures. It has been found in crevices between bridge timbers; in culverts and drain pipes; in boat houses, barns and the attics of houses; and in hollow trees (Davis and Schmidly 1994).

Site investigations were conducted during daylight hours in June, September and March. While no netting activity was conducted, no evidence of bats (chatter noise, droppings) was observed while traversing the entire project corridor on foot. Additionally, no hollow trees or abandoned buildings were observed in the project area during field investigations. Therefore, the Southeastern myotis is not expected to be present in the proposed project corridor. Due to the mobility of this species, lack of preferred habitat and absence of any evidence of bats, the proposed action is expected to have no impact on the Southeastern myotis from any of the alternative routes investigated. As a result, no cumulative impacts are expected to this species.

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*)

The Rafinesque's big-eared bat is a state-listed threatened species and a sensitive species in Sam Houston National Forest. It is a nocturnal, medium-sized grayish brown bat with long rabbit-like ears that may live up to ten years in the wild (TPWD 2009). Roosting habitat for the Rafinesque's big-eared bat includes cave entrances, hollow trees, abandoned buildings and under bridges in forests of the southeastern United States (TPWD 2009). East Texas is the western most extent of its range, and while its use of caves and abandoned structures is well documented in other states, little is known about factors governing roost tree selection (Mirowsky 1997). Davis and Schmidly (1994) describe their eastern forested range as largely devoid of caves with roosts typically in hollow trees, crevices behind bark, and under dry leaves. Roost tree locations are typically found through netting activity, hearing bat chatter and finding bat droppings.

Site investigations were conducted during daylight hours in June, September and March. While no netting activity was conducted, no evidence of bats (chatter noise, droppings) was observed while traversing the entire project corridor on foot. Additionally, no hollow trees or abandoned buildings were observed in the project area during field investigations. Therefore, Rafinesque's big-eared bat is not expected to be present in the proposed project corridor. Due to the mobility of this species, lack of preferred habitat and absence of any evidence of bats, the proposed action is expected to have no impact on Rafinesque's big-eared bats from any of the habitats investigated. As a result, no cumulative impacts are expected to this species.

Determination of Effects

The following table displays the determinations of effect for the TES species evaluated in detail, and summarizes the rationale for those determinations (Table 5).

Table 5. Summary of sensitive species that may potentially occur in the Sam Houston National Forest or Walker County, Texas (USFS 2010).

	Species	Federal Status†	Sensitive Species*	Determination	Rationale for Determination of All Alternatives Investigated
PLANTS	Texas Bartonian (<i>Bartonia texana</i>)		SHNF	No impact	Habitat not observed in project area
	Big Thicket Emerald Dragonfly (<i>Somatochlora margarita</i>)		SHNF	No impact	Major Streams will be Bored and Stream protection measures would minimize potential impacts to water quality.
MOLLUSKS	Louisiana Pigtoe (<i>Pleurobema riddellii</i>)		SHNF	No impact	
	Sandbank Pocketbook (<i>Lampsilis satura</i>)		SHNF	No impact	Major Streams will be Bored and Stream protection measures would minimize potential impacts to water quality.
	Texas Heelsplitter (<i>Potamilus amphichaenus</i>)		SHNF	No impact	
FISH	Sabine Shiner (<i>Notropis sabinae</i>)		SHNF	No impact	Major Streams will be Bored and Stream protection measures would minimize potential impacts to water quality.
BIRDS	Bachman's Sparrow (<i>Aimophila aestivalis</i>)		SHNF	No impact	
	Bald eagle (<i>Haliaeetus leucocephalus</i>)		SHNF	No impact	Species not observed in project area; preferred habitat not observed in project area
	Migrant Loggerhead Shrike (<i>Lanius ludovicianus migrans</i>)		SHNF	No impact	
	Red-cockaded Woodpecker (<i>Picoides borealis</i>)	LE	SHNF	No effect	Project is located in Management Area 1; Project does not cross identified nesting habitat; No cavity trees were observed within the project area.
MAMMALS	Southeastern myotis (<i>Myotis austroriparius</i>)		SHNF	No impact	Preferred habitat not observed in project area
	Rafinesque's Big-eared Bat (<i>Corynorhinus rafinesquii</i>)		SHNF	No impact	

†LE = federally listed endangered, LT = federally listed threatened

*SHNF = Sam Houston National Forest listed sensitive species

Summary of Effects to TES and MIS

The proposed action is needed because many of the existing on-site disposal systems located within the project area are currently exhibiting an unacceptably high frequency of failure due to their age, poor soil conditions, hydraulic overloading, and inadequate maintenance (PPA 1998). Malfunctioning septic systems may result in public health threats and potential degradation to area surface waters, shallow groundwater, and surrounding habitats. This action responds to the goals and objectives outlined in the National Forests and Grasslands in Texas Revised Land and Resource Management Plan, and helps move the project area towards desired conditions described in that plan (NFGT 1996). Specifically, this action will likely improve the water quality and soil quality of the local area, addressing the NFGT mission “To maintain, improve, or restore, healthy and naturally diverse ecosystems which sustain those resources and values that contribute to the ecological, social, and economic needs of the public” (NFGT 1996).

The Forest Service property affected by the proposed project includes mixed upland pine woodlands and an existing maintained herbaceous right of way. A portion of the affected mixed pine woodlands are immature plantation woods that are homogeneous in forest type, and a portion is a more mature pine forest. However, this more mature pine area still has shrubs and small trees in the midstory that would not provide preferred RCW nesting habitat, and no evidence of RCW or nest cavities were observed in the habitat survey area. The woodlands within the proposed project easement would be altered to an herbaceous corridor of approximately 20-feet in width (permanent easement).

In summary, the June and September 2010 and March 2011 habitat surveys were systematic surveys of habitats within 100 feet of the proposed 2,423 feet long OCR 5 & 6 construction easement centerline. However, the proposed construction easement is a smaller footprint within the habitat survey area, consisting of 50 feet in total width. Aquatic habitats within the proposed project easement included intermittent stream channels that consisted of sections of dry stream bed and sections of shallow (<6 inches depth) pools with bedrock and clay substrates. The stream channels were investigated and no mussels or fish were observed in the channel or along the banks. No threatened, endangered, or sensitive species were observed during the survey, although several habitats within the proposed project area would provide general habitat for fish, amphibians, gastropods, invertebrates, reptiles, and plants classed as sensitive by the U.S. Forest Service. However, none of these habitats are particularly rare within the Walker County portion of the Sam Houston National Forest, or East Texas.

Based on the literature, discussions with Sam Houston National Forest biologists and field investigations, none of the protected or sensitive species identified as potentially occurring in the region are expected to be found within the proposed project corridor. The red-cockaded woodpecker (RCW) could potentially use the pine forests in the general area as foraging habitat, but no evidence of the RCW or preferred RCW nesting habitat was observed in the survey area, and the nearest documented RCW stands are approximately 8 miles away. Based on this information and the lack of

other federally protected species' habitat within the proposed project corridor, the proposed action is expected to have no effect on federally-listed threatened and endangered species.

Additionally, with proper erosion control and/or avoidance measures at creek crossings, none of the proposed action alternatives are expected to have impacts on sensitive species listed by the U.S. Forest Service as potentially occurring in Sam Houston National Forest.

Clearing the proposed right-of-way will produce a corridor through the existing forests and potentially increase the amount of ecological "edge" or fragmentation in the forest. It is presumed the increased amount of sunlight, created by opening the forest canopy, stimulates plant growth in the open areas. Grasses, forbs, and shrubs typically become established in these areas. The estimated total amount of "edge" habitat to be created by this project is 1,513 linear feet (OCR 5 and 6 combined) within a 20-foot permanent corridor occupying 1.73 acres. It is suspected that the permanent maintenance of a reduced, 20-foot corridor, adjacent mature trees up to heights of 60 feet, will likely shade the majority of the corridor and thus revert back to a shaded understory plant community. Therefore, for the purpose of this evaluation, it is anticipated the impacts will be temporary in nature and thus addressed below accordingly.

Although this corridor is potentially considered forest fragmentation, many species of animals are known to favor edge habitats, e.g., cotton-tailed rabbits, white-tailed deer, and several species of gallinaceous or ground-dwelling birds. These species often rely on a mix of open areas to produce preferred forbs for foraging and open cover to detect and flee predators. For this reason, cutting a corridor in a forested area may, in fact, increase species diversity.

This view is obviously an arguable point if the habitat being altered was a unique, mature pine forest supporting a climax community of flora and fauna. Important species like the federally endangered red-cockaded woodpecker are dependent on these mature habitat types and respectfully, should be protected; however, not all forested areas support this potential. The fact the proposed project occurs within a mixed pine/hardwood forest of varying age classes surrounded by development within the city limits of Huntsville, this area does not lend itself best to be managed to this degree. As a result, portions of Compartment 58 are being managed for timber production and management techniques emphasize using either even-aged or uneven-aged timber cutting to provide a range of timber products. In conclusion, the total area of impact on forest area is 1.73 acres, which consists of 0.2 % of the 850 acres within Compartment 58.

Management Indicator Species (MIS)

Management Indicator Species (MIS) are identified in the Revised Land and Management Plan for the National Forests and Grasslands in Texas. MIS are selected because it is believed changes in their populations are related to management activities. These species include those with special habitat needs that may be an important game species, non-game species of interest and those that may be

available to determine population trends. MIS may be used as a tool for assessing changes in specialized habitats, formulating habitat objectives, and establishing standards and guidelines to provide for a diversity of wildlife, fish, and plant habitats.

Red-cockaded Woodpecker

The red-cockaded woodpecker is the only management indicator species (MIS) that is considered an endangered species with a potential to occur within the vicinity of the proposed project. A thorough description of the natural history, preferred habitat and known colonies of this woodpecker are provided on Page 27 under Federally Listed Species.

Eastern Wild Turkey

The eastern wild turkey subspecies (*Meleagris gallopavo silvestris*) is found over the eastern one-fourth of Texas, in the Piney Woods ecoregion. It often is found in pine-oak woodlands. This subspecies is much less common than the other two subspecies of turkeys known to occur in the state; Rio Grande turkey (*M.g. intermedia*) and Merriam's Turkey (*M. g. merriami*). Texas Parks and Wildlife Department has spent considerable time, effort, and money, in restoring this taxon to its former distribution (online resource; www.tpwd.state.tx.us).

Eastern wild turkeys are considered the most abundant and hunted of all the U.S. turkey species. They require a variety of habitats including open lands and forests. Adequate forestland is necessary to maintain their populations. They generally prefer hardwood and mixed forests with 15 to 65 percent open area which includes fields, cropland and pastures. Good habitats provide plentiful fruit, seeds, insects and vegetation for turkeys to consume. Additionally, Turkeys also need roosting areas within forested habitats. Turkeys often prefer to roost in conifers, located in close proximity to water and on ridgetops or knolls" (online resource, <http://www.naturalresources.msstate.edu/wildlife/eastern-wild-turkey.html>). The Eastern Wild Turkey is rather omnivorous in its eating habits, consuming a wide variety of plant seeds, nuts, acorns, insects (adults and larvae), spiders, and other small invertebrates. Females nest in "swampy bottomlands, dry slopes, or woodlands, well concealed in thicket or other undergrowth" (Oberholser, 1974). "Currently the Wild Turkey thrives in Texas." Furthermore, there are "an estimated 16,000 eastern turkeys throughout eastern Texas, resulting from recent restoration" (online resource: www.txtbba.tamu.edu).

Alternatives 2 & 3 would result in converting approximately 0.99-1.04 acres of permanent easement from forest to grassland with portions of an additional 1.48-1.56 acres of temporary easement that would be cleared, but allowed to convert back to a forested state. In total, approximately 2.47-2.6 acres will be altered to an "open" habitat in the forest. This open area will become vegetated with secondary or successional growth of herbaceous plants and seedlings and saplings of woody plants.

The interface of this habitat with existing forest habitat will create an “edge” habitat with short, dense plant growth. These areas could be used as a foraging area for wild turkeys. This thick vegetation zone might, in fact, be used by eastern wild turkeys as possible nesting habitat. Spring Branch Creek would not be crossed at a perpendicular angles and additional riparian vegetation would be cleared. Cumulative effects associated with this project would be related to maintenance or management of vegetation along the pipeline ROW. Because the total acreage is minute (0.99-1.04 acres permanent, and 1.48-1.56 acres temporary, total 2.47-2.60 acres) compared to surrounding areas, it is anticipated no significant long-term deleterious effects. As mentioned above, eastern wild turkeys prefer hardwood and mixed forests with 15 to 65 percent open area and creating a ROW through the established forest could enhance the habitat for them. In fact, Eastern Wild Turkeys might utilize the new habitat for nesting, the overall effect of which would be positive for this species.

Yellow-breasted Chat

The eastern yellow-breasted chat (*Icteria virens virens*) is the largest wood-warbler found in the United States. This somewhat secretive bird is locally “common” to “uncommon” throughout eastern Texas often found in small clusters or colonies. Chats are known to have an affinity for early successional shrub-scrub habitat types. It is documented that a considerable amount of this habitat must be present for them to flourish (online resource: <http://faculty.ncwc.edu/mbrooks/pif/Fact%20Sheets/Species%20Fact%20Sheets/Yellow-breasted%20Chat%20profile.pdf>). Chats occupy and nest in habitats that are described as “thickets, briar tangles, and woodland undergrowth near rivers and swamps and juniper or oak scrub on drier uplands and slopes.” The diet consists of a wide variety of insects and their larvae (e.g., grasshoppers, beetles, caterpillars, butterflies and moths, ants, wasps etc.). At times it feeds on wild fruits and berries (Oberholser, 1974).

According to data from 555 Breeding Bird Survey routes conducted by Texas A & M University in Texas, the relative abundance of yellow-breasted chats was as high as 10-30 chats per route in the Pineywoods and southwest Edwards Plateau regions. These data were also reported to show a statistically significant annual population change of +3.9% for the period 1980-2005, compared to a +0.5% change for the whole breeding range. (online resource: <http://www.txtbba.tamu.edu>).

Alternatives 2 & 3 would result in converting approximately 0.99-1.04 acres of permanent easement from forest to grassland with portions of an additional 1.48-1.56 acres of temporary easement that would be cleared, but allowed to convert back to a forested state. In total, approximately 2.47-2.6 acres will be altered to an “open” habitat in the forest. This open area will become vegetated with secondary or successional growth of herbaceous plants and seedlings and saplings of woody plants. The interface of this habitat with existing forest habitat will create an “edge” habitat with short, dense plant growth. This thick vegetation zone might, in fact, be used by Yellow-breasted Chats as possible nesting habitat. Cumulative effects of associated with this project would be related to maintenance or

management of vegetation along the pipeline ROW. Because the total acreage is minute (1.48-1.56 acres temporary, and .99-1.04 acres permanent, total 2.47-2.60 acres) compared to surrounding areas, we anticipate no significant long-term deleterious effects. In fact, if Yellow-breasted Chats utilize the new habitat for nesting, the overall effect may be positive for this species.

Pileated Woodpecker

The pileated woodpecker (*Dryocopus pileatus*) is the largest extant woodpecker to be found in Texas. It is found primarily in the eastern one-third of the state where it is “fairly common” to “uncommon” in wooded areas. Pileated woodpeckers live in mature deciduous or mixed deciduous-coniferous woodlands of nearly every type. They can also be found in younger forests that have scattered, large, dead trees or a ready supply of decaying, downed wood. Throughout their range, pileated woodpeckers can also be found in suburban areas with large trees and patches of woodland (online resource: http://www.allaboutbirds.org/guide/Pileated_Woodpecker/lifehistory). In Texas, these woodpeckers reside in thick forests, preferring rivers, streams, bayous, and swamps lined with bald cypress, cottonwoods, oaks, and pines where they are generally seen as singles or in pairs (Oberholser, 1974). Pileated Woodpeckers forage for wood-boring insect, ants and their larvae in dead trees, often referred to as “snags”. They have also been reported to use existing holes in dead trees as nesting sites (Oberholser, 1974).

The U.S. National Biological Service breeding bird survey data from 1967-1994 in Texas indicate that the Pileated Woodpecker population has been stable during this period (online resource: <http://www.txtbba.tamu.edu>).

Alternatives 2 & 3 would result in converting approximately 0.99-1.04 acres of permanent easement from forest to grassland with portions of an additional 1.48-1.56 acres of temporary easement that would be cleared, but allowed to convert back to a forested state. In total, approximately 2.47-2.60 acres will be altered to an “open” habitat in the forest. This open area will become vegetated with secondary or successional growth of herbaceous plants and seedlings and saplings of woody plants. It is intended that when the ROW is cleared, that as many tall trees and snags will be left standing as possible, especially in the temporary ROW. Cumulative effects of associated with this project would be related to maintenance or management of vegetation along the pipeline ROW. Because the total acreage is minute (1.48-1.56 acres temporary, and .99-1.04 acres permanent, total 2.47-2.60 acres) compared to surrounding areas, we anticipate no significant long-term deleterious effects. For alternative 2 the non-perpendicular creek crossings will likely remove hardwood trees that may be used by the pileated woodpecker; however the removal of these are not likely to jeopardize the existence of this bird species. Since hardwood trees preferred by the pileated woodpecker will remain undisturbed, along with the integrity of the riparian corridor, impacts from the remaining 20-foot permanent corridor through an existing forest are considered negligible in alternative 3. For both the

alternatives the cumulative effects associated with the project would be minimal and no significant, long-term deleterious effects are anticipated.

Non-Native Invasive Plant Species

The proposed action will result in temporary soil disturbance during the construction phase, which could potentially result in new plant species colonization along the proposed easement. Plant species currently comprising the maintained powerline easement herbaceous vegetation community and the mixed pine forest communities were described previously in the Biological Factors and Habitat Description Sections. Non-native invasive plant species (NNIPS) infestations were not documented along the proposed easement during the March 2011 field investigation. However, the Forest Service identifies several invasive species of concern for National Forests & Grasslands in Texas, including Eurasian watermilfoil, water hyacinth, tropical soda apple, deep rooted sedge, Chinese tallowtree, and Japanese climbing fern (USFS 2011).

A plan for early detection of NNIPS, followed by rapid response to control of these unwanted plants is described in the design criteria on page 15.

Social and Economic Factors

Walker County encompasses approximately 787.45 square miles with a 2000 U.S. census population total of 61,757. Approximately 74% of the population was white, approximately 23.4% black, and the remainder were Asian, American Indian or other races. The median household income for Walker County was \$38,244 in 2008, and the percent of households below the poverty level was 23.5%. A review of the U.S. census data indicates that none of the proposed action alternatives would disproportionately or adversely affect minority or low-income populations.

Visual Quality Observations

Visual quality observations of the proposed easement on Forest Service property were made during the March 2011 field investigation, and documented in digital photographs (Appendix C, Photographs 1-12). The proposed easement cannot be seen from main roads or highways. The location of the OCR 5 easement where it enters Forest Service property is not readily visible from the nearest public road (Johnson Road). Additionally, the OCR 5 easement has several bends in the alignment that provide a decrease in visual impact (compared to a single strait alignment). The location of the OCR 6 easement where it enters Forest Service property is only visible from an existing powerline easement. The OCR 6 easement is parallel to and located within this existing, maintained power line easement where it enters Forest Service property. The OCR 6 easement parallels the powerline easement and then turns to the northwest across a mixed pine woodland, with an additional bend in the alignment that decreases the visual impact of the project.

Transportation Analysis

The only road construction associated with the proposed action will be for temporary roads within the proposed easement during pipeline construction and installation. The traffic along these temporary roads will be limited to construction activities and will remain within the proposed construction easement. In areas where impacts to creeks will be avoided by boring, access roads will terminate at these riparian corridors and require access from either side using existing easements.

Economic Viability

The main economic factor that differs between alternatives is construction and maintenance cost. Table 6 compares the construction and maintenance costs of the three Alternatives considered. Alternative 1 (No Action) appears to be the most economical alternative, but the water quality, public health benefits, and property value enhancements provided by central wastewater collection and treatment services would not be realized in the proposed service area. Likewise, the opportunity for the orderly development of a gravity wastewater collection line with minimized woodland clearing in the Tan Yard Creek watershed would be lost if Alternative 2 were implemented.

Table 6. Comparison of estimate of operation and maintenance costs associated with OCR 5 & 6 project alternatives over a 25-year life of project, assuming a cost of \$150 per linear foot of installation and 1% annual maintenance cost.

Effect	Alternative 1*	Alternative 2	Alternative 3	Alternative 4
	(No Action)	(2,155 feet)	(2,365 feet)	
Initial Construction	\$710,000	\$323,250	\$354,750	-
Annual Maintenance	\$7,100	\$3,232.50	\$3,547.50	-
Annual Power	-	-	-	-
Total for 25-year life of project	\$887,500			-

* Estimated as costs to 142 residences for one \$5,000 septic system installation and annual maintenance costs of \$50 for the 25 year period.

Cumulative Effects

Cumulative environmental effects are the potential result of the combined, incremental effects of human activity on the environment. In addition to the direct and indirect effects of alternatives discussed in previous sections of this report, the cumulative impacts of the proposed action were assessed through a combination of site investigations, documentation of the existing environment, and a search of historical information. Information used to address cumulative effects includes recent aerial imagery, topographic map, soil survey map, watershed map, 2000 U.S. census data, and historical aerial photographs (Appendix D).

The proposed action is located in a recently-annexed portion of Huntsville, Texas on private property and within a portion of Compartment 58 of the Sam Houston National Forest. The private properties affected by the proposed action are largely individually-owned parcels in a lower-than-average income residential area. Current sewage treatment practices use individually-owned septic systems, many of which are degraded and contributing to decreasing water quality and soil quality in the watershed. Replacing the degraded septic systems with a new gravity-fed sanitary sewer pipeline would likely result in beneficial effects to property values and watershed water quality and soil quality. Because the area currently is developed with residential home sites, there is a possibility that the proposed action could promote some additional development in the area. However, with the current road infrastructure, the development would be limited.

In addition to the direct and indirect effects of the proposed action on individual species, the cumulative impacts of the proposed action were assessed through a combination of site investigations, documentation of the existing environment, and a search of historical information. Compartment 58 of Sam Houston National Forest is located on the northeast side of Huntsville, in an area adjacent to residential development on three sides of the compartment. Two maintained, herbaceous easements and a National Forest System Road currently cross the compartment in the vicinity of the proposed project easement. The Forest Service property affected by the proposed action includes mixed pine woodlands and an existing maintained herbaceous right-of-way. A portion of the affected mixed pine woodlands are immature plantation woods that are homogeneous in forest type, and a portion is a more mature pine forest. This region of the forest does not contain documented RCW stands, and the forest type within the proposed easement is not unique habitat within SHNF or East Texas in general.

The action alternatives would result in the change from mixed pine/hardwood forest habitat to an herbaceous corridor within a portion of the proposed project easement. The remaining portion of the project easement already occurs in herbaceous right-of-way or edge habitat of the existing right-of-way and the proposed action would not result in a change in habitat type. The creation of an additional corridor in Compartment 58 would allow additional light infiltration in the mixed pine/hardwood forest and establishment of herbaceous vegetation that could serve a flight passage and foraging habitat for bird and bat species. However, the disturbance to existing vegetation could allow the colonization of non-native or invasive plant species in the proposed project easement.

Construction activities could also result in erosion along the proposed easement or at stream crossings. The proposed project easement crosses the current 100-year floodplain of Tan Yard Branch at one location on Forest Service property and at one location on private property south (upstream) of Forest Service property. Both of the floodplain crossings were minimized during the review of project alternatives to the smallest width across the floodplain that is possible in the project vicinity. To minimize the potential adverse effects, the proposed construction activities will follow guidelines requiring state-approved Best Management Practices (BMPs). The proposed action will have measures in place to protect water quality of the intermittent streams within SHNF, and are unlikely to have long-term negative effects of aquatic communities. These measures also reduce the

likelihood that the proposed action would negatively affect water quality downstream of this compartment. Following the pipeline installation, soils will be backfilled to preconstruction contours. Therefore, cumulative effects to the floodplain in this watershed of the Trinity River basin are expected to be minimal. In addition to beneficial effects from replacing degrading septic systems with a sanitary sewer infrastructure in the residential areas surrounding the compartment will have on water quality and soil and habitat quality in the immediate project area, overall water and soil quality in the watershed should improve with the proposed action.

Consultation and Coordination

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

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