Final Environmental Assessment

Construction and Operation of a Proposed Cellulosic Ethanol Plant, Range Fuels, Inc. Treutlen County, Georgia

DOE/EA 1597

Prepared for

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Acronyms and Abbreviations

AAC	acceptable ambient concentration
AAPT	Average Annual Daily Traffic
ac	acre
ALA	American Lifelines Alliance
$AlSO_4$	aluminum sulfate
APE	Area of Potential Effect
AMSL	average mean sea level
ASME	American Society of Mechanical Engineers
BG	Block Group
bls	below land surface
BMP	Best Management Practice
BOD	biochemical oxygen demand
Btu/hr	British thermal units per hour
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	Carbon Monoxide
CoMo	Cobalt Molybdenum
CT	Census Tract
CWA	Clean Water Act
dB	decibel
dB_a	A-weighted Decibel Scale
DOE	Department of Energy
DNR	Georgia Department of Natural Resources
EA	Environmental Assessment
EAC	Early Action Compact
EMS	Emergency Medical Services
EO	Executive Order
EPAct	Energy Policy Act
EPD	Environmental Protection Division
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
ft^3	cubic feet
g	gravity
GDOT	Georgia Department of Transportation
GNHP	Georgia Natural Heritage Program
gpd	gallons per day
gpm	gallons per minute
H_2	Hydrogen
hr	hour
HPD	Historic Preservation Division

I-16	Interstate Highway 16
km	kilometer
kV	kilovolt
kWh	kilowatt-hour
LDN	Day-Night Average Noise Level
µg/m3	micrograms per cubic meter
mg/m3	milligrams per cubic meter
mgd	million gallons per day
mg/L	milligrams per liter
MMBTU	Million British Thermal Units
NAAQS	National Ambient Air Quality Standards
NaOH	sodium hydroxide
NARHGIS	Natural, Archaeological, and Historic Resources GIS
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PGA	peak ground acceleration
PM	particulate matter
PPE	personal protection equipment
ppm	parts per Million
PSD	Prevention of Significant Deterioration
PSM	Process Safety Management
PTE	potential to emit
RCRA	Resource Conservation and Recovery Act
RO	reverse osmosis
ROW	right of way
RTE	Rare, Threatened, and Endangered
SARA	Superfund Amendments and Reauthorization Act of 1986
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control, and Countermeasures Plan
SVOC	semivolatile organic compound
SR	State Route
tpd	tons per day
tpy	tons per year
TSCA	Toxic Substances Control Act
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	United States Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

VOC	volatile organic compound
WQA	Water Quality Act
WWTP	Wastewater Treatment Plant
yr	year
ZnO	Zinc Oxide

1.0 Introduction

1.1 Background

Under the Energy Policy Act (EPAct) of 2005, the U.S. Congress directed the U.S. Department of Energy (DOE) to carry out a program to demonstrate the commercial application of integrated biorefineries for the production of ethanol from lignocellulosic feedstocks. Federal funding for cellulosic ethanol production facilities is intended to further the government's goal of rendering cellulosic ethanol cost-competitive with gasoline by 2012 and, along with increased automobile fuel efficiency, reducing gasoline consumption in the U.S. by 20 percent within 10 years.

In February 2006, pursuant to § 932 of the EPAct, DOE issued a funding opportunity announcement for applications to design, construct, and operate an integrated biorefinery employing lignocellulosic feedstocks (woody material) for the production of combinations of liquid transportation fuels, biobased chemicals, substitutes for petroleum-based feedstocks and products, and energy in the form of electricity or useful heat. Range Fuels, Inc. (Range Fuels) applied for, and was one of six companies selected to negotiate for award of, financial assistance to aid in the construction and operation of their planned cellulosic ethanol production plant.

Based on this selection, DOE proposes to provide funding to Range Fuels for the construction and operation of the cellulosic ethanol production facility near the town of Soperton, Georgia, in Treutlen County (Figure 1-1), hereafter referred to as the Proposed Action. In accordance with DOE and National Environmental Policy Act (NEPA) implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. The proposal to use federal funds to support the project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with NEPA (42 U.S. Code [USC] §§ 4321 et seq.) and DOE's NEPA implementing regulations (10 Code of Federal Regulations [CFR] Section 1021.330) and procedures, this environmental assessment (EA) examines the potential environmental impacts of DOE's Proposed Action and a No Action Alternative.

1.2 The National Environmental Policy Act

The Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508) and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021) require that DOE, as a Federal agency:

- Assess the environmental impacts of its proposed actions.
- Identify any adverse environmental effects that cannot be avoided should the Proposed Action be implemented.

- Evaluate alternatives to the Proposed Action, including a No Action Alternative.
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Characterize any irreversible and irretrievable commitments of resources that would be involved should the Proposed Action be implemented.

These requirements must be met before a final decision is made to proceed with any proposed federal action that could cause significant impacts to human health or the environment. This EA is intended to meet DOE's regulatory requirements under NEPA and provide DOE and other state and federal agency decision-makers with the information they need to make informed decisions in connection with the construction and operation of the proposed plant.

This EA evaluates the potential individual and cumulative effects of the Proposed Action. No other action alternatives are analyzed in detail, although this draft EA provides a discussion of alternate sites that were considered but determined by Range Fuels to be unfeasible. For purposes of comparison, this EA also evaluates the impacts that would occur if DOE were to decide not to subsidize the construction and operation of the proposed plant (the No Action Alternative).

This draft EA has been prepared under DOE's regulations and guidelines for compliance with NEPA (42 U.S.C §§ 4321 *et seq*.). This draft EA will be available to interested members of the public and to Federal, state, and local agencies for review and comment prior to DOE's final decision on the Proposed Action.

1.3 Proposed Action

DOE proposes to provide up to $100 million in financial assistance to Range Fuels to support construction and initial operation of a cellulosic ethanol production plant in the Treutlen County Industrial Park near Soperton, Georgia (Figure 1-1). As noted above, DOE is required to evaluate the potential environmental impact of this funding decision. Environmental impacts could result from this funding decision as a direct result of construction supported by the financial assistance or from the subsequent operation of the facility, which is directly tied to its construction. Therefore, the Proposed Action for this NEPA analysis is the construction and operation of a cellulosic ethanol production plant in the Treutlen County Industrial Park near Soperton by Range Fuels.

It should be noted that even if DOE does not ultimately provide any funding in support of construction or operation of the facility, Range Fuels would be able to pursue other funding to support the project and could potentially still construct the facility.

The proposed cellulosic ethanol plant would utilize a two-step conversion process to produce ethanol and other usable byproducts. When at peak capacity, the plant is expected to produce up to 100,000,000 gallons of fuel-grade ethanol per year and up to 20,000,000 gallons of methanol per year. In converting biomass to cellulosic ethanol, the amount of feedstock used in the process would be as much as 2,500 dry tons/day (tpd) consisting of a mix of forest residue and timber from Treutlen County and the surrounding area. Once produced, the ethanol would be sold as fuel for transportation. Methanol and

limited quantities of higher molecular weight alcohols ranging from propanol to pentanol would also be produced as by-products of the process. These by-products could either be sold to reduce the absolute cost of the ethanol produced or recycled into the process. A portion of the methanol produced would be used as denaturant for the ethanol.

1.4 Purpose and Need for Proposed Action

In compliance with the statutory mandate of EPAct § 932, DOE has implemented a program to demonstrate the commercial application of integrated biorefineries that produce ethanol from lignocellulosic feedstocks. The facility that would be constructed and operated as a result of the Proposed Action would meet the requirements of EPAct §932 by using renewable supplies of timber and forest residue, to produce fuel-grade ethanol. The Proposed Action also would support DOE's mission to reduce dependency on fossil fuels and commercialize biomass technologies. By providing financial assistance to support the construction of the proposed cellulosic ethanol production plant, DOE would support national energy needs and the development of alternative fuel sources.

1.5 Applicable Regulatory Requirements and Coordination

NEPA is the environmental component of planning for federal projects and projects with federal funding. NEPA is integrated with other planning activities to ensure that such decisions consider environmental and socioeconomic factors in a systematic manner. Requirements of applicable permits and regulations are also included in the evaluation performed under the NEPA process.

Federal statutes, regulations, and executive orders (EOs) applicable to one or more components of the Proposed Action and No Action Alternative as described in this EA include, but are not necessarily limited to:

1.5.1 Federal Statutes

- National Environmental Policy Act (42 USC 4321-4370)
- Endangered Species Act of 1973 (ESA) (16 USC 1531-1543)
- Fish and Wildlife Coordination Act (16 USC 661, et seq.)
- Migratory Bird Treaty Act (16 USC 701, et seq.)
- Clean Water Act of 1977 (CWA) and the Water Quality Act of 1987 (WQA) (33 USC 1251 et seq., as amended)
- Farmland Protection Act of 1981 (7 USC 4201 et. seq., as amended)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act of 1986 [SARA])
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901)
- Toxic Substances Control Act (TSCA) (15 USC 2601 et seq., as amended)

- National Historic Preservation Act (NHPA) of 1966 (16 USC 470 et seq., as amended)
- Archeological Resources Protection Act of 1979 (16 USC 470)
- Clean Air Act (CAA) (42 USC 7401 et seq., as amended)
- Noise Control Act of 1972 (42 USC 4901 - 4918)

1.5.2 Regulations

- CEQ Regulations for Implementing NEPA (Title 40 CFR, Parts 1500-1508 (40 CFR 1500-1508)
- Protection of Historic Properties (36 CFR Part 800)
- DOE Compliance with the National Environmental Policy Act (10 CFR Part 1021)
- DOE Compliance with Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022)

1.5.3 Executive Orders

- EO 11514, Protection and Enhancement of Environmental Quality (amended by EO 11991)
- EO 11990, Protection of Wetlands
- EO 12372, Intergovernmental Review of Federal Programs
- EO 11988, Floodplain Management
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risk
- EO 13010 Critical Infrastructure
- EO 13025 Amendment to EO 13010, the President's Commission on Critical Infrastructure Protection

1.5.4 DOE Policies, Orders and Guidance

- DOE O 451.1B, National Environmental Policy Act Compliance Program (Change 1, September 28, 2001)
- Secretarial Policy on the National Environmental Policy Act (June 13, 1994)
- Questions and Answers on the Secretarial Policy Statement on the National Environmental Policy Act (July 1994)
- DOE P 430.1, Land and Facility Use Planning (July 9, 1996) (with Secretary of Energy Memorandum, December 21, 1994)
- DOE P 141.1, Management of Cultural Resources (May 2001)

- DOE Interim Guidance: Need to Consider Intentional Destructive Acts in NEPA Documents (December 2006)

1.5.5 Applicable Permits Required for Proposed Action

- Georgia SIP Air Construction Permit: Application submitted April 9, 2007, Permit Issued June 27, 2007, Permit No. 2869-283-0005-S-01-0
- Georgia SIP Air Construction Permit Modification: Permit Issued June 27, 2007, Permit No. 2869-283-0005-S-01-0, Application pending, Expect Permit issued by December 2007
- U.S. Army Corps of Engineers (USACE) CWA Section 404 NWP to replace culvert under Commerce Drive. Application Pending, Expected Permit approval in January 2008
- USACE CWA Section 404 NWP to construct new electric transmission line. Application Pending, Expected Permit approval in January 2008
- Georgia General National Pollutant Discharge Elimination System (NPDES) Storm Water Permit due to Construction Activities For Stand Alone Construction Projects – GAR100001: Submit September 2007, Expected Permit coverage granted October 2007
- Industrial Wastewater Pre-Treatment Discharge Permit to Soperton: Submit application December 2007, Expected Permit by December 2008
- Georgia General NPDES Storm Water Discharges Associated with Industrial Activity – GAR000000, Submit application December 2008, Expected Permit coverage granted by January 2009
- US Environmental Protection Agency (USEPA) NPDES Industrial Wastewater Discharge Permit – Forms 1 and 2D and per Georgia Rules and Regulations for Water Quality Control, 391-3-6-.06, Submit application December 2007, Expected Permit issued by December 2008
- Spill Prevention Control and Countermeasures Plan – 40 CFR 112, Plan development pending, Plan completed and implemented by January 2009
- Storm Water Pollution Prevention Plan – Requirement of Georgia General NPDES Storm Water Discharges Associated with Industrial Activity – GAR000000, Plan development pending, Plan completed and implemented by January 2009
- Georgia Environmental Protection Division (EPD) Water Withdrawal Permit, Submit application December 2007, Expected Permit issued by December 2008

1.6 Scope of Analysis

This document analyzes the potential environmental and socioeconomic impacts that would result from implementation of the considered alternatives: the Proposed Action and a No Action Alternative.

This EA evaluates the potential individual and cumulative effects of the Proposed Action. Two alternate locations in Treutlen County were assessed by Range Fuels as possible sites

for the proposed plant, but these sites were deemed unsuitable. These two sites are discussed in this EA as alternatives that were considered but not analyzed (see Section 2.3).

While it is possible that the Range Fuels plant could be built and operated without DOE financial assistance, that scenario would not provide for a meaningful No Action Alternative analysis, as it would be identical to the Proposed Action. For purposes of analysis, this EA therefore evaluates, as the No Action Alternative, the potential impacts that would occur if the proposed cellulosic ethanol production plant were not built and operated.

The resource areas below are discussed in detail in this document:

- Land Use
- Geomorphology, Geology, Seismic Hazard, and Soils
- Hydrology
- Water Quality
- Wetlands
- Biological Resources
- Protected Species
- Safety and Occupational Health
- Noise
- Meteorology
- Air Quality
- Waste Management and Hazardous Materials
- Cultural Resources
- Transportation
- Utility Infrastructure
- Aesthetics
- Socioeconomic Factors
- Environmental Justice
- Protection of Children

1.7 Public Scoping and Agency Consultation

In July 2007, DOE sent scoping letters to federal, state, and local agencies; tribal organizations; and residents in the immediate vicinity of the proposed project site. The scoping letters described the Proposed Action and requested assistance in identifying potential issues that should be evaluated in this EA. DOE received a comment letter from the Miccosukee Tribe of Florida explaining the tribe's interest in and concern about projects that produce air emissions, especially mercury. The Seminole Tribe of Florida responded that they were primarily interested in potential impacts to cultural resources in the area. Appendix A contains copies of the scoping letters, Appendix B contains the responses DOE received from the agency scoping letters, and Appendix C contains the scoping letter distribution list.

1.8 Document Organization

This EA follows the organization established by the CEQ regulations (40 CFR, Parts 1/500-1508) and includes the following sections:

- 1.0 Introduction
- 2.0 Description of Proposed Action and Alternatives
- 3.0 Affected Environment and Environmental Consequences
- 4.0 References
- Appendices

2.0 Description of Proposed Action and Alternatives

As required by federal regulation, this EA addresses the possible environmental impacts of the Proposed Action and a No Action Alternative. Section 2.1 describes the activities that would occur if DOE provides up to $100 million for construction and operation of the five phases of the cellulosic ethanol plant. Section 2.2 discusses the No Action Alternative and Section 2.3 provides information on two alternatives that were considered as options but were eliminated from detailed analysis by Range Fuels.

2.1 Proposed Action (Preferred Alternative)

DOE would provide funding to Range Fuels for construction of a cellulosic ethanol plant that would utilize a two-step conversion process to produce ethanol and other usable byproducts. The plant would be built over five phases, with production beginning in the first phase and increasing as each phase is completed. When at peak capacity in the fifth phase, the plant is expected to produce up to 100,000,000 gallons of fuel-grade ethanol per year (286,000 gallons per day [gpd]) and up to 20,000,000 gallons of methanol per year (57,000 gpd).

2.1.1 Facility and Infrastructure Description

The Range Fuels facility would include a wood chipper, feedstock storage, conversion units for production, administrative offices, paved parking and drives, rail spurs, product loadout racks, wastewater treatment plant (WWTP), firewater pond, spray pond, stormwater detention pond, and supporting utility infrastructure (Table 2-1).

TABLE 2-1
Components of Proposed Action
Range Fuels EA

Component	Description
Chipper	A 130-inch disc knife chipper capable of processing up to 2,500 tpd of dry feedstock
Chip Storage Piles	Capable of containing 18,500 tons of wet feedstock (a 4-day supply)
Conveyors	Up to 2,500 feet of chain or belt conveyors
Conversion Unit (gas cleaning, alcohol synthesis units, and alcohol drying and separation units)	At final construction, five conversion units, each capable of converting 500 tpd of dry feedstock
Water Requirements	Up to 0.316 mgd (316,800 gpd) from groundwater Up to 0.005 mgd (5,000 gpd) from municipal supply
Natural Gas Demand	Approximately 3,900 ft^3/day Approximately 1,000 feet of 2-inch pipe in downtown Soperton replaced with 4-inch pipe
Electricity	Approximately 290,832,000 kWh annually

TABLE 2-1
Components of Proposed Action
Range Fuels EA

Component	Description
	Approximately 1 acre 115 kV to 25 kV substation Approximately 1.25 miles of new electrical transmission line
Product and Conversion Storage Tanks	2 – 42,000 gallons each for ethanol storage
	2 – 21,000 gallons each for methanol storage
	8 – 550,000 gallons each for ethanol storage
	4 – 215,000 gallons each for methanol storage
	1 – 70,000 gallons for higher molecular weight alcohol storage
	5 to 15 –<1,000 gallons for use in conversion process
Loadout Racks	4 loadout racks capable of loading one tanker truck and one tanker rail car simultaneously. Up to 34 trucks, 9 rail tankers, or a combination of trucks and rail tankers would be loaded daily.
Wastewater Treatment	Up to 0.864 mgd to the onsite WWTP starting with Phase 1 operation using primary and secondary treatment.
	The City of Soperton will receive up to 0.043 mgd.
Fire Water Pond, Spray Pond, and Stormwater Detention Pond	Firewater Pond – 350 ft L x 80 ft W x 6 ft D, 0.63 acre Area
	Spray Pond - 350 ft L x 80 ft W x 6 ft D, 0.63 acre Area
	Detention Pond – 212 ft L x 142 ft W x 12 ft D, 0.70 acre Area
Roads	One 2-lane SR truck route (approx. 0.25 mile) and one 2-lane onsite private drive. Two turn lanes will be added to SR 15. Approximately 1,000 feet of Old Dairy Road will be paved.
Railroads	Two parallel railroad spurs, less than 0.25 mile long, off the existing Georgia Central Railways mainline
Other improved surfaces	Administrative office and onsite cafeteria
Parking and walkways	Approximately 20,000 square feet

tpd tons per day
mgd million gallons per day
kWh kilowatt-hours
kV kilovolts
ft feet
WWTP wastewater treatment plant
ft^3/day cubic feet per day

In addition to the components that would be constructed by Range Fuels, other actions would occur as a direct result of the Proposed Action. These actions are considered in this analysis as part of the Proposed Action. These actions, as summarized in Table 2-2, include:

- Georgia Department of Transportation (GDOT) would construct a two-lane State Road (SR) truck route to connect the facility with SR 15. GDOT is planning to add turn lanes at the entrance to the Industrial Park from SR 15 and SR 29.
- Atlanta Gas Light would replace approximately 1,000 feet of 2-inch diameter gas line in downtown Soperton with 4-inch diameter gas line.
- Treutlen County would construct a fire and emergency response facility near the Industrial Park.

TABLE 2-2
Parcels within Proposed Range Fuels Site
Range Fuels EA

Parcel[1]	Current Use	Proposed Uses	Size (ac)	Amount Previously Cleared of trees (ac)	Amount Currently Impervious (ac)	Additional Amount to be Cleared of Trees (ac)	Amount to be Preserved (ac)	New Impervious Surface Added (ac)
A	Forest and Roads	Preserved Natural Green Space, Paved Roads	95.9	7.5	0	0	91.9	4.0
B	Forest, Fallow Agricultural Field	Chipper, Feedstock Storage, Paved Drives and Truck Waiting Area, Preserved Natural Greenspace	40.6	7.0	0	7.2	29.4	2.6
C	Undeveloped Industrial Park	Range Fuels Production Facility, Administrative Offices, Paved Drives and Parking, Stormwater Detention Pond, Firewater Pond, Spray Pond, Preserved Greenspace (Natural and Landscaped)	115.7	93.8	0	0	65.7	10.0
D	Undeveloped Industrial Park and Concrete Batch Plant	Product Loadout Area	9.3	8.4	0.1	0.55	8.6	0.31
E	Undeveloped Industrial Park	Rail Spur	2.8	0	0.0	0.43	2.4	0.10
F	Undeveloped Industrial Park	Electrical Substation	10.8	8.9	0.0	1.0	9.8	0.25
		Facility Site	**275.1**	**125.6**	**0.1**	**9.3**	**207.3**	**17.26**
G	Forest	State Truck Route and Preserved Natural Greenspace	6.9	1.2	0	1.3	5.6	0.96
H	Electrical Transmission Line	Pasture, Row Crop, Pine Plantation, Regrowth Hardwood Forest	18.8	1.5	2.1	0.5	0.0	0.0
		Off-Site Areas	**25.7**	**2.7**	**2.1**	**1.8**	**5.6**	**1.0**

[1] Parcel Identifier refers to Figure 2-1.
ac acre

- Georgia Power would construct a new 115 to 25 kilovolt (kV) substation in the Industrial Park and approximately 1.25 miles of new transmission line to deliver service to the substation. While Georgia Power has not completed siting analyses for the new transmission line, the most direct route from the existing transmission infrastructure is likely and that route is analyzed in this EA. Georgia Power would obtain and comply with all appropriate permits to install the lines.

2.1.2 Site Background and Proposed Layout

The proposed Range Fuels site encompasses 275.1 acres distributed across six parcels (designated as Parcels A – F, Figures 2-1 and 2-2A through 2-2F). The parcels consist of intact forest land, cleared land where forest has been removed, and disturbed land where the forest has been removed and the land has been converted to a specific use, such as transportation or buildings. Parcels C through F are within the Treutlen County Industrial Park, while Parcels A and B are contiguous to the Industrial Park (Figure 2-1). Parcels G and H, comprising 25.7 acres, are disjunct to the facility site. The Proposed Action would encompass a total of 300.8 acres (Parcels A-H) plus an additional 0.5 acre that would be temporarily disturbed due to the gas line upgrade in downtown Soperton.

Currently, there are seven developed parcels in the Treutlen County Industrial Park. After the Range Fuels facility is built, there will be three parcels remaining for development, comprising a total of approximately 7 acres. The nearest residence to the site is located at the intersection of Knox Mill Road and Old Dairy Road, in the northwest quadrant of the intersection. This residence is approximately 1,500 feet from the main construction site to the northwest.

Parcel A encompasses 95.9 acres of predominantly forested land. This parcel would be permanently preserved as natural greenspace and wildlife habitat, except for road corridors. The natural habitat that would be preserved (91.9 acres) includes intermediate-aged regrowth hardwood forest, planted pine plantation that would be managed to provide a more natural pine forest environment, and forested wetlands.

Parcel B is a 40.6-acre tract that includes mixed hardwood forest and a fallow agricultural field. Parcel B would be the location of the chipper and the associated feedstock storage. However, most of Parcel B (29.4 acres) would be permanently preserved as natural greenspace.

The production facility, administrative offices, staff parking, stormwater detention pond, WWTP, spray pond, and firewater pond would be located on Parcel C, a 115.7-acre tract. The existing forested and wetland areas along the streams in Parcel C would be permanently preserved as natural greenspace. The remainder of Parcel C that would not be developed would be maintained as landscaped greenspace.

Parcel D is a mostly undeveloped 9.3-acre lot within the Industrial Park that currently contains a concrete batch plant. The batch plant would be retained for onsite use during construction and the product loadout system would be constructed in Parcel D. The loadout-area would be small and 8.6 acres of this parcel would be retained as permanent natural and landscaped greenspace.

The connecting railroad spur lines would be constructed from the loadout area to the local rail line, across Parcel E, a 2.8-acre undeveloped site. The portion of Parcel E not used for rail spurs (2.4 acres) would be retained as permanent natural greenspace.

Parcel F is a 10.8-acre site where a new electrical substation would be located. The substation and transmission lines would occupy 1 acre on this parcel and the remainder (9.8 acres) would be retained as permanent natural greenspace, including the wetland located on the southern and western portion of the parcel.

Parcels A through F are generally contiguous, with Commerce Drive located between Parcel C and Parcels D, E, and F. Parcel G is separated from the other parcels and would be the location of the new truck route connector from SR 15 to Old Dairy Road. Parcel G will be purchased by Treutlen County with the new truck connector through Parcel G funded by GDOT and constructed by Treutlen County. As part of this parcel, 5.6 acres of land located along either side of the proposed new truck route would be purchased by Range Fuels and preserved as permanent natural greenspace to prevent future residential development along this road.

The location of the Industrial Park places the active railroad between the Industrial Park and the Soperton Fire Department. Due to concerns over timely accessibility to the site because all the railroad crossings are at-grade, plans are underway to locate a fire and emergency medical services (EMS) station near the facility to provide fire services and EMS response capability to the Industrial Park, including the Range Fuels facilities. The facility would house fire and EMS personnel who would be fully trained to respond to any emergency situation that may arise at the Range Fuels facility. Additionally, these EMS personnel would provide services to the surrounding community. Fire and emergency services north of the railroad tracks would be improved by eliminating the possibility of a passing train delaying arrival of respondents.

In addition to the installation of the new road in Parcel G, portions of the existing Old Dairy Road will be converted from unpaved to paved. As part of the road upgrades planned by Treutlen County and GDOT, northbound and southbound left turn lanes would be added to SR 15 at the intersection with the new road.

Parcel H is a combination of multiple property tracts and identifies the considered route for the new electrical transmission line outside of Parcel F. Range Fuels would own none of this parcel. Transmission line easement would be obtained by Georgia Power on 18.8 acres of land comprising primarily pasture with 0.5 acre of hardwood forest. The forested areas would be converted to open land, but would not be otherwise developed, and would remain as greenspace unless the property owners chose to change the use of the land.

Additional new impervious areas totaling 18.26 acres (Table 2-2) would be created through development of the project. New impervious areas would result from paving for roads and parking, building roofs and unwalled covers, and improved handling areas.

Within the Range Fuels site, encompassing 275.1 acres in Parcels A through F, 67.4 acres would be developed into production units, administrative buildings, firewater pond, spray pond, parking, roads, and walkways. The remaining 207.3 acres would be maintained as greenspace and buffer, which would serve multiple functions, including preserved wetlands and stream channel, wetland and streamside buffer, visual buffer, noise buffer, and wildlife habitat. Most of this area would remain in a natural state, with maintenance limited to

firebreaks and forest health and safety measures (thinning, felling of diseased/damaged trees, etc.). The areas near the production units and administrative buildings would be landscaped and maintained as lawns with flowering shrubs and other ornamental plants. To the extent possible, Range Fuels would require landscaping to use plant species native to the region.

2.1.3 Construction

Range Fuels proposes to begin construction of the proposed cellulosic ethanol plant in the fall of 2007, and would proceed in five phases. As each phase is completed, it would be brought on-line for production. The first phase would be completed in December 2008. The fifth phase is planned for completion in December 2009, at which time the plant would be operating at full capacity. It is estimated that up to 290 workers would be employed during construction of the project.

The plant would be sited to minimize clearing and grading activities. The plant site is approximately 80 percent previously cleared and would require grading prior to construction. At completion, the plant and associated onsite support facilities would cover 67.4 acres from Parcels A through G, of which an additional 9.3 acres will be cleared (Figure 2-1).

An Erosion, Sedimentation and Pollution Control Plan would be developed for the site and submitted to EPD prior to construction. Sedimentation and erosion controls would be implemented during construction to minimize the potential for erosion of surrounding soils due to construction activity and stormwater runoff.

- Site-specific measures would minimize transport of soils. The contract for this work would require that the contractor implement Best Management Practice (BMPs) consistent with the *Manual for Erosion and Sedimentation Control Manual* (Georgia Soil and Water Conservation Commission, 2000) Georgia Department of Natural Resources (DNR) General Permit GAR100001. Construction and post-construction BMPs would limit soil erosion and runoff to adjacent land, implement soil erosion and sedimentation controls during construction to minimize potential for soil erosion, and transport of sediment offsite. Specific BMPs that would be implemented are:
- 25-foot undisturbed buffer zones for all wetlands
- Engineered and vegetated swales to divert stormwater runoff to detention pond
- Rock check dams in the swales to act as velocity dissipation controls
- Silt fencing and hay bales for sediment structural controls
- Stormwater detention pond to collect sediment carried by storm water runoff
- Mulch and disturbed area stabilization with local plant and seed varieties
- Construction entrances/exits engineered with geotextiles and rock to minimize drag-out of mud and debris

The primary BMP would be a permanent stormwater detention pond to collect stormwater runoff from the construction site and future operating plant. The basin's purpose would be to minimize the amount of sediment leaving the site and impacting surface waters with

stormwater runoff. The basin volume would be conservatively designed based on the total disturbed area of the construction site (67.4 acres) with the principal and emergency spillways able to accept stormwater runoff generated from a 2-year, 24-hour storm event and 25-year, 24-hour event, respectively.

The stormwater detention pond would be approximately 212 feet long by 142 feet wide at its top and 140 feet by 70 feet at its base and a depth of 12 feet, equating to a volume of 229,057 ft^3. The surface area for the basin would be approximately 0.7 acre. Removal of built-up sediment would occur when the basin becomes one-third full. The removed sediment is not expected to be hazardous or contain polluting materials; therefore, it would be used as fill either onsite or offsite.

The stormwater detention pond would be seeded with a native grass mix for permanent slope stabilization. Additional plant species would be expected to colonize the basin through time. The detention pond would be designed to detain runoff for energy dissipation and sediment settling and it is not anticipated to retain stormwater. The outfall from the basin would discharge to the onsite creek just before the creek flows under Commerce Drive. The existing reinforced concrete pipe channeling the stream flow under Commerce Drive is undersized; this pipe would be reengineered as a box culvert and sized appropriately to accept the additional discharge from the detention pond. The culvert size would be increased through a vertical increase to accommodate high flows, but would not widen the existing channel. In accordance with the USACE Savannah District's regional conditions, the bottom 20 percent of the culvert would be buried to allow the natural substrate to colonize the structure's bottom, encourage fish movement, and maintain the existing channel slope. An engineered, basin outlet structure would discharge the flow from the basin approximately 25 feet upstream of the point at which stream flows under Commerce Drive.

During construction, a grading plan would be prepared to identify how the site would be graded and how drainage patterns would be directed, and to address erosion and sediment control and stormwater management goals. A stormwater detention pond, rock check dams, and other stormwater control and retention structures that require excavation and filling also would be incorporated into the grading plan. Implementation of these grading plan components would prevent runoff velocities and transported sediments from affecting receiving waters. The grading plan also would include information regarding boundaries and times for earthwork, establish the degree and length of finished slopes, and specify where and how excess material would be disposed of and where borrow materials would be obtained if needed. The grading plan would identify the boundaries of wetlands and specify no encroachment into these areas during construction. Grading crews would be supervised by the Project Manager and Construction Manager to ensure the grading plan is implemented as intended. Buffers would be maintained around sensitive resources (such as wetlands and streams) to provide additional protection. A stormwater pollution prevention plan would be developed for the site per the requirements of the DNR industrial stormwater general permit (GAR000000). The plan would include quarterly monitoring and reporting of stormwater discharge quality.

The Range Fuels facility would be designed with post-construction stormwater controls to prevent downstream impacts from increased impervious area following construction. Specific BMPs that would be implemented include:

- 25-foot undisturbed buffer zones for all wetlands
- Engineered and vegetated swales to divert stormwater runoff to the detention pond
- Rock check dams in the swales to act as velocity dissipation controls
- Detention pond to collect sediment carried by stormwater runoff
- Mulch and disturbed area stabilization with local plant and seed varieties

The state protected gopher tortoise (*Gopherus polyphemus*) has been identified on the site. During construction of the facility:

- Exclusion fencing would be placed in a trench to extend below the ground surface to ensure that gopher tortoises are not in the construction area
- Exclusion fencing would be routinely inspected to determine if it is in proper condition and any needed maintenance immediately implemented.
- The site would be inspected prior to beginning each day's construction activities to determine if tortoises have entered the construction area. Any tortoises found would be relocated out of the construction area.

Following placement of the exclusion fences, if any new burrows are found within the proposed construction area, Range Fuels would implement the following procedures, developed in coordination with DNR, prior to September 30, 2007:

- Have a U.S. Fish and Wildlife Service (USFWS) permitted subcontractor examine each burrow with a remote camera to determine if any contain gopher tortoises or other animals.
- Isolate empty burrows with exclusion fences to prevent reoccupation and then collapse or plug each burrow to prevent future use.
- Have a USFWS-permitted subcontractor capture any tortoises in occupied burrows within the construction area and relocate these tortoises to suitable nearby habitat outside the construction area exclusion fences.

2.1.4 Operations

The plant would operate 24 hours a day, up to 350 days per year. The chipper would operate up to 18 hours a day for 5.5 days per week. Rail shipments of products would occur 3 days per week and truck shipments of product would occur daily Monday through Friday.

The following sections describe the material balance and logistics, including input and output, waste, and transportation of feedstock and products produced at the plant.

2.1.4.1 Material Balance and Logistics

Input

At full production after Phase 5, Range Fuels would require up to 875,500 tons per year (tpy) (2,500 dry tpd) of woody biomass to produce denatured fuel-grade ethanol. The woody biomass would serve as feedstock for the catalytic conversion process and would be obtained

from unmerchantable timber, logging residues and/or merchantable pulp timber. Unmerchantable timber consists of trees that are too young for commercial harvest, have a growth form that makes them unsuitable for commercial processing (such as very crooked or forked multiple times, or trees that have been damaged (lightning struck or broken by wind) and cannot be used for commercial purposes. Logging residues consist of tree tops, branches, stumps, and bark associated with timber harvesting activities.

Feedstock would be purchased through local timber suppliers working under contract to Range Fuels and would be delivered to the site via truck. The exact mix and origin of unmerchantable timber, logging residues and merchantable pulp timber used at any given time would vary, based on market conditions. Because merchantable pulp timber would be more expensive than unmerchantable timber and logging residues, use of this source would be minimized. Feedstock would be obtained primarily from Treutlen County and the surrounding areas to the extent possible. However, feedstock sources would not be limited to the immediate area and feedstock would be obtained from any commercially viable source as needed.

The proposed cellulosic ethanol plant would use as much as 2,500 dry tpd of biomass consisting primarily of forest residue and timber from Treutlen County and the surrounding area as feedstock for the conversion process. Within a 40-mile radius of Soperton, current harvest levels produce 574,500 tpy of logging residues, which would be available as feedstock for Range Fuels (General*Bioenergy, 2005; Appendix D). An additional 465,000 tpy of unmerchantable pine timber also would be available for use as feedstock, assuming a 30-year rotation (General*Bioenergy, 2005). In Georgia, timber and pulp rotations typically occur on 20- or 30-year rotations. The 20-year rotation produces less merchantable timber and approximately 1.5 times as much unmerchantable timber compared to the 30-year rotation (General*Bioenergy, 2005). Based on the conservative estimate of a 30-year rotation, the amount of logging residues and unmerchantable pine available within 40 miles of Soperton exceeds the maximum need of Range Fuels by 163,500 tpy. The available supply within 75 miles far exceeds the amount needed by Range Fuels at full production (Appendix D). At the start of production, fuel supply contractors would not have adequate equipment infrastructure in place to ship all the required logging residue and unmerchantable timber to Range Fuels from within the Soperton region. During the period when this process is being developed, Range Fuels could augment feedstock with merchantable pulpwood.

All inbound trucks carrying feedstock would access the plant from SR 15 from the northeast, then continue onto Old Dairy Road and into the chipping area. Planned roadway improvements for truck traffic into the chipping area include the addition of a GDOT truck route connecting Old Dairy Road to SR 15 (approximately 0.25 mile in length) and improving Old Dairy Road from a two-lane unimproved dirt road to a two-lane paved road meeting specifications for the 0.25-mile extension to the entry to the chipper. Old Dairy Road would remain an unimproved two-lane dirt road south of the entry to the chipper. The new truck route would be built by GDOT and be designed to accommodate the anticipated volume of truck traffic. The truck route also would have a northbound left turn lane to accommodate outbound trucks heading to I-16 upon exiting the facility.

The feedstock would be delivered by up to 254 trucks per day. Upon reaching the Range Fuels facility, feedstock would either be processed or, if already chipped, unloaded to the storage

piles. Processing would include chipping to a 3/4-inch nominal chip size. Once processed, the wood would be transferred to storage piles and conveyed by three belt conveyor systems to day storage prior to being fed into the process via a pressurized feed system. Chip handling and storage operations at the plant would be similar to those used at existing forestry product operations. Additional inputs would include the process catalyst, water pumped from groundwater, boiler feed water additives, power, and natural gas.

Approximately 0.005 mgd (5,000 gpd) of potable water would be obtained from the City of Soperton for use in the office and restroom facilities. Process water would be obtained by drilling one or more onsite groundwater wells. Municipal water would not be used as process water because it is chlorinated and the chlorine would interfere with the catalytic conversion process. Range Fuels would obtain a water withdrawal permit from EPD and install onsite groundwater wells to withdraw up to 0.316 mgd (316,800 gpd) for use as process water. Well water would be withdrawn from the Floridan aquifer, which supports withdrawal of more than 3,000 mgd (3 billion gpd) with negligible overall decline in water levels (U.S. Geological Survey [USGS], 2007c).

The maximum expected groundwater withdrawal rate for use in the conversion process would be approximately 0.316 mgd (316,800 gpd) once all five phases of construction are complete and the facility is operating at maximum capacity. The initial withdrawal rate for Phase 1 construction and operation would be approximately 0.063 mgd (63,360 gpd) and increase in approximate increments of 0.063 mgd (63,360 gpd) with completion of each phase. No specific groundwater data are available for Treutlen County; however, EPD has confirmed that Treutlen County is not within a state groundwater withdrawal area of concern based on analysis of data for neighboring Laurens County (Bill Frechette, EPD, personal communication, September 6, 2007).

An existing round concrete culvert under Commerce Drive would be replaced with a larger concrete box culvert to minimize the potential for stream bank deterioration from high rainfall events. The culvert capacity would be increased by replacing the small-diameter (18-inch) round culvert with a box culvert of the same width as the stream channel (3 feet).

Natural gas would be required to provide initial heat to the conversion and catalytic units during system startup or following any maintenance activities that require plant shutdown (cold starts). Following cold starts, natural gas would be used until tail gas can be generated from the conversion process and subsequently recycled in place of natural gas. Tail gas is the cleaned syngas generated by the process and used as combustion fuel to provide heat to the conversion units. This is expected to occur four times a year for 20 hours per start, requiring approximately 3,900 ft^3 per day of natural gas during the startups for a maximum of 15,600 ft^3 per year.

Site-specific electric upgrades would be required for the Proposed Action. A new substation, approximately 40,000 square feet, would be built at the southwest corner of the intersection of Commerce and Parkview Drives on the Range Fuels site. The substation would tie into the existing Georgia Power grid 115 kV lines to the south of the Industrial Park with overhead lines. The substation would supply power to the facility, at final build-out, at the rate of approximately 290,832,000 kWh annually. New 115 kV transmission lines would have to be constructed to connect the substation to the electrical power grid. The metal catalyst utilized to transform the syngas to liquid alcohols would be expected to have a 5-year life cycle.

New catalyst would be delivered to the site in bulk containers. The spent catalyst would be removed from the reaction vessels and replaced in the bulk containers for shipment offsite to be rejuvenated and returned to use. During construction, one truckload per catalyst charge (25,000 lb) would be delivered to the site for placement within each of the five conversion units for a total of five truckloads. The trucks would deliver the catalyst to the site as each of the conversion units is completed. An additional replacement charge would also be stored onsite as a backup. When full operation is reached, catalyst deliveries would be made once every 4or 5years.

Process Description

The plant would be arranged sequentially with continuous processing from raw feedstock through final product (Figure 2-3). The design would also incorporate recycling of process water. Ethanol would be produced using a two-step conversion process. The first step uses a biomass converter to transform biomass (wood chips) to synthesis gas and the second step uses a catalytic converter to convert the synthesis gas to alcohols, including ethanol, methanol, and a small amount of higher molecular weight alcohols.

The biomass converters would convert wood into a gaseous mixture of carbon monoxide (CO) and hydrogen (H_2) (synthesis gas or syngas) with a small amount of inert solid material (ash) remaining. The raw syngas would be subjected to a number of cleanup and compression steps before being sent through the catalytic syngas converters. Wood feedstocks would be chipped either in the field at their point of origin or at the site. If chipped in the field, the feedstock would be delivered to the site as woodchips via truck. If chipped at the site, raw feedstocks would be chipped and transferred to a storage area. From the storage area, chips would be conveyed to the conversion step, which consists of sequential stages (Stage 1 and Stage 2) within a conversion unit. Chipping, storage, and wood processing operations are planned for the north side of the site so that the route for trucks delivering wood would be buffered and extend away from any homes in the area.

Once produced, the ethanol would be sold as fuel for transportation. Methanol and small amounts of higher molecular weight alcohols (propanol, butanol, and pentanol) would also be produced as by-products of the process and could either be sold to defray costs or used as supplemental feedstock for the process.

Natural gas would be used as a startup fuel, switching to tail gas once it can be generated on a sustained basis. All heating within the conversion units would occur indirectly, and there would be no direct contact between the wood chips and a burner flame. The chips would be continuously conveyed through the Stage 1 sections, where they would be indirectly heated to volatilize constituent organics and other components. The chips would then be fed to Stage 2 of the conversion unit, where the temperature would be further increased to reform some of the remaining carbon and hydrocarbons. Air emissions from conversion units would be controlled with catalytic oxidizers. A flare would be designed to control emergency venting from the entire process as well as the cyclic discharge of the pressurized lock-hopper volumes as each hopper is cycled during operations. Displaced emissions associated with the operation of the loadout racks would also be vented to the flare. The flare would be enclosed and continuously piloted with natural gas with a burner capacity of 500,000 British Thermal Units per hour (Btu/hr).

After passing through Stage 2 of the conversion unit, the ash would be removed from the exiting syngas by process cyclones. The ash would then be cooled and pneumatically conveyed to ash hoppers, then to a truck loadout for disposal as waste. A small gaseous purge stream (mainly CO_2) from the gas quenching operations (which immediately follows Stage 2) vents through a baghouse to remove entrained particulate. This particulate would also be collected in a hopper and added to the ash sent offsite.

Tests would be performed to determine the suitability of the inorganic minerals contained in the ash for land application as a soil amendment. The remaining stream would be quenched and separated into syngas, water, and a liquid hydrocarbon stream. The liquid hydrocarbon stream would be returned to Stage 2 of the Conversion Unit for recycling. Quench water would be used to lower the raw syngas temperature and scrub (remove) any remaining solids or liquid hydrocarbons from the raw syngas. The syngas would then be filtered and dewatered before compression prior to alcohol synthesis.

After the raw syngas is compressed, it would be further treated to remove CO_2 and volatile organic compounds (VOCs). For CO_2 removal, a scrubbing process utilizing an absorption tower followed by a stripping tower would be used. VOCs would be removed with a scrubber. The recovered organics and the syngas stream would be returned to the conversion units for further processing. Conversion of the syngas to alcohol would occur as a result of a catalytic, exothermic reaction, resulting in the generation of substantial heat during the conversion process. This excess heat would be used elsewhere in the conversion units, reducing the amount of tail gas combusted within the conversion process. The cleaned syngas would be fed through a series of catalytic syngas converters. The synthesis products (alcohols) would then be cooled and sent to the distillation units for separation. Some un-reacted gases would be recycled back through the catalysts for further conversion, with the remaining un-reacted gases combusted as tail gas in the conversion units.

The crude liquid alcohol stream produced by the alcohol synthesis process is a mixture of ethanol and methanol, with smaller amounts of higher molecular weight alcohols (propanol through pentanol), water, and minor amounts of other reaction byproducts. A series of distillation columns would separate the crude alcohol stream into purified methanol, ethanol, higher molecular weight alcohols, and water streams. The re-boilers on each of the distillation columns would be steam-heated. After distillation, the methanol would be transferred to storage tanks in preparation for loading into tanker trucks or railcars. The wet ethanol would be sent through molecular sieve dryers to remove excess moisture, with the water being sent to an onsite WWTP for treatment prior to reuse or, when of acceptable quality, discharged to the sewer. The dried ethanol would be sent to storage tanks in preparation for loading into tanker trucks or railcars. The higher molecular weight alcohols would be pumped to an onsite storage tank prior to sale and shipment offsite or recycled back into the process.

Output

Under the Proposed Action, Range Fuels would operate a cellulosic ethanol production plant with a capacity to produce up to 100,000,000 gallons per year of ethanol (286,000 gpd) and up to 20,000,000 gallons per year of methanol (57,000 gpd). After processing, the methanol and ethanol would be transferred to storage tanks in preparation for loading into tank trucks or railcars. The higher molecular weight alcohol byproducts would either be pumped to an onsite storage tank prior to being shipped offsite or recycled to the process as feedstock.

Ethanol would be stored in two 42,000-gallon shift tanks and eight 550,000-gallon storage tanks. Methanol would be stored in two 21,000-gallon shift tanks and four 215,000-gallon storage tanks. An additional single tank would provide up to 70,000 gallons of storage for the higher molecular weight alcohols.

A portion of the methanol generated would be used to denature the ethanol prior to shipping. Ethanol would be shipped by truck or rail to marketing terminals throughout the Southeast, while any methanol sold commercially rather than used for denaturing would be shipped solely by truck. Four loadout racks, two for trucks and two for railcars, would be used to transfer the liquid products into the shipping containers.

Air emissions would be treated by a flare designed to control emergency venting from the entire process as well as the cyclic discharge of the pressurized feed system. Displaced emissions associated with operation of the loadout racks would also be vented to the flare.

Measures that Range Fuels would implement to reduce or eliminate fugitive dust emissions during construction and plant operations would include the following:

- *Sprinkling/Irrigation*. Sprinkling the ground surface with water until it is moist is an effective dust control method for haul roads and other traffic routes (Smolen et al., 1988). This practice can be applied at almost any site and will be implemented at the Range Fuels construction site. When suppression methods involving water are used, care would be exercised to minimize over-watering that could cause the transport of mud onto adjoining roadways, ultimately increasing the dust problem.
- *Vegetative Cover*. In areas not expected to handle vehicle traffic, Range Fuels will implement vegetative stabilization of disturbed soil. Vegetation provides coverage to surface soils and slows wind velocity at the ground surface, thus reducing the potential for dust to become airborne.
- *Mulch*. Where appropriate, landscape or onsite ground mulch will be placed on exposed ground as both a dust control measure and for soil stabilization. Disturbed soils will be mulched after seeding to minimize the potential for erosion while vegetative cover becomes established.

A spill prevention plan, project design features (e.g., secondary containment around tanks), and materials handling procedures would be adopted by Range Fuels prior to initiating operation of the facility. These procedures would prevent any impacts from spills of process generated alcohols. In an effort to minimize spills and vapors associated with storage and loading, Range Fuels would use floating roof tanks to minimize vapors from storage tanks. The loading facilities would pipe vapors from empty trucks and rail cars to flares as they are being loaded. A tray system would be under both the truck and rail car facilities and would be contained; any spills would be collected for reprocessing. The storage tanks for ethanol and methanol would have an impermeable liner and would be bermed to hold the entire contents of the storage tanks in the event of a spill. Fire suppression systems would be installed throughout the Range Fuels facility to meet all applicable standards.

A Spill Prevention, Control, and Countermeasures Plan (SPCC) will be developed and implemented at operation startup per the requirements of 40 CFR 112 Oil Pollution Prevention. The plan will define:

- Spill prevention team and their associated contact information
- Locations, volumes, and product stored of all oil or alcohol containers, tanks, and vessels, etc.
- Implementation of BMPs such as secondary containment, drip pans, and spill kits
- Required actions and responses of each of the team members to any spill or leak
- Inspection and training protocols for the team and facility

Waste

Process wastewater streams would be managed through a number of onsite recycling and treatment processes before being released to the local sewer system and onsite stream. All sanitary wastewater would be discharged directly to the local sewer system. Up to 0.005 mgd (5,000 gpd) of sanitary wastewater from the facility would be sent to Soperton's WWTP for treatment.

An onsite WWTP would be constructed concurrent with construction of Phase 1 of the facility and would begin treating process water at the beginning of facility operation. The WWTP is designed to treat 0.864 mgd (864,000 gpd) of process wastewater, the maximum volume at full operation. Wastewater components prior to treatment would be expected to include biochemical oxygen demand (BOD), suspended solids, dissolved solids, small amounts of RCRA metals, VOCs such as benzene, semivolatile organic compounds (SVOCs), oil and grease, bicarbonate, phenols, and chlorides. The onsite WWTP would use a flocculent (aluminum sulfate [$AlSO_4$]) for removal of suspended solids and sodium hydroxide (NaOH) to neutralize the pH of the wastewater. Both are common chemicals used in water treatment plants.

The onsite WWTP would discharge to surface waters onsite approximately 0.072 mgd (72,000 gpd) of treated process wastewater under the Georgia Water Quality Rules, 391-3-6-.06. Approximately 0.0432 mgd (43,200 gpd) of process wastewater would be sent to the Soperton WWTP, along with the sanitary flow (combined flow to WWTP of 0.048 mgd). The flow to the Soperton WWTP would be permitted under a Georgia Industrial Wastewater Pre-Treatment Discharge Permit. In addition, approximately 0.0576 mgd (57,600 gpd) of treated process wastewater would be sent to evaporation ponds. The remaining flow 0.691 mgd (691,200 gpd) from the WWTP would be recycled to the process. Figure 2-4 describes the basic water and wastewater balance for the plant.

Sludge and solids generated by the WWTP would be anticipated to amount to approximately 1.5 tpd or less. These solids would be recycled through the conversion process where the organics would be converted to alcohols and the non-organic minerals that remain would become char and ash. This material would be sold as a soil amendment to area nurseries and sod farms on an as-demanded basis. Range Fuels has identified local vendors interested in obtaining this material. At full production, the Range Fuels WWTP would generate an estimated 525 tpy of solid waste. Total solid waste from production would be less than 18,100 tpy. This would require between four and five truck loads per day

to deliver the solids offsite. The char/ash could be sold to local plant nurseries and sod farms as a soil amendment or disposed of in the Toombs County Landfill. Range Fuels has identified local vendors interested in this material.

Range Fuels has completed a preliminary analysis of process wastewater from a pilot-scale test plant of the conversion process. The process wastewater, which includes water generated by the conversion process and subsequently removed from the ethanol, would contain only compounds that would be treatable by routine operation of the onsite WWTP. The biomass conversion process would generate 25 to 40 tpd of solid material (char/ash). The majority of this material would be collected in hoppers below the conversion units. The remainder of this material would be removed from the gaseous process stream using cyclones and would be collected in hoppers prior to loading into trucks for offsite disposal. The small gaseous carbon dioxide (CO_2) purge stream would use bag filters to remove entrained particulate matter (PM) down to PM10 (particulate matter with an aerodynamic diameter of 10 microns). Approximately 2 tpy of PM would be collected from the baghouse and added to the other solids sent offsite for disposal or reuse.

Because the conversion process must operate under pressure, any emissions to atmosphere would necessarily be contained within process vessels. In addition, the conversion process, from the point at which the chips enter the conversion units until the liquid product is placed in a tank truck or railcar, would have air pollution control devices that would prevent organic compounds from venting to atmosphere or would destroy them. Equipment leaks associated with the process have been estimated to be less than 0.5 lb/hr of VOC. The liquid products (alcohols) would be stored in floating roof tanks with both primary and secondary seals. Emissions from all the tanks would be less than 1 lb/hr of VOC (primarily ethanol and methanol). Emissions from the loadout racks would be controlled by an onsite flare (Air Application to Construct, CH2M HILL, April 2007).

No wastes would be generated with change out of the catalyst for the conversion process.

Transportation

The transportation infrastructure in the immediate vicinity of the plant would need to be modified to accommodate the increase in traffic that would result from the Proposed Action. Feedstock materials would be transported by truck from regional tree harvest operations. Materials generated at the plant (ethanol, methanol, and char) would be transported from the plant by both truck and train. Primary routes of travel to and from the Industrial Park are I-16 to the north via SR 29 or SR 15 (Figure 2-5). The proposed route for incoming feedstock would be along SR 15 from the northeast, then onto the proposed new truck route and Old Dairy Road, and into the chipping area. Planned roadway improvements for truck traffic into the chipping area include the addition of a GDOT truck route connecting Old Dairy Road to SR 15 (approximately 0.25 mile in length) and improving approximately 1,000 feet of Old Dairy Road from a two-lane unimproved dirt road to a two-lane paved road. The remainder of Old Dairy Road would remain an unimproved two-lane dirt road south of the entry to the chipper. The new truck route would be built by GDOT and be designed to accommodate the anticipated volume of truck traffic. Two turn lanes will be added to SR 15 at the entrance to the truck route. The main entrance of the facility and the product loadout racks would be accessed from Commerce Drive, within the Industrial Park. A rail

spur would be located south of Commerce Drive to connect with the existing railroad for shipment of product by rail. Turn lanes will also be added to the entrance of the Industrial Park from SR 29.

Project Design Features to Minimize Threat from Terroristic Activities

The Proposed Action would be designed to minimize potential threats or damages from terroristic acts. The facility design would include security fences, manned guard house, security lighting, and emergency cutoff controls for the conversion units and loadout racks. The truck delivery area would be separated from the main facility by a security fence.

The facility would be connected to the local 911 emergency response system. In addition, the facility perimeter would be regularly patrolled by the Treutlen County Sheriff's Department.

Project Design Features to Minimize Potential Safety Hazards

Range Fuels has committed to the following measures to minimize safety hazards associated with the operation of the proposed cellulosic ethanol production plant:

- High temperature and high pressure operations would take place inside contained vessels and the process is designed to Occupational Safety and Health Administration (OSHA) and American Society of Mechanical Engineers (ASME) standards and codes. In addition to being designed to ASME pressure vessel codes, high pressure vessels would be hydrostatically tested before being put into service. Appropriate pressure relief devices would also be properly installed on each pressure vessel.
- The entire production process would be designed and fabricated such that adequate insulation would be installed on all hot surfaces to minimize the potential for casual contact burns. In situations where insulation cannot be used on vessel surfaces, barriers would be installed to prevent exposure.
- Raw syngas would be treated and identified as a hazardous waste stream even though it is recycled and consumed within the process. Employees who would be required to conduct maintenance on the scrubbing water recycle section of the process would be provided adequate personal protection equipment (PPE) and instruction to avoid contact with process fluids that would include polycyclic aromatic hydrocarbons (PAH) encountered in this equipment.
- Range Fuels would institute proper training protocols for employees working with sodium hydroxide (NaOH), as related to the onsite WWTP.
- Adequate dust masks would be required for employees involved in transfer of catalyst materials.

Both ethanol and methanol are flammable liquids and since they would be the primary products for the Range Fuels plant, they would be stored in relatively large quantities. Range Fuels would implement appropriate process design and administrative controls to mitigate fire risk by employing the following:

- Water and foam are the two primary fire suppression materials. Foam is the preferred method for topping an ethanol or methanol spill to prevent vapors produced by the spill

from igniting. Foam suppression systems would be located near areas where there is a likelihood of pooled alcohols, especially storage and loading areas.

- High volume, high pressure fire water hydrants would be strategically located to deliver fire water coverage to the entire facility. Fire water systems would be piped throughout the facility, with fire hose stations located to provide full facility coverage, including feedstock storage and handling facilities.

- Deluge and water curtain systems would be employed in high risk areas and areas where high vapor or spray potential for alcohols is present with storage of large quantities of flammables. Such areas include the tank farm and alcohol loading system areas.

- The Delta V control system, that would be implemented by Range Fuels, incorporates specific redundant safety systems to "lock down" the facility with automatic control valves bringing an abrupt stop and containment to flowing flammable vapors and liquids in the event of a fire.

- Firelines between process areas and forested areas would be established and maintained according to recommendations from the Georgia Forestry Commission, CH2M HILL-Lockwood Greene, consulting fire system design experts, and insurance underwriters. Each of these parties has been contacted and discussions have been initiated to determine requirements and ensure proper inclusion in the facility's design.

- All Range Fuels personnel would be trained in early detection and mitigation of incipient fires, as well as proper notification and documentation procedures. Contact information for additional offsite fire fighting resources would be posted and personnel would be informed of proper reporting protocols. Proper use of fire mitigation resources would be a regular part of employee training and incorporated into the site's safety program.

- Administrative controls/procedures would dictate the utilization of fire water monitors or other sources for wetting wood storage areas during periods of dry weather.

Project Design Features to Avoid and Minimize Impacts

Range Fuels would obtain any required permits, approvals, or certifications prior to beginning construction or demolition activities. Construction contractors would be required to strictly comply with all applicable permit conditions and occupational safety requirements during construction activities.

In addition to obtaining and complying with all required permits, and the BMPs identified for construction and operation of the facility, Range Fuels is committed to implementing the following project design features:

- Minimize forest clearing by siting the plant and support facilities on previously cleared areas to the extent possible.

- Avoid encroachment into nearby wetlands. All onsite wetlands would be preserved as greenspace.
- Minimize impacts to streams by maintaining the existing forested stream buffers and designing the site to direct site runoff into a stormwater detention pond instead of directing flows into the onsite streams.
- Limit construction activity to weekdays and normal working hours to minimize potential for disturbance to nearby residents.
- Use sprinkling, irrigation, or mulching to minimize generation of airborne dust.
- Re-vegetate with native species seed mix, as available, and mulch disturbed soil as soon as work is complete to minimize the potential for erosion and generation of fugitive dust from bare soil.
- Minimize encroachment on viewshed by locating facilities away from public roads and maintaining vegetated greenspace between public roads, businesses, and homes.
- Minimize the height of the structures and process equipment to maximize visual screening from existing trees.
- Incorporate onsite wastewater treatment to treat process wastewater, including recycling of 0.691 mgd at full operation. This would minimize the demand for raw water as well as the volume of treated water discharged. To achieve the high recycle rate, the onsite WWTP would include primary and secondary treatment operations that would involve clarification, neutralization and equalization, RO and spray ponds.
- Preserve the forested buffer to the north and west of the site to minimize noise that would reach potential receptors.
- Coordinate with GDOT on location of new connecting truck route from SR 15 to Old Dairy Road to allow efficient travel by feedstock delivery trucks with minimal impact on local traffic and residential areas.
- Purchase a 250-foot wide corridor for the new road connecting SR 15 and Old Dairy Road. Taking into account a 24-foot wide road bed and 80-foot wide right-of-way (ROW), this would allow approximately 75 feet of undeveloped buffer outside of the ROW to prevent future residential development along the route and minimize the potential for local traffic to interact with truck deliveries.
- Reuse process by-products (char and ash) through sales to local plant nurseries and sod farms for use as soil amendment, reducing the operational burden on local landfills.
- Use on-site company fleet vehicles that utilize E-85 fuel. These vehicles would be commercially marketed, readily available passenger vehicles. The number of these vehicles would vary depending on the stage of plant operations.

2.2 No Action Alternative

While it is possible that the Range Fuels plant could be built and operated without DOE financial assistance, that scenario would not provide a meaningful No Action Alternative under NEPA because it would be identical to the Proposed Action. For purposes of analysis in this EA, the No Action Alternative is used to evaluate the potential impacts that would occur if the proposed cellulosic ethanol production plant were not built and operated and no supporting infrastructure were constructed. The No Action Alternative assumes that no development would occur in the Industrial Park absent the proposed project. Under the No Action Alternative, no DOE financial assistance would be awarded to Range Fuels.

2.3 Alternatives Considered but Dismissed by Range Fuels

NEPA requires, in the analysis process, consideration of the Proposed Action, the No Action Alternative, and any other practicable alternatives. Through the site selection process, Range Fuels considered two alternative sites for the plant. Neither of these sites was considered by Range Fuels to be practical compared to the Proposed Action because both sites alternative were considered to have greater potential for construction risks and environmental impacts compared to the Proposed Action. The following sections describe these sites and provide the rationale for eliminating them from detailed consideration in this EA.

2.3.1 Alternative Site 1

Alternative Site 1 is a 30-acre site located on Highway 29 South in Treutlen County. This site was eliminated from further consideration primarily because it is not large enough for the Proposed Action. In addition, the 30-acre site is located in proximity to multiple residential properties, and past land use at the site would have created the potential for exposure to existing soil and groundwater contamination.

2.3.2 Alternative Site 2

Alternative Site 2 is a 110-acre site located 3 miles south of I-16 on Highway 29 near Soperton. This site was eliminated from further consideration because of multiple factors. The site is not currently designated or zoned for industrial development and is located in proximity to multiple residential properties. This site has no existing utilities or rail access. The site topography is hilly, and development would require extensive land clearing and earthmoving prior to construction.

3.0 Affected Environment and Environmental Consequences

The following sections discuss the existing environment in the project area and identify the potential adverse or beneficial consequences associated with the Proposed Action and the No Action Alternative.

3.1 Land Use and General Site Description

3.1.1 Existing Environment

Treutlen County is a largely rural county, with forestry, and to a lesser extent, agriculture as the major land uses. There has been limited population and economic growth in Treutlen County in recent years. According to the 2006 Treutlen County/Soperton Joint Comprehensive Plan, the county's land use is relatively stable outside of Soperton and the I-16 corridor. The Range Fuels facility site occupies approximately 275.1 acres within and adjacent to an Industrial Park approximately 2 miles northwest of the town of Soperton in Treutlen County.

Treutlen County began developing a 220-acre Industrial Park in the 1970s to encourage industrial growth (Figure 2-1). The Range Fuels plant would be placed within the Industrial Park, which also contains seven other commercial operations including a carpet backing plant, a newspaper printing company, a produce distribution facility, a snack product distribution facility, an Easter Seals operations center, a concrete batch plant, and a County-wide vocational training facility. Once the Range Fuels facility is fully operational, the Industrial Park will contain three parcels available for development. These parcels are located to the southeast of the proposed Range Fuels site. The chipper and feedstock delivery area would be placed on approximately 11.2 acres immediately north of the Industrial Park.

There are no land use regulations in Treutlen County or in the City of Soperton. Agriculture and forestry account for greater than 94 percent of the land area of the county, with forestry (mostly pine tree plantations) accounting for almost 80 percent of all land use. There are scattered residential and neighborhood-type commercial uses, as well as transportation/ communication/utilities corridors, within the rural setting (Treutlen County, 2006). The closest schools and churches are 2.4 and 3.2 miles, respectively, to the southeast. The closest hospital is 21 miles from the site.

The majority of the Range Fuels site was previously cleared and comprises old field plant communities, streams, and wetlands. Buffer areas around streams and wetlands were not cleared and contain mature deciduous trees (Figure 3-1). Land surrounding the Industrial Park site is used for forestry and agriculture, with scattered residential sites. The coordinates of the approximate center-point of the site are 32° 24' 10" North, 82° 37' 13" West (North American Datum 1927).

Primary routes of travel to and from the Industrial Park are from I-16 to the north via SR 29 or SR 15. The Range Fuels site is bordered by Old Dairy Road to the east and Commerce Drive to the south.

3.1.2 Consequences of Proposed Action

Under the Proposed Action, construction and paving would convert approximately 67.4 acres of cleared land, old field habitat, and mixed hardwood forest to 12.8 acres of impervious surface including buildings, industrial process components, parking, paved road, feedstock storage, and maintained landscaping. Most of the Proposed Action would be located in an area already designated as an Industrial Park. While the land cover would be altered, the intended industrial use of the land would not change.

The proposed chipper, feedstock and chip storage, and feedstock truck receiving area, and a small (20 feet by 20 feet) support building would be located on the north side of the plant on approximately 41 acres of land. This would result in conversion of approximately 11.2 acres of mixed hardwood forest and a minimal amount of a fallow agricultural field.

The proposed new truck route between SR 15 and the feedstock delivery entrance would convert approximately 1.3 acres of pine forest to paved road. This would be a negligible impact on land use in the county. There are hardwood forests, pine plantations, and residential properties that border the project area, but construction of the facility would not change the current adjacent land uses. Any impacts to land use would be negligible.

The chipper, new truck road, and the electric transmission line would result in converting forest land to industrial uses. A total of 13 acres of forest land would be converted. This would be a negligible impact on forest land in Treutlen County. The placement of the transmission line across pasture would not affect that land use.

3.2 Geomorphology, Geology, Seismic Hazard, and Soils

3.2.1 Existing Environment

Geomorphology, as discussed here, refers to landforms, slopes (topography/relief), and soils at the site. Analysis of this feature helps to establish the relationships between various elements of the environment (geology, hydrology, vegetation, and wildlife).

Treutlen County is located within the Coastal Plain Physiographic Province in the Atlantic Southern Loam Plains (Vidalia Upland) ecoregion. Elevations in the ecoregion range from about 80-525 feet above average mean sea level (AMSL) (USEPA, 2007). The topography at the site ranges from 250 to 320 feet above AMSL. This ecoregion is characterized by generally low, flat, and gently rolling land with finer-textured soils. It has an abundance of agriculturally important soils as well as forested areas that are more sloping or are low, flat and poorly drained (DNR, 2007a). Gentle side slopes are typically dissected by numerous small, low to moderate gradient sandy bottomed streams (USEPA, 2007).

Treutlen County is located within the Coastal Plain Province, approximately 110 miles west of the Atlantic Ocean. The Coastal Plain geology consists of a seaward-thickening accumulation of sediments overlying igneous and metamorphic bedrock. The sediments consist of alternating layers of sand, clay, and limestone that range in age from the Late

Cretaceous through Holocene. The uppermost geologic unit throughout the county is the Neogene undifferentiated, which includes the Altamaha Grit, the Citronelle, and the Hawthorn formations (DNR, 1976). The Altamaha Grit is a band of subsurface sandstone that underlies about 15,000 square miles of Georgia's Coastal Plain. The Citronelle is mostly fine- to coarse-grained sand and locally is gravelly and contains layers of hardpan, or cemented iron oxide, that retard ground-water movement. Outcrops of indurated sandstone and claystone are common throughout the county.

Underlying the surficial sediments is the Hawthorn Formation. The Hawthorn Formation, a Miocene sequence of phosphatic clays and dolomitic limestones, ranges in thickness from 125 to 178 feet, and is estimated to exist at depths of up to approximately 300 feet below land surface (bls) (Counts and Donsky, 1963, Lawton, 1977).

Below the Hawthorn Group are several hundred feet of unconsolidated and consolidated sediments consisting of limestone, dolomite, and sand of Oligocene to Middle Eocene age (Clarke et al., 1990). The uppermost limestone units include the Tampa and Ocala Formations, and these highly permeable rock units comprise the Floridan aquifer, the primary source of potable water in the area. In Treutlen County the Upper Floridan aquifer can be up to 160 feet thick.

Earthquake hazard is defined with respect to two ground motion parameters specified by USGS based on a probability of exceedance of 2 percent in 50 years (Federal Emergency Management Agency [FEMA], 2002). Typically, these two parameters are combined and expressed as a single value, expressed as peak ground acceleration (PGA), expressed in units of gravity(g) (American Lifelines Alliance [ALA], 2005a; 2005b). In Treutlen County, there is only a 0.01probability of a magnitude 5 or greater earthquake over a 100-year period (USGS, 2007a). The PGA for Treutlen County is 0.04 g (USGS, 2007b).

Four soil series occur within the proposed project area: Gilead, Lakeland, Norfolk, and Plummer (United States Department of Agriculture [USDA], 1964). The Gilead and Norfolk Series cover the majority of the proposed project area (USDA, 1964). The Gilead Series consists of moderately well drained, firm, clayey soils found in the upper coastal plain and has moderately slow permeability. The Lakeland Series is excessively drained, rapidly permeable soils found on uplands. The Norfolk Series are well drained with moderate permeability and generally located in uplands. The Plummer Series is poorly drained and is found throughout the coastal plains (USDA, 2007).

Two soil types from the Norfolk soil series (Norfolk loamy sand with 2 to 5 percent slopes and Norfolk loamy sand with 2 to 5 percent slopes, eroded) that are designated as prime farmland by the USDA Natural Resource Conservation Service (NRCS) occur on the proposed project site (Alex Comegys - NRCS personal communication, July 20, 2007). Based on review of the Treutlen County, Georgia Soil Survey, these soils cover 24.6 acres within the project area.

3.2.2 Consequences of Proposed Action

The Proposed Action would have minimal impact on geomorphology. The site is located on level to gently sloping land and only minor grading would be required. Any changes to topography would be minor. Geotechnical surveys have been conducted to confirm that the site would be suitable for the project.

No part of the Proposed Action would have impacts that would extend to the underlying geology of the site. No impacts to geology are anticipated.

The ALA earthquake hazard level assessment for electric power and oil and gas pipelines uses a three-tiered hazard ranking system based on PGA. Areas where PGA may exceed 0.5g are assigned a high hazard ranking, areas where PGA would not exceed 0.15g are assigned a low hazard ranking, and area with expected PGA between 0.15g and 0.5g are assigned moderate hazard ranking (ALA, 2005a; 2005b). With a PGA of 0.04g, Treutlen County is well below the cut-off for the low hazard ranking. Also, with only a 1 percent chance of a magnitude 5 or greater earthquake in a 100-year period, a severe earthquake is unlikely to occur in Treutlen County. The potential for earthquake risk is considered minor.

Project construction would result in new disturbance to approximately 48.3 acres of soils (Table 3-1).

The values in Table 3-1 reflect construction footprint including both pervious and impervious surfaces in the total.

TABLE 3-1
Surface Area Required for Construction
Range Fuels EA

Component	Approximate Required Surface Area (acre per parcel)							
	Parcel A	Parcel B	Parcel C	Parcel D	Parcel E	Parcel F	Parcel G	Parcel H
Chipper		1.9						
Chip Storage Piles		9.3						
Conveyors		2.0						
Conversion Unit (gas cleaning, alcohol synthesis units, and alcohol drying and separation units)			25.0					
Electrical Substation						1.0		
Electrical Transmission Line								0.51
Product and Conversion Storage Tanks			2.0					
Loadout Racks				0.5				
Wastewater Treatment Plant			0.5					
Firewater Pond, Spray Pond and Stormwater Detention Pond			2.0					
Roads	2.0	0.9	3.0				2.7	
Railroads					0.5			
Other improved surfaces (parking and walkways)/			0.6					

The 24.6 acres of prime farmland that would be converted to industrial use represents a negligible amount of the prime farmland within Treutlen County. The two designated prime farmland soil types that occur on the site occur on approximately 8,680 acres in Treutlen County (approximately 7 percent of the county; USDA, 1964). Slightly less than 0.3 percent of these two series within the county would be converted. Other soil types that have been designated as prime farmland in Treutlen County would not be impacted by the proposed project. The area where the prime farmland would be lost is being developed as an Industrial Park and these soils have been permanently removed from agricultural production independent of the proposed project. Any impacts to prime farmland would be negligible.

Soils have been disturbed throughout much of the proposed project site through previous land clearing activities. During construction, heavy equipment would be used to move and compact soils in construction areas. Disturbance to soils would occur from work on construction sites, roadbeds, and parking lots. Construction of new structures and paved areas would require clearing and grading. The total disturbed area would be kept to the minimum necessary to complete the work and would be confined to the final site boundaries.

Soil disturbance could result in increased erosion potential from loss of ground cover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to water quality that could result are discussed in Section 3.4.2. Potential impacts would be controlled or avoided through the use of appropriate BMPs and soil stabilization/revegetation techniques following construction. Appropriate BMPs would be selected based on site-specific conditions and could include, but would not be limited to, sediment barriers (silt fence or straw bales), a detention pond, and establishment of improved construction entrances.

Because rainfall is distributed fairly evenly throughout the year, as discussed in Section 3.10, it would not be possible to plan construction for a dry period to further minimize potential erosion impacts.

Following construction, exposed surfaces would be re-vegetated and final site grading would direct runoff to a stormwater detention pond that would be located in the southwestern portion of the site.

Construction impacts would be minor and temporary. The use of construction BMPs and post-construction stormwater BMPs would reduce potential impacts from erosion and stormwater runoff. Any long-term impacts would be negligible.

3.3 Hydrology

3.3.1 Existing Environment

3.3.1.1 Surface Water

The Industrial Park is within the Oconee River watershed. There are three unnamed streams within the Range Fuels site (Figure 3-2). All of the streams are tributaries of Rocky Creek, which is a tributary to Red Bluff Creek. The primary drainage on the property originates

from farm ponds offsite, with additional flows provided by a spring/seep in the north-eastern portion of the property. The primary unnamed stream is approximately 2 feet wide. This major stream flows from the northeast to the southwest and is joined by two additional unnamed streams within the property. One of the tributary streams is a perennial stream that originates offsite and the other is an intermittent stream that flows only in response to an offsite water discharge. The major stream exits the property to the southwest through a culvert beneath Commerce Drive. It flows into a small offsite pond that discharges to Rocky Creek.

There are forested and emergent wetlands on the Range Fuels site surrounding the stream channels (Figure 3-2). These wetlands are further discussed in Section 3.6.

There are no Federal Emergency Management Agency (FEMA) designated floodplains or floodways on the site (Treutlen County, 2006).

3.3.1.2 Groundwater

Several aquifers underlie the lower half of the Oconee River basin in Treutlen County, which includes the Range Fuels site. The only aquifer that receives recharge in Treutlen County is the surficial aquifer (Treutlen County, 2006). The surficial aquifer is composed of sand, silt, and clay units varying in age from Pliocene to recent. Below the surficial aquifer, is the Floridan aquifer. This aquifer underlies all of Treutlen County and is composed of the Suwannee Limestone (Eocene). This aquifer is confined by greater than 100 vertical feet of the Hawthorn Formation (Miller, 1986). The total thickness of the Floridan aquifer in Treutlen County ranges from approximately 200 to 300 feet. Transmissivity in the aquifer ranges from 10,000 to 50,000 ft^2/day (Bush and Johnston, 1988). Historic groundwater levels measured at two locations, one in Soperton and one northwest of Soperton, indicated that the depth to water in the Floridan aquifer ranged from 124.5 to 135 feet bls (USGS, 2007c and d). The deepest of these aquifers is the Cretaceous aquifer, which occurs greater than 1,000 feet below land surface in Treutlen County (Miller, 1986). The Cretaceous aquifer is separated from the Floridan aquifer by a confining unit that is greater than 500 feet thick and is composed of interbedded sand and clay.

Recharge areas for the surficial aquifer are located in the northeastern and southeastern parts of Treutlen County. These recharge areas are more than 5 miles from the Range Fuels site (Treutlen County, 2006). Groundwater recharge areas for the Floridan and Cretaceous aquifers are located north of Treutlen County (Bush and Johnston, 1988).

The average potentiometric surface of the portion of the Upper Floridan aquifer that includes Treutlen County is currently monitored by USGS wells in Laurens County to the west and Montgomery County to the south. Levels range seasonally from 25 to 35 feet below land surface in Laurens County and 72 to 80 feet below land surface in Montgomery County. Water levels show influence from changes in seasonal and climatic conditions. Drought conditions in 2001-2002 caused water levels to decline approximately 5 to 10 feet from the normal range. Water levels in Montgomery County have also declined due to pumping (Leeth et al., 2007).

Groundwater use in the County is estimated to be 1.25 mgd. Of that total, 0.45 mgd is for public supply, 0.29 mgd is for domestic use, and 0.51 mgd is for irrigation and livestock (USGS, 2000). Residents in unincorporated areas of the County rely mainly on domestic

wells for their water supply. The City of Soperton supplies its residents with water from the Floridan aquifer (Treutlen County, 2006). The City of Soperton is currently the only municipal or industrial entity permitted to withdraw groundwater in the County. The City's permit allows for an annual average withdrawal rate of 0.65 mgd, with a monthly average maximum of 0.75 mgd from the Floridan aquifer (EPD, 2005).

3.3.2 Consequences of Proposed Action

The layout of the cellulosic ethanol plant and its supporting infrastructure would avoid encroachment on surface waters on the site and their existing buffers. Construction would not occur within any designated floodplains and would have no impact on upstream floodplain elevations or downstream flood conveyance.

The Proposed Action would result in the conversion of approximately 12.8 acres of pervious to impervious surfaces. Construction activities would result in soil disturbance and loss of vegetative cover. These activities could result in modified surface water runoff patterns from the site. Impacts on hydrology could result from land clearing, loss of vegetation, and associated accelerated runoff from impervious surfaces following precipitation events. Water quality could be affected by erosion. Stream habitat and bank stability could be affected by higher peak flows and channelization as a result of increased stormwater run-off. However, the use of construction and post-construction BMPs, as described in Sections 2.1.3 and 2.1.4.1, would prevent a significant increase in runoff following implementation of the Proposed Action. As a result, impacts to surface water hydrology from construction and operation of the facility would be minor. When maximum wastewater recycling is achieved, impacts to hydrology would become negligible.

Water yields from the Floridan aquifer have declined in recent years due to drought periods. Range Fuels is coordinating with Georgia EPD on availability of water from the Floridan aquifer and obtaining a groundwater withdrawal permit to meet their needs.

Groundwater would be withdrawn from the Floridan aquifer. At a withdrawal rate of 316,800 gpd within the Range Fuels facility, pumping would have minimal impacts on any wells outside a 1,000 foot radius of the facility's withdrawal well. This is based on the Cooper-Jacob calculation of the distance to a drawdown of 5 feet after 1,000 days of pumping. Estimates of aquifer transmissivity and storage were derived from USGS publications on the Floridan aquifer (Bush and Johnston, 1988; Miller, 1986; Lohman, 1972). These references suggest that there is more than 250 feet of available drawdown in the Floridan aquifer at the proposed facility location. Therefore drawdown outside of the 1,000-foot radius is negligible to other groundwater users. Obtaining site specific characteristics of the aquifer will be required to obtain a State of Georgia Water Withdrawal permit for the well. Range Fuels is coordinating with Georgia EPD on availability of water from the Floridan aquifer and obtaining a groundwater withdrawal permit to meet their needs.

3.4 Water Quality

3.4.1 Existing Environment

The 303(d) List of Waters reports on streams and lakes identified as impaired for one or more pollutants and do not meet one or more water quality standards. There are no 303(d) (DNR, 2007) listed segments of impaired waters near the project area, though four stream segments in Treutlen County are included on 303(d) list. A 3-mile segment of Red Bluff Creek between Little Red Bluff Creek and the confluence with the Oconee is designated as partially supporting the designated use of fishing due to non-point source impacts to biota (DNR, 2007c). The unnamed streams on the site drain to Rocky Creek, a tributary of Red Bluff Creek.

Two NPDES permits for wastewater discharges have been issued to entities in Treutlen County: the Treutlen County Development Authority and City of Soperton WWTP. Discharge locations for both are in the Red Bluff Creek watershed, although neither discharges to streams on the Range Fuels site.

No water quality data have been collected from streams onsite.

The City of Soperton currently obtains its water supply from the Floridan aquifer. According to the City of Soperton, the water is potable except for treatment with chlorine and fluoride (David Brantley, personal communication, 2007). The proposed facility is not within the recharge area for the Floridan aquifer in this part of Georgia. Therefore, no impacts from adjoining properties or the proposed facility are anticipated. It is noted that the Floridan aquifer is completely confined in Treutlen County by greater than 100 vertical feet of clay-rich Miocene sediments (Miller, 1986). This reference also shows that this confining unit extends across southern Georgia from Alabama to South Carolina. Locally, the confining unit begins in the north in Laurens and Emanuel counties, and thickens to the south.

3.4.2 Consequences of Proposed Action

Impacts on water quality could result from construction activities that lead to soil disturbance and exposed soil, which can create the possibility for the transport of sediment and soil-bound pollutants into streams. Transport could occur downslope or into immediately adjacent waters. The potential water quality impacts would be temporary and limited to the construction footprints. Implementation and maintenance of BMPs as described in Section 2.1.3 would minimize the potential for such impacts and prevent significant construction-related impacts. Turbidity monitoring at stormwater discharge locations would be performed as a condition of the NPDES construction general permit to confirm that no significant adverse impacts to water quality would result.

Post-construction, an additional 17.26 acres of the site would contain impervious surfaces. The majority of the site within the Industrial Park (approximately 60 percent) would have vegetation or pervious surfaces that would intercept much of the precipitation in rainfall events. Onsite soils would allow infiltration of substantial amounts of precipitation. No direct impacts would occur to existing stream and wetland buffers and these areas would

provide added protection through interception and infiltration of runoff before it could reach any surface waters.

Post-construction grading and the detention pond would contain or treat stormwater to prevent offsite impacts to water quality. Peak discharges are estimated to be 83.3 cubic feet per second (cfs) for a 2-yr, 24-hr storm event and 150 cfs for a 25-yr, 24-hr storm event. Any runoff from lesser storms would be detained within the stormwater system.

Extraction of groundwater by Range Fuels is not expected to deplete nearby surface water bodies because the Floridan aquifer is thickly confined and the recharge to the aquifer occurs north of Treutlen County. For the same reasons, extraction of groundwater at the facility should not impact groundwater quality because the Floridan aquifer is protected by the confining layer.

The only potential impacts to the surficial aquifer are releases of hazardous materials from facility operations. The facility will have operational policies and procedures to manage and store such materials, so that releases should not occur. If an accidental release should occur, the facility will have a SPCC plan to contain, manage, and cleanup the release. These procedures are expected to minimize, to the extent possible, any potential impacts to the surficial aquifer.

The added volume of sanitary wastewater 0.005 mgd (5,000 gpd) would be well within the capacity of the Soperton system, which has a maximum flow rate of 1.5 mgd, with available capacity of 0.1 mgd.

The expected discharge to the Soperton WWTP would be less than a third of the available capacity of the Soperton sewer conveyance system (0.043 mgd vs. 0.3 mgd) and half of the available capacity of the WWTP (0.048 mgd vs. 0.1 mgd). There would be no expected impacts from the increase in flow from the WWTP to the Soperton WWTP.

The Soperton WWTP does have both flow and pollutant limits on the wastewater it will accept. The design limits of the Soperton WWTP on the wastewater it can receive are 250 milligrams per liter (mg/L) for both BOD and total suspended solids (TSS) and 25 mg/L for ammonia nitrogen (NH_3-N). The expected discharge from the onsite WWTP would be treated to less than 50 mg/L for the BOD and TSS and 10 mg/L for the NH_3-N, well within the limits of the Soperton WWTP. Therefore, no impacts from the additional pollutant load from the facility to the Soperton WWTP would be expected. The Soperton WWTP also has plans for expansion within the next 3 to 5 years. The expansion would double the existing capacity of the Soperton WWTP (Treutlen County Development Authority, 2007).

The estimated current flow of the onsite stream to which the onsite WWTP will discharge is approximately 0.432 mgd (432,000 gpd or 0.67 cubic feet per second [cfs]). The WWTP will discharge approximately 0.072 mgd (72,000 gpd) of treated wastewater to the onsite stream, which is an unnamed tributary of Rocky Creek. This represents an approximate increase of stream flow below the point of discharge of 17 percent. The expected impact of this increase would be minor.

It is not anticipated that the Proposed Action would have an impact on the local wastewater treatment system.

Because there would be no changes in harvest site runoff characteristics following removal of feedstock, there would be no impacts to water quality resulting from Range Fuels purchase of feedstock materials.

3.5 Wetlands

3.5.1 Existing Environment

Approximately 18 acres of forested wetlands have been identified on the Range Fuels site within the Industrial Park (Figure 3-2). Descriptions of the field methodologies and wetlands identified by CH2M HILL on the Range Fuels site are provided in Appendix E. Wetlands located along the proposed transmission line route will be delineated by Georgia Power during the route selection process. Approximately 90 percent of the wetlands on the site are within a forested area immediately adjacent to perennial and intermittent streams that bisect the property, extending 30 to 100 feet to either side of the stream channel. The remaining 10 percent of onsite wetlands are emergent wetlands located in the eastern portion of the parcel that would remain undeveloped. The area south of the proposed Commerce Drive loadout racks and north of the existing railroad contains an ephemeral stream. An area of forested wetland is present immediately to the north and south of the ephemeral channel, after it flows past Parkview Drive

Additional wetlands are located on the parcel adjacent to the Industrial Park that would contain the chipper. This parcel contains two small forested wetlands. The wetland east of where the chipper would be located covers 4.2 acres and the one along the western side of the parcel covers 1.5 acres (Figures 2-2A through 2-2F, Appendix E). One of these wetlands is located on the western half of the property and the other is located to the north of the unpaved road on the property. Both wetland areas are located outside of the area proposed for the chipper, storage areas, and truck travel.

3.5.2 Consequences of Proposed Action

The layout of the cellulosic ethanol plant and its supporting infrastructure would avoid encroachment on any wetlands, and their associated buffers. An undisturbed buffer of 25 feet or more in width, starting from the point of wrested vegetation within the wetland outward, would be maintained around all wetlands on the site. This distance is the minimum undisturbed buffer width required by the EPD for warm water, non–trout streams. The buffer is intended to protect the wetland or stream from concentrated surface runoff that would cause scouring and/or erosion of the receiving waters. These areas would be maintained as permanent, natural greenspace.

Replacement of the existing concrete culvert under Commerce Drive would have temporary, minor impacts to the stream that is channeled under the road. The stream must be diverted to allow construction of the new box culvert. The diversion would be within a new channel, but adjacent to the existing channel, until construction can be completed. Besides repositioning of the stream flow, another temporary impact would be a small amount of sediment entering the flow due to the construction operations associated with the new culvert. Silt fencing would be used to minimize the amount of sediment entering the stream. Once construction of the new culvert is complete, there would be no change in the

width of the channel either upstream or downstream of the new culvert. There would be no long term negative impacts to wetland hydrology from replacement of the culvert.

3.6 Biological Resources

3.6.1 Existing Environment

The Range Fuels facility site includes 6 parcels totaling approximately 275.1 acres. Approximately 67.4 of the 275.1 acres would be developed for the project and the remaining acreage would be kept as natural and landscaped greenspace.

The main facility site (Figure 2-1, Parcel C) would cover 115.7 acres within an area designated as an Industrial Park. Much of this 115.7-acre parcel has been previously cleared. Within the previously cleared areas, much of the northern and western areas of the site are vegetated with native grasses, while the southern and eastern portions of the site are predominantly bare dirt, except for one area in the southern portion that was recently seeded and mulched. The eastern portion appears to have burned or been burned in the fall or winter of 2006. The areas surrounding wetlands and streams on the parcel were not cleared and a 30- to 100-foot wide strip of mature trees remains around the streams and wetlands. These forested areas are dominated by hardwoods.

The proposed site for the rail spur (Figure 2-1 Parcel E) is within an existing industrial area containing a concrete batch plant with a two-lane paved road (Parkview Drive) forming the western boundary. A small (approximately 1-foot wide) ephemeral stream flows between the area of the proposed loadout racks and the existing railroad. An area of forested wetland is present immediately to the north and south of the ephemeral stream, after it flows past Parkview Drive.

The parcel that would contain the proposed chipper (Figure 2-1, Parcel B) is immediately adjacent to the proposed Range Fuels facility site to the north and covers 40.6 acres. An unpaved road bisects the property from east to west. Approximately 6.1 acres along the southeastern boundary of this parcel site is a fallow agricultural field. The remainder of the site is hardwood forest dominated by oaks and includes the two small (approximately 1.5 and 4.2 acres) forested wetlands described above.

1.3 acres of pine plantation would be converted to roadway by the construction of the new road, but 5.6 acres of this forested habitat would be preserved as permanent natural greenspace.

Construction of the new electric transmission line would convert 0.5 acres of hardwood forest to maintained right-of-way. This area would be contiguous with the existing pasture that the lines would cross.

Common flora on the main parcel include a variety of grasses, dominated by broomsedge (*Andropogon virginicus*). The northeastern portion of the site contains an emergent wetland dominated by black willow (*Salix nigra*) and two species of rush (*Juncus* spp.). The areas surrounding wetlands and non-wetland waters on the site contain a 30- to 100-foot buffer of mature trees, dominated by red maple (*Acer rubrum*), sweetbay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), and willow oak (*Quercus phellos*).

Common fauna on the site would be typical of the upper coastal plain of Georgia and would include a variety of birds in the forested areas surrounding the wetlands. It is expected that the site and the surrounding areas would contain a variety of common small animals including field mice, armadillos, opossums, foxes, rabbits, snakes and squirrels (Wharton, 1978). The northwestern and western perimeter of the main parcel and the western portions of the northern parcel near where the chipper would be located contain active and inactive burrows for the gopher tortoise. Other species often occur as commensals with the gopher tortoise and inhabit the gopher tortoise burrows.

The wooded area between the railroad and the planned loadout racks (Figure 2-1, Parcel E) contains a mixed hardwood around an ephemeral stream approximately 1 foot wide. Immediately to the north and south of the ephemeral stream and after it flows past Parkview Drive is a forested wetland containing royal fern (*Osmunda regalis*), soft rush (*Juncus effusus*), sweetbay magnolia sweetgum, willow oak, and red maple.

Parcel A is a mixed hardwood forest containing one intermittent stream in the northern third of the parcel. There are two forested wetlands located in the northeast and southwest portions of the site. Parcel D is within an existing industrial area that is predominantly bare dirt. Parcel F is approximately half scrub-shrub and forested wetland and half mowed grasses.

3.6.2 Consequences of Proposed Action

Implementation of the Proposed Action could result in minor impacts to biological resources (plants and animals) and habitat quality (foraging and nesting). Disturbance from construction would directly alter the plant communities occurring on the facility site, along the new road corridor, and along the new electric transmission corridor. Because most of the facility construction disturbance would occur on lands that currently contain little to no native vegetation, such as unpaved roads and gravel or dirt lots with non-native grasses planted for erosion control and ruderal weeds, impacts to vegetation from construction of the facility would be negligible to minor. The new approximately 0.25-mile road would be placed through a planted loblolly pine stand and the conversion of a portion of this stand to roadway would be a negligible impact on loblolly pine in the region. The electric transmission corridor would be placed through agricultural land, planted loblolly pines, and regrowth hardwood forest. The pine and hardwood areas would be converted to treeless areas that would cyclically progress from grass to shrub vegetation with the mowing maintenance of the right-of-way. Any impacts to vegetation would be minor.

Impacts to common flora and fauna would result from implementation of the Proposed Action. The project would result in development of 67.4 acres of previously cleared land for buildings, production units, pavement, and associated landscaped areas. Because appropriate BMPs, as discussed in the Proposed Action, would be implemented, any indirect impacts from stormwater runoff to downslope offsite habitats would be negligible. Because the area to be developed has been previously cleared and now contains habitats of limited quality, impacts to habitat are expected to be negligible.

It is expected that wildlife would be displaced from the construction area and immediately adjacent lands during construction. The number of animals displaced by the facility would

not be large, as the majority of the land that would be used for the facility has been previously cleared and provides limited habitat value.

There are extensive forested lands and other natural habitats adjacent to the facility site, transmission corridor and the proposed road extension. All portions of the facility site are connected to off-site habitats through the preserved riparian corridors and forest habitat. In natural environments, terrestrial animal populations typically are below the level that habitat can sustain (the theoretical carrying capacity). This results from disease and parasites, predation, competition, imperfect distribution within the environment, and episodic extrinsic perturbations including wildfire, flood and drought (Hedrick, 1984; Ricklefs, 1990; Robinson and Bolen, 1984). Because populations typically are below the theoretical carrying capacity, displaced animals are able to relocate to other suitable sites and assimilate without negative population consequences. Direct observations of vegetation in the areas that would be preserved around the facility indicate that browsers and grazers are below the level that could be sustained at present, as there is no evidence of limiting herbivory pressure and there are unconsumed plant resources available.

Because the area is currently within a severe drought (EPD, 2007), wildlife population numbers are likely further depressed below normal levels. Animal populations respond to reduced water in the environment with direct mortality from water stress and also through induced reproductive depression in response to environmental cues (Robinson and Bolen, 1984). As a result of the drought, it is likely that there is more unoccupied habitat than would be expected under normal conditions, which would enhance the ability of any displaced animals to assimilate into new locations.

At the Range Fuels site, the ability of displaced animals to relocate to suitable habitat would be enhanced because of the ability to travel along the preserved riparian corridors and forested areas to locate new suitable habitat. Because current conditions are such that ample habitat is expected to be available for assimilation of displaced animals, any secondary impacts to animal populations in the area surrounding the Range Fuels facility would be expected to be negligible.

The facility site is predominately cleared land. There are numerous utility and transportation corridors (improved and unimproved) in the region. Most of the forest is pine plantation on 20- or 30-year harvest rotation and little mature forested habitat remains. Cleared areas for pasture and row crop production are common in the county (USDA, 1964). The mixed hardwood area that would be cleared for the chip mill is a regrowth forest following abandonment from previous clearing for pasture or row crop production. The new electric transmission line would be placed through predominately open land, with limited clearing along only 150 feet of its 5,460-foot route. Because only limited additional fragmentation would occur and this would be within an already highly-fragmented landscape, any additional habitat fragmentation impacts would be expected to be minor.

The conversion of loblolly pine and re-growth hardwood to electrical transmission right-of-way would be a minor impact on animal communities. There would be a reduction in forested habitat, localized increases in available forage for forest animals as a result of edge effects (Robinson and Bolen, 1984). There would be new habitat created for species that use grass/shrub areas. However, the amount of habitat conversion would be minimal and regional population changes would be expected.

Incidental wildlife mortality, both onsite and in the surrounding area, could result from construction-related traffic. However, any such losses would not threaten local populations with extinction.

Once operational, the constant activity at the facility could prevent some animals from returning, but others would be expected to acclimate the disturbance and resume use of the adjacent areas. Incidental wildlife mortality could result from operational vehicle traffic resulting from worker commutes and deliveries and shipments. However, any such losses would not threaten local populations with extinction and would be negligible in the regional setting. No other impacts to wildlife would be expected from operation of the facility.

Because logging residues and unmerchantable timber are removed from harvest sites during site preparation for replanting, this material is not available as part of the ecological community and does not provide habitat for nearby animals. Therefore, no impacts to wildlife habitat are expected from Range Fuels purchase of feedstock materials following pine harvests.

3.7 Protected Species

3.7.1 Existing Environment

The Georgia Natural Heritage Program (GNHP) database contains records of occurrences of six rare, threatened, and endangered (RTE) species in Treutlen County (Table 3-2). All six species have state protection status, but none have federal protection status. No federally protected species are known to occur in Treutlen County. CH2M HILL conducted multiple site visits in the spring and summer of 2007 to assess the site for protected species. No federally protected species were identified during these site visits. Habitat and evidence of the presence for gopher tortoise (*Gopherus polyphemus*), state listed as threatened, were identified. The report for these site visits is included in Appendix E.

None of the protected species known to occur in Treutlen County were observed within or adjacent to the project boundaries.

TABLE 3-2
GNHP Rare, Threatened, and Endangered Species in Treutlen County, GA
Range Fuels EA

Common Name	Scientific Name	State Status	Habitat
Spotted Turtle	*Clemmys guttata*	Unusual	Heavily vegetated swamps, marshes, bogs, and small ponds; nest and possibly hibernate in surrounding uplands
Pineland Barbara Buttons	*Marshallia ramosa*	Rare	Altamaha Grit outcrops; open forests over ultramafic rock
Cutleaf Beardtongue	*Penstemon dissectus*	Rare	Altamaha Grit outcrops and adjacent pine savannas; rarely sandridges
Yellow Flytrap	*Sarracenia flava*	Unusual	Wet savannas, pitcherplant bogs
Ocmulgee Skullcap	*Scutellaria ocmulgee*	Threatened	Mesic hardwood forests; bluff forests

TABLE 3-2
GNHP Rare, Threatened, and Endangered Species in Treutlen County, GA
Range Fuels EA

Common Name	Scientific Name	State Status	Habitat
Ohoopee Bumelia	*Sideroxylon macrocarpum*	Rare	Dry longleaf pine woods with oak understory; often hidden in wiregrass

Although not previously reported from Treutlen County, signs were observed of current use of portions of the project site by the gopher tortoise. Nine gopher tortoise burrows were identified within or near the project boundaries in two distinct clusters (Figure 3-3). Gopher tortoise inhabit sand hills, dry hummocks, longleaf pine-turkey oak woods, and old fields. The gopher tortoise is a species in decline and is listed as a threatened species by the state of Georgia. It is listed as threatened throughout its range in the southeastern United States because it is a "species that lives a long life, reaches sexual maturity at over ten years of age, produces relatively small clutches, experiences low recruitment, and suffers from an upper respiratory tract disease, high levels of predation and loss of habitat" (Heinrich, 2007).

The burrows identified on the Range Fuels site were located along the northwest border of the area designated for the main facility and adjacent to and south of an unpaved road within the area proposed for the chipper. Gopher tortoise burrows are often inhabited by other species, including protected species such as the federally protected indigo snake, where the species co-occur. No gopher tortoises were identified during the site visit; however, signs of ongoing gopher tortoise activity were observed, including fresh digging at burrows. No other animal species were observed near burrows.

3.7.2 Consequences of Proposed Action

To avoid impacts to gopher tortoises to the extent practicable, Range Fuels has designed the facility layout to avoid direct impacts to burrows. The nearest disturbed area associated with construction of the facility would be approximately 200 feet from the nearest tortoise burrow.

DOE and Range Fuels met with the U.S. Fish and Wildlife Service (USFWS) and DNR on August 22, 2007 to address gopher tortoise concerns at the proposed site. Based on information gained during this informal consultation, Range Fuels has committed to placing exclusion fencing around the proposed construction area in the Fall of 2007 prior to construction. As a result, construction related impacts to the gopher tortoise are not anticipated.

During the August 22, 2007 meeting, DNR and USFWS determined that the proposed construction area is too far north for occurrence of the federally protected Indigo Snake. However, should any Indigo Snakes be found at the construction site, Range Fuels has committed to notifying USFWS and informal consultation would be initiated to avoid impacts and resolve any concerns.

With the preservation of approximately 207.3 acres of natural greenspace and implementation of the proposed project design features, any impacts to protected species would be negligible.

3.8 Safety and Occupational Health

3.8.1 Existing Environment

Firefighting services currently are provided for the Industrial Park by the Soperton Fire Department, located in downtown Soperton approximately three miles from the proposed plant. This is a volunteer fire department equipped with six Class A pumper trucks ranging from 750 gallons to 2,500 gallons and one 2,000 gallon tanker truck. The Range Fuels site has hydrants in place which would be utilized in the case of a fire on-site.

Police services at the proposed plant would be provided by the Treutlen County Sheriff's Office in Soperton.

Medical services, including emergency rooms, are available at the Fairview Park Hospital in Dublin, Meadows Regional Medical Center in Vidalia, and Emanuel Medical Center, in Swainsboro, approximately 26, 21, and 25 miles, respectively, from the proposed plant.

3.8.2 Consequences of Proposed Action

The chemicals and chemical processes used to produce ethanol create potential for health and safety hazards. These hazards include high temperature and high pressure operations, flammable and toxic liquids, and potential exposure to particulate matter. These potential hazards would be minimized by implementing the high temperature and high pressure management and control measures identified in the Proposed Action.

There are no liquid chemicals involved in the conversion process other than the alcohols produced. However, both methanol and ethanol are toxic when acute exposures are realized. The risk of potential spills and exposure to released vapors would be minimized through the use of floating roof storage tanks, berms around the storage tanks, and a tray system to catch any spills from fuel loading processes. The proposed foam fire suppressant would minimize the evolution of alcohol vapors from potential spills and act as a mitigating agent to reduce exposure.

As described in the Proposed Action, raw syngas would be subjected to a number of cleanup and compression steps before being sent through the catalytic syngas converters. This raw syngas will be at a high temperature and contain fine particulate and other organic contaminants at the end of the reformer section. Water scrubbers would be employed at the exit of the reformer section to quench the temperature of the syngas stream and remove fine particulate and organic contaminants from the gas. The organic contaminants would accumulate in the scrubbing water and be separated in a separate vessel. The concentrated

organic material would be pumped back to the entrance of the reformer where it would be converted to additional syngas. Although this separation and transfer back to the reformer would occur in a closed loop system, it is noted that this material would be a complex mixture of PAHs that includes benzene and other carcinogenic compounds. The hazards associated with the process and the mixture of PAH would be minimized through the management and control measures identified in the Proposed Action.

The only material other than the feedstock and steam used in the process are the two solid, metallic catalysts used to convert the syngas into alcohol. The primary catalyst is a proprietary cobalt molybdenum (CoMo) base with other promoters added followed by a zinc oxide (ZnO) base catalyst. These materials are not considered toxic in and of themselves but can generate fine particulate as a result of shipping and handling. This catalyst is loaded into the synthesis reactor where it would be expected to remain for approximately two years before it would need to be replaced. During the initial loading and replacement operations there is potential for dust generation and exposure. This potential hazard will be minimized by the implementing the safety measures as defined in the Proposed Action. Adequate dust masks would be required for employees involved in transfer of catalysts materials.

The only risk from the onsite WWTP is the corrosivity of the sodium hydroxide (NaOH) used to neutralize the pH of the wastewater. This aqueous solution has a very high pH and would facilitate the corrosion of certain metals if not contained appropriately. NaOH could also result in severe chemical burns and permanent loss of eyesight could occur upon contact. This potential hazard would be minimized by implementing the safety training protocols as identified in the Proposed Action.

Both ethanol and methanol are flammable liquids and since they are the primary products for the Range Fuels plant they would be in process and stored in relatively large quantities. This would present potential fire hazards to the plant and surrounding forested areas. This potential hazard would be minimized by implementing the fire management and control measures identified in the Proposed Action. A site safety plan has been prepared and would be implemented prior to breaking ground on the facility and would cover all construction and facility operations. This plan includes information on all medical and environmental hazards associated with the plant and would be in accordance with federal OSHA guidance. The site specific safety plan includes guidance for excavation and trenching, electrical, hazardous chemicals, spill prevention, fall prevention, proper equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection. A safe behavior observation program would be implemented to encourage safe behaviors until they become an everyday habit (CH2M HILL Lockwood Greene, 2007). Additional site safety plans will be developed to include operational hazards including operation of wood chippers and conveyors and working outside in hot or inclement weather. Due to Range Fuels' commitment to developing and implementing site safety plans during construction and operation, impacts to worker safety and occupational health are not anticipated.

Range Fuels has initiated pre-construction implementation of emergency mitigation measures through ongoing discussions with the Soperton and Treutlen County Fire Departments for Fire, and EMS. The plant's emergency plan would include a list of residences, businesses, and other places that would be notified and instructed in the event of an accidental release or other emergency requiring public notification. The plan also would include coordination with the Soperton Fire Department.

Plans to locate a station to provide EMS and fire services to the Industrial Park and the surrounding community will allow that facilities north of the railroad tracks in the Industrial Park will not be limited by the possibility of a passing train delaying the arrival time of emergency responders.

3.9 Noise

3.9.1 Existing Environment

Noise, in the context of this analysis, refers to sounds generated by activities that could affect employees of the facility, employees of nearby commercial operations, residents near the proposed facility, or wildlife. Noise levels typically are expressed in terms of decibels (dB), a measure of the sound pressure generated. The decibel scale is logarithmic rather than linear because humans perceive sound as the logarithm of the sound pressure rather than the actual sound pressure (USEPA, 1974; Danish Wind Industry Association, 2004).

For determination of impacts to human receptors, noise measurements are weighted to increase the contribution of noises within the normal range of human hearing and decrease the contribution of noises outside the normal range of human hearing. For humans, this is considered an A-weighted scale (dB_a). When sound pressure doubles, the dB_a level increases by three. Psychologically, most humans perceive a doubling of sound as an increase of 10 dB_a (USEPA, 1974; Danish Wind Industry Association, 2004). Sound pressure decreases with distance from the source. Typically, the amount of sound energy is halved as the distance from the source doubles (USEPA, 1974; Danish Wind Industry Association, 2004).

Additionally, people tend to exhibit differing sensitivity to noises generated by time of day, with noise at night being more disturbing than daytime noise. Therefore, a Day-Night Average Noise Level (LDN) is used to determine whether noise would be perceived as an adverse impact. USEPA developed an index as a standard descriptor for noise impacts from a variety of sources. Where LDN values exceed 65 dB_a, residential development is not recommended (USEPA, 1974).

Noise levels within the Treutlen County Industrial Park are variable, depending on truck and train traffic in the area. While no specific data have been compiled for the Treutlen County Industrial Park, background noise levels in these areas would be expected to range from 40 dB_a to 75 dB_a, with occasional upward spikes related to rail and road traffic. A rural home typically has an interior noise level of approximately 40 dB_a when quiet and between 55 dB_a and 60 dB_a when watching television (The Engineering Toolbox, 2007; USEPA, 1974).

3.9.2 Consequences of Proposed Action

Heavy equipment such as bulldozers, graders, backhoes, excavators, dump trucks, and cement trucks would generate noise that could affect the onsite workers. Construction equipment typically emits noise in the 86- to 94-dB range. Construction workers would use hearing protection and would follow OSHA standards and procedures.

Construction sites are located within 1,500 feet of existing buildings, with the closest residence approximately 1,500 feet from the proposed facility. Construction would occur during daylight hours, up to six days a week. Nearby employees and residents could notice

construction-related noise, which would be above background levels but confined to daytime hours. Direct exposure would be temporary, limited to times when personnel were traveling between vehicles and buildings or among buildings. Temporary and minor construction-related noise impacts would occur between fall 2007 and winter 2009.

The chipper that Range Fuels has planned for the facility would be partially enclosed and would be surrounded by a permanent buffer of approximately 91.9 acres of trees to the west, north, and east to reduce the potential noise impacts to the surrounding area. Facility operation would occur around the clock and noise from operations would be fairly continuous with the exception of chipping equipment. Chipping operations would run for 16-18 hours daily and not operate overnight.

Noise levels from facility operation including the wood chipping would be approximately 56 dB_a at 1,500 feet from the chipping operations, absent the buffer of trees (Table 3-3). The nearest off-site receptor is 1,500 feet from the facility and separated by the tree buffer. Pine forest typically reduces noise levels by 5 dB_a per 100 feet, with the reduction diminishing with distance (Aylor, 1972). While the buffer would not be as effective as solid forest, due to the presence of roads which would allow some sound to travel unimpeded, it would cause some reduction in the noise reaching the nearest residence. For analysis purposes, a 5 dB_a reduction (equal to 100 feet of pine forest) is assumed, resulting in outdoor noise levels of 51 dB_a reaching the nearest residence.

TABLE 3-3
Typical Equivalent Sound Levels (dB_a) from Wood Chipping Facilities
Range Fuels EA

Distance (feet)	Sound levels (dB_a) from Partially Enclosed Chipper [a]
200	74
300	70
400	68
500	66
600	64
800	62
1,000	60
1,200	58
1,500	56
2,000	54
2,500	52
3,000	50

[a] Noise levels are uninterrupted direct line of sight with no intervening structures or vegetation
Source: Resource Systems Engineering, 2007

Outdoor conversation typically experiences mild annoyance when noise levels are above 55 dB_a and significant interference with outdoor conversations at 62 dB_a (USEPA, 1974). Because of the intervening tree buffer, outdoor noise levels at the nearest residence would be below the mild annoyance threshold and no adverse impacts to outdoor activity would be expected.

Typical homes have an effective noise attenuation rating of 15 dB_a, making indoor noise less than the corresponding outdoor noise levels (USEPA, 1974). Allowing for the attenuation of noise from the structure of the house, indoor noise levels at the nearest residence would be 36 dB_a. This is within the typical noise level for such a structure during quiet time and well below the indoor noise level when watching television. No adverse impacts to indoor activities would be expected from operation of the facility.

There is one residence along SR 15 that would be passed by trucks delivering feedstock to Range Fuels. This residence would experience 508 truck passes between 6:00 AM and 10:00 PM Monday through Friday and approximately half that on Saturday, between 9:00 AM and 5:00 PM. This equates to one truck every 1.9 minutes during these periods. Typical noise levels for trucks at highway speed (approximately 55 mph) is approximately 90 dB_a. Trucks passing the residence on SR 15 would be traveling at low speed, having just come off I-16 or just starting toward I-16 after turning onto SR 15, so slightly lower noise levels would be typical, but would still be sufficient to interfere with outdoor conversations at the residence and cause annoyance within the house.

Sleep arousal typically occurs from episodic noise that exceeds background sound levels by 15 dB_a (USEPA, 1974). Because the chipper would not be operating overnight and no truck deliveries would occur overnight, the noise level during normal sleep hours would not cause sleep arousal.

3.10 Meteorology

3.10.1 Existing Environment

Treutlen County is characterized by a warm and humid, temperate climate. Average annual temperature ranges from lows of about 53°F to highs of approximately 78°F. Winter months (December through February) are the coolest with average monthly low temperatures ranging from 37° to 39°F and high temperatures range from 63° to 64°F. The warmest months are the summer months of June through August. During those months average monthly low temperatures range from 66° to 70°F and high temperatures range from 91° to 93°F. Average annual precipitation is approximately 46 inches. September and October are the driest months with average rainfall of 2.3 inches. July and August are the wettest months with an average of 4.8 and 5.4 inches respectively (Southeast Regional Climate Center, 2007).

Treutlen County has a low incidence of tornadoes, which is 3.1 times lower than the national average (City-Data.com, 2007). Only one damaging tornado has occurred since 1950. Maximum wind speeds in Treutlen County are between 90 and 100 miles per hour (ALA, 2005a; 2005b). Georgia has not experienced a major hurricane (Category 2 or greater) since before 1900 (geocities.com, 2007). Because Treutlen County is 90 miles west of the Georgia coast, it is unlikely to experience a direct hit from a hurricane because South Atlantic

hurricanes are extremely unlikely to travel west. Hurricanes that hit the Georgia coast usually do so while traveling north. However, Treutlen County does experience heavy rainfall and high winds from tropical systems that strike the Georgia coast (geocities.com, 2007).

3.10.2 Consequences of the Proposed Action

No aspect of the Proposed Action would affect the climate or weather of the region. No impacts to meteorology would be expected to occur under the Proposed Action.

The wind hazard for Treutlen County is rated as moderate because maximum wind speed may exceed 90 miles per hour (ALA, 2005a; 2005b). Heavy rains would not adversely affect Range Fuels' operations. The shipments of feedstock would likely be disrupted during hurricane evacuation from the Georgia coast as I-16 is converted to eastbound-only traffic in all lanes from Savannah to SR 441 near Dublin during these events (Georgia Navigator, 2007). However, due to the low incidence of tornadoes and low frequency of coastal evacuations along the Georgia coast, the potential for severe weather to adversely impact operations at the Range Fuels facility is considered minor.

3.11 Air Quality

3.11.1 Existing Environment

The CAA requires the USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS include two types of air quality standards. Primary standards protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (USEPA, 2006A). USEPA has established NAAQS for six principal pollutants, which are called "criteria pollutants" (Table 3-4).

TABLE 3-4
NAAQS Criteria Pollutants
Range Fuels EA

Pollutant	Primary Standards [a]	Averaging Times	Secondary Standards
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[b]	None
	35 ppm (40 mg/m^3)	1-hour[b]	None
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter PM_{10}	150 µg/m^3	24-hour[b]	Same as Primary
$PM_{2.5}$	15.0 µg/m^3	Annual [c] (Arithmetic Mean)	Same as Primary
	35 ug/m^3	24-hour[d]	Same as Primary
Ozone	0.08 ppm	8-hour[e]	Same as Primary
	0.12 ppm	1-hour[f] (Applies only in limited	Same as Primary

TABLE 3-4
NAAQS Criteria Pollutants
Range Fuels EA

Pollutant	Primary Standards [a]	Averaging Times	Secondary Standards
		areas)	
Sulfur Oxides	0.03 ppm	Annual (Arithmetic Mean)	
	0.14 ppm	24-hour[b]	
		3-hour[b]	0.5 ppm (1300 µg/m^3)

[a] ppm parts per million
µg/m^3 micrograms per cubic meter
[b] Not to be exceeded more than once per year on average over 3 years.
[c] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
[d] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
[e] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
[f] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1, as determined by Appendix H. (b) As of June 15, 2005, EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas

Source: http://www.epa.gov/air/criteria.html (USEPA, 2007b)

Areas that meet the air quality standard for the criteria pollutants are designated as being in attainment. Areas that do not meet the air quality standard for one or more of the criteria pollutants may be subject to the formal rule-making process and designated as being in nonattainment for that standard. Treutlen County is in attainment for all criteria air pollutants, including the new 8-hour ozone standard (USEPA, 2007b). Because the proposed facility would not be built in a criteria air pollutant non-attainment or maintenance area or emit any criteria pollutant in excess of the major source threshold of 100 tpy, a full CAA conformity determination is not required.

The Range Fuels facility would emit approximately 2,375 tpd of CO_2 at full operations. This CO_2 is generated during the gasification step as a result of thermal reactions. Biomass (wood) is chemically comprised of approximately 30% oxygen by weight, incorporated in the molecular structure of cellulose, hemicellulose, and lignin. During the devolatilization step of the gasification process, some of this oxygen combines with the carbon in wood to produce CO_2. Additionally, during the reforming step when volatiles are subjected to higher temperatures, some of this CO_2 reacts with carbon (Boudouard Reaction) to produce CO, which along with H_2 becomes the product "synthesis gas." The CO_2 generated through the thermal reactions represents approximately 20% of the carbon introduced to the process by the feedstock, i.e., the wood chips. The remaining 80% of the carbon ends up as CO in the synthesis gas along with a minor amount (<3%) of CH_4 and ultimately becomes part of the alcohol fuel products or tail gas used as fuel for process heat. The CO_2 leaves the process from two sources; the stripper column after it is absorbed from the raw synthesis gas and flue gases from the burners combusting tail gas.

Combustion of wood chips using EPA's AP-42 emission factors represents a "net zero" emission rate for CO_2. While the Range Fuels process does not combust wood chips (it

gasifies them), the associated CO_2 emission rate is based on an assumption that CO_2 released from wood as a result of burning or other carbon-releasing processes represents no increase in the net amount of CO_2 in the atmosphere. A cycling of carbon between the atmosphere and forests results in no net gain or loss of airborne CO_2. On the other hand, CO_2 from burning petroleum, natural gas, or coal represents an increase in the net amount of atmospheric CO_2 from the introduction of "new" carbon that has been previously sequestered underground for millennia or longer.

3.11.2 Consequences of Proposed Action

During construction, air quality impacts could occur from dust carried offsite and combustive emissions from construction equipment. The primary risks from blowing dust particles relate to human health and human nuisance values. Fugitive dust can contribute to respiratory health problems and create an inhospitable working environment. Deposition on surfaces can be a nuisance to those living or working downwind. Temporary and minor construction-related air quality impacts would occur between fall 2007 and winter 2009.

Impacts to air quality during facility operations were assessed during the new source (construction) permitting process. As part of the application to construct an air emission source, the maximum emission rate of each criteria air pollutant was determined for each air emission source at the plant. The cumulative sum of the emissions from all the sources at the plant, operating at their maximum capacity, determines the facility's potential-to-emit (PTE). The emission rates of the criteria pollutants can be determined by several methods:

- Emission Factor
- Mass Balance
- Engineering Judgment
- Source Testing

The facility would be constructed and would operate initially under an Air Permit to Construct and Operate (Permit Number 2869-283-0005-S-01-0) issued by the EPD, effective June 27, 2007. The majority of the emission calculations included in the air permit to construct application were performed using emission factors developed by EPA and listed in EPA's AP-42 (EPA, Compilation of Air Pollutant Emission Factors, Fifth Ed. 1995). The estimated annual PTE for the criteria pollutants of the Range Fuels facility are listed in Table 3-5. Because the total of any one criteria pollutant is less than 100 tpy, construction of the plant does not trigger more stringent air permitting regulations known as Prevention of Significant Deterioration (PSD). Because PSD is not triggered, no modeling of the criteria pollutants is required. The PTE of the criteria pollutants are projected to be at levels that would not result in exceedances of any of the primary standards. Any impacts from criteria pollutants would be less than significant.

TABLE 3-5
Maximum Annual (PTE) Criteria Pollutant Emissions (maximum operation)
Range Fuels EA

Pollutant	Annual Emissions (tpy)
$PM_{2.5}$	41.2
PM	93.0
NO_x	95.5
SO_x	0.72
CO	86.6
VOC	26.2
HAPs (total)	9.0
HAPs (individual)	all <10

Because toxic air pollutants may potentially have air impacts at very low ambient concentrations, much lower than the NAAQS for the criteria pollutants and the facility would not be a major source, only the air toxics were required to be modeled. The potential impacts of toxic air pollutants were evaluated using the EPD air toxics guidelines to model a predicted ambient air toxics concentration or impact, and compare this modeled result with an USEPA/EPD established acceptable ambient concentration (AAC.) Based on the results of the emissions estimating and modeling to support the EPD Air Permit to Construct, ambient concentrations of all air toxics from the facility during normal operations at maximum production are below the respective AACs for each air toxic (Table 3-6). This demonstrates compliance with EPD's air toxics guidance and a negligible impact on air quality from toxic emissions.

TABLE 3-6
Air Toxics Impact Analysis
Range Fuels EA

Pollutant	Emission Rate		Total Emissions (lb/hr)	Averaging Period	Maximum Predicted Concentration (ug/m^3)	AAC* (ug/m^3)
	5 Conversion Units and 1 Flare (lb/hr)	Total of 5 Units (lb/hr)				
Benzene	1.38E-03	4.12E-04	1.79E-03	Annual	2.44E-04	1.30E-01
				15-minute	4.02E-03	1.60E+03
1,4 Dichlorobenzene	7.89E-04	2.35E-04	1.02E-03	Annual	1.39E-04	8.00E+02
Formaldehyde	4.93E-02	1.47E-02	6.40E-02	Annual	8.70E-03	8.00E-01
				15-minute	1.44E-01	2.45E+02
n-Hexane	1.18E+00	3.53E-01	1.53E+00	Annual	2.09E-01	7.00E+02
			0.00E+00	15-minute	3.44E+00	1.80E+05
Naphthalene	4.01E-04	1.20E-04	5.21E-04	Annual	7.09E-05	3.00E+00
				15-minute	1.17E-03	7.50E+03

TABLE 3-6
Air Toxics Impact Analysis
Range Fuels EA

Pollutant	Emission Rate: 5 Conversion Units and 1 Flare (lb/hr)	Emission Rate: Total of 5 Units (lb/hr)	Total Emissions (lb/hr)	Averaging Period	Maximum Predicted Concentration (ug/m^3)	AAC* (ug/m^3)
Toluene	2.23E-03	6.67E-04	2.90E-03	Annual	3.94E-04	5.00E+03
				15-minute	6.50E-03	5.60E+04

*AAC for annual averaging period obtained from USEPA's Integrated Risk Information System Web Site. AAC for 15-minute averaging period obtained from OSHA/NIOSH STELs or ceiling limits.

The Proposed Action would alter current waste biomass residue management practices in a way that will reduce overall air emissions. Current management practices frequently employ open burning of biomass residue piles as a means of disposal. The collection and use of these biomass residues for process feedstocks by Range Fuels would eliminate this practice. Although the "net zero" CO_2 emission rate would essentially remain the same under this scenario there are other emission issues that are significant. Table 3-7 is representative of types of emission contaminants and their respective amounts from open burning of biomass. In addition to these contaminants other studies have identified Dioxin and mercury emissions resulting from forest fires. Thus, the Proposed Action would reduce the introduction of new carbon into the current atmospheric carbon cycle and eliminate localized pollutants from open burning.

The VOC emissions associated with the operations as described previously are very small. The nearest residents and offsite workers would be at least 1,500 feet from the facility. At this distance combined with the low emission rate, most VOCs would have dispersed into the atmosphere to extremely small concentrations at any atmospheric condition.

Impacts to workers in the Industrial Park or residents of Soperton from odors associated with VOC emissions from the plant are expected to be negligible.

3.12 Waste Management and Hazardous Materials

3.12.1 Existing Environment

Treutlen County has no landfill sites within the county. Solid wastes are collected and transported to the Toombs County Landfill (Treutlen County, 2006). The Toombs County landfill is located approximately 18 miles southeast of the site along SR 29, and has capacity to accept solid wastes for an additional 20 years, and is permitted to accept both solids/sludges and construction/demolition debris (James Thompson, personal communication, August 29, 2007). Toombs County Landfill is licensed for 1,702,689 yd^3 of solids and sludges. The latest EPD Notice of Violation was in November 2004 for violations associated with daily coverings.

TABLE 3-7
Biomass Open Burning Emissions
Range Fuels EA

Species[a]	Field Studies (range)	Lab Studies (range)
CO	65-140	59-105
Methane	6.2-16	11-16
Non-methane HC	6.6-11	3.4-6.8
Nitrous Oxide	0.18-2.2	0.01-0.05
NOx	2.0-8.0	0.7-1.6
Ammonia	0.9-1.9	0.08-2.5
RCN	-	0.24-0.93
SOx	0.1-0.34	-
Carbonyl Sulfide	0.005-0.016	0.02-0.3
Hydrogen	33	-
Ozone	4.8-40	-
Aerosols[b]		
TPM	12-82	-
POC	8-54	-
EC	2-16	-
Potassium	0.24-0.58	-

[a] moles of constituent per 1000 moles CO_2
[b] g/kg C (CO_2)

Source: The MIT Press (1991).

No hazardous waste sites or hazardous materials have been identified on the site of the Proposed Action (Pace Geotechnical, Inc., 2007).

3.12.2 Consequences of Proposed Action

The proposed construction area does not overlie any known hazardous waste sites. No impacts from contaminants would be expected during construction.

Small amounts of potentially hazardous waste materials (e.g. waste oils, lubricants, solvents, cleaners, paints) would be generated during construction and during routine maintenance of the completed facility. Those wastes would be recycled within the process or undergo proper disposal. Organic materials recycled within the process would be subjected to the same devolatilization and reforming unit operation as the wood feedstock and also be thermochemically converted to synthesis gas.

No impacts from hazardous materials would occur during construction of the proposed ethanol production facility.

Spill prevention and containment measures and flare placement have been designed to reduce potential impacts from fuel production, storage and transport.

No hazardous wastes would be generated from process operations. Those operations would generate approximately 50 tons of ash and char per day (17,500 tpy) requiring two to three

truckloads per day to deliver offsite. The Toombs County Landfill has informed Range Fuels that their facilities can accommodate in excess of 20,000 tpy of solid wastes from Range Fuels without impacting their current operations or landfill life expectancy of 20 years (James Thompson, personal communication, 2007). Solid waste from char, ash, and wastewater sludge would not impact solid waste services in the area.

Small amounts of trash and wastes generated from the cafeteria and offices would be collected by Treutlen County for disposal. Once the garbage is collected, it would be taken by the County to the Toombs County Landfill (Treutlen County, 2006). The amount of waste generated would not significantly affect the capacity of the Toombs County Landfill.

The Range Fuels production facility would be located away from all other facilities currently in the Industrial Park and away from any areas where future industrial occupants could place facilities. There is no reasonable potential for hazardous materials at any other facilities to interact with Range Fuels or for materials used at Range Fuels to interact with hazardous materials at other facilities. No interactive impacts from hazardous materials are anticipated from the proposed project.

The Range Fuels' Operations Safety Management System is in development and will be completed prior to commissioning activity. The plans within the Safety Management System will, at a minimum, comply with Process Safety Management Regulation OSHA 29 CFR 1910.119 and will include specific sections on process safety, risk analysis, and impacts to the surrounding facility and community.

3.13 Cultural Resources

3.13.1 Existing Environment

Cultural resources include sites, places, objects, buildings, structures, or districts that are of cultural, historical, archaeological, ethnohistorical, architectural, or of scientific importance. Federal laws and statutes protect such resources and must be addressed when Federally-sponsored, -funded, or –licensed projects could potentially disrupt cultural resources.

To qualify for listing on the National Register of Historic Places (NRHP), a property must have historic significance and integrity and be at least 50 years old. Certain properties are exempt from the 50-year rule if they possess exceptional significance. A property must demonstrate significance in at least one of the following areas:

- Association with events that have made a significant contribution to the broad patterns of our history
- Association with the lives of persons significant in our past
- Embodiment of the distinctive characteristics of a type, period, or method of construction or representative of the work of a master, or possessing high artistic value, or representative of a significant and distinguishable entity whose components may lack individual distinction
- Yielding, or likely to yield, information important in prehistory or history

Historic significance is the importance of a property to a community, state or the nation. In addition to the above criteria, significance is defined by the area of history in which the property made important contributions and by the period of time when these contributions were made (National Register Bulletin 16, 1991).

In addition to having associations that might qualify it for listing on the NRHP, a property must also retain sufficient integrity. Integrity is best described as an historic property's physical features and how these features relate to the property's significance. There are seven components to integrity: location, design, setting, materials, workmanship, feeling, and association. Although integrity can be subjective, in order for a property to be considered historically significant, it must possess several if not all of these seven elements in addition to meeting NRHP criteria.

In July of 2007, Brockington and Associates, Inc. conducted a field survey of the site for the proposed Range Fuels Plant near Soperton, GA. The study area was defined as the Area of Potential Effect (APE). The APE is the area that is potentially impacted physically, visibly, and/or audibly by the undertaking. The APE includes indirect effects from construction, as well as the actual building or construction site. The survey was conducted on behalf of CH2M HILL, Inc. and was conducted in compliance with Section 106 of the National Historic Preservation Act, and 36 CFR Part 800, by personnel qualified under CFR 61, Appendix A.

Background research focused on documenting previously recorded cultural resources, their locations, and developing prehistoric and historic contexts. Background research began with a search of the online Natural, Archaeological, and Historic Resources GIS (NARHGIS) database maintained by the DNR for previously recorded archaeological sites and historic structures within 1.6 kilometer(km) (1 mile) of the APE. A review of the cultural resource files and other relevant information was conducted at the DNR, Historic Preservation Division (HPD) in Atlanta. Historic maps, county histories, and reports of previous investigations in the area were also reviewed.

Research found only one previously recorded archaeological site (9TU20) within a 1.6-km (1-mile) radius of the project tract. Site 9TU20 consists of a small scatter of lithics and ceramics. The site was recorded by Garrow and Associates, Inc., in 2000 and was found to not be eligible for nomination to the NRHP. No previously recorded historic structures or other architectural resources were identified within 1.6 km (1 mile) of the field survey.

During this survey 622 screened shovel tests were spaced at 30-meter (100-foot) intervals along 79 transects places throughout the tract according to landforms, wetlands, and disturbance patterns. A visual inspection of all exposed ground surfaces was also conducted. Four archaeological sites and one isolated find were identified during the field survey (Appendix F).

During the structures survey, no intact structures older than 50 years were identified within the project area. There are the remains of an old farmstead and barn, but both are in such dilapidated condition that they are only considered as an archaeological resource. Additionally, no structures which appeared to be older than 50 years were within the project's APE. There are a few older structures along SR 15 and SR 29; however, they lie

outside of the project's APE. These structures are buffered from the project area by swampland. Therefore, they were not included in this study.

3.13.2 Consequences of Proposed Action

Based on a review of national, state, and local sources of information, and a field survey by qualified archeologists, there appear to be no NRHP eligible cultural resources that would be affected by the Proposed Action. The SHPO has concurred with the report findings and a copy of the concurrence is included in Appendix G.

In the event that cultural deposits (human remains, trash pits, lithics, pottery, remnants of older construction, etc.) are discovered during construction of the project, work would cease in the area of discovery, and HPD would be notified. An HPD archaeologist or a designated representative would evaluate any such discovery, and, in consultation with SHPO, complete proper mitigation measures before construction activities resume.

3.14 Transportation

3.14.1 Existing Environment

The Range Fuels facility site is approximately 2 miles northwest of the town of Soperton in and immediately north of the Soperton Industrial Park. The Soperton Industrial Park is located on Commerce road between SR 29 and SR 15 and along a Georgia Central Railways local line.

The Georgia Central Railways local line runs along the southwestern boundary of the Treutlen County Industrial Park. This line transports goods and materials to a mainline junction in Dublin. There is no train service on weekends and the rail line does not support passenger service. The train makes one stop daily, Monday through Friday, at the Industrial Park to pick up shipments from the carpet backing facility located to the southeast of the planned Range Fuels facility.

Approximately 3 miles north of the Soperton Industrial Park, there is an exchange from SR 15 onto the main interstate route serving the area, I-16. The most direct route from I-16 to the proposed site is via SR 15 to Commerce Drive. However, SR 29 provides an alternate route to the site from I-16 and some traffic originating west of Soperton travels via SR 29.

SR 15 is a North-South rural arterial between Soperton and I-16. The roadway consists of two twelve foot travel lanes, two foot paved shoulders, one foot grass shoulders and ditches. The I-16 SR 15 interchange is a typical four-ramp intersection with relatively small turning radii on each corner.

The recent traffic history for SR 15 between the interstate and County Road 94, where the bulk of the truck traffic related to Range Fuels would occur, shows no essential growth over the last ten years based on Average Annual Daily Traffic (AADT), with a general decline over the past three years (Table 3-8). The traffic capacity of this section of SR 15 for its given level of service is 1,600 vehicles per hour in each direction (Transportation Research Board, 2000). Over the past 10 years, AADT on this section of SR 15 has not exceeded 2,040 AADT. For rural roads, one tenth of the AADT is considered the peak hour rate of use in each direction. For this section of SR 15, the peak hour use over the past ten years would be 204

vehicles in each direction, which is 12.75 percent of the capacity of SR 15 for its given level of service.

TABLE 3-8
Average Annual Daily Traffic and Percent of Capacity for State Route 15 for the Period 1997 – 2006.
Range Fuels EA

Year	Average Annual Daily Traffic	Percent of Capacity at Peak Hour [a]
1997	1,444	9.03%
1998	2,009	12.55%
1999	1,601	10.00%
2000	2,040	12.75%
2001	1,888	11.80%
2002	1,876	11.73%
2003	1,650	10.31%
2004	1,540	9.63%
2005	1,320	8.80%
2006	1,470	9.80%

[a] Capacity is based on current level of service and is 1,600 vehicles per hour in each direction for SR 15.
(Source, GDOT, 2006)

SR 29 is a North-South rural arterial between Soperton and I-16. The roadway consists of two 12-foot travel lanes, 2-foot paved shoulders, 1-foot grass shoulders, and ditches. The intersection used to access State Route 29 is a "Y" intersection with the acute angle near 45 degrees (45°) and a large turning radius on the northern corner.

The recent traffic history for SR 29 shows generally stable traffic over the past ten years with a slight overall increase during the period (Table 3-9). The traffic capacity of SR 29 for its given level of service is 1,600 vehicles per hour in each direction (Transportation Research Board, 2000). Over the past 10 years, AADT on this section of SR 29 has not exceeded 3,890 AADT. For rural roads, one tenth of the AADT is considered the peak hour rate of use in each direction. For this section of SR 29, the peak hour use over the past 10 years would be 389 vehicles in each direction, which is 24.31 percent of the capacity of SR 29 for its given level of service.

TABLE 3-9
Average Annual Daily Traffic and Percent of Capacity for State Route 29 for the Period 1997 – 2006.
Range Fuels EA

Year	Average Annual Daily Traffic	Percent of Capacity at Peak Hour [a]
1997	3,328	20.72%

1998	3,116	19.47%
1999	2,484	15.53%
2000	3,420	21.38%
2001	3,676	22.98%
2002	3,693	23.08%
2003	3,890	24.31%
2004	3,400	21.25%
2005	3,110	19.43%
2006	3,460	21.63%

[a] Capacity is based on current level of service and is 1,600 vehicles per hour in each direction for SR 15.
(Source, GDOT Annual Coverage Counts)

3.14.2 Consequences of Proposed Action

Rail Traffic

There would be no change in the number of trains passing through the Soperton Industrial Park as a result of the Range Fuels facility. Twice a week, the train would deliver empty tanker cars to Range Fuels and pick up loaded tankers to deliver product to customers. Because there would be no increase in the number of trains and only additional cars dropped off and picked up, any impacts on rail service would be minor. Because there would be no increase in the number of trains and only a maximum addition of 9 railcars per week, any impacts on road traffic from delays at at-grade road crossings would be minor.

Car/Truck Traffic

The potential for impacts to traffic would occur during construction and operation of the Range Fuels Facility. The traffic analysis is based on the following assumptions:

- The chipping facility would receive deliveries Monday through Friday from the hours of 6:00 A.M. to 10:00 P.M. and for half a day on Saturday.
- The maximum AADT for SR 15 and SR 29 over the past ten years are used as the baseline traffic level to provide a conservative prediction.
- There will be 290 construction workers and 70 production facility employees.
- All workers will work every day.
- Facility employee and construction worker traffic will be divided equally between SR 15 and SR 29, to provide a conservative estimate as there are two other routes of travel available to workers.
- Each construction worker will drive a vehicle to and from work.

- Each facility employee will drive a vehicle to and from work.
- All traffic during construction would occur within a 12-hour period each day.
- All traffic during operation would occur within the 16-hour period each day when feedstock deliveries would be made.
- During operation, one general delivery truck (office supplies, soft drinks/snacks, janitorial supplies) will make a round trip to Range Fuels each day during the week.
- Catalyst will be delivered once per quarter plus one additional delivery for back-up during construction.
- Catalyst, which is projected to have a 5-year operational life, will be delivered once every four years during operation.
- General deliveries will be divided equally between SR 15 and SR 29.

During construction of the Range Fuels facility, there will be an additional 300.015 vehicles per day traveling to and from on SR 15, an increase of 14.71 percent in traffic load from baseline conditions (Table 3-10). During construction, an additional 300.20 vehicles per day would travel to and from Range Fuels on SR 29, an increase of 7.71 percent in traffic load from baseline conditions (Table 3-10). The capacity for each of these roads is 19,200 vehicles direction in a 12-hour construction day. Total traffic volume on SR 15 would be 12.19 percent of capacity during construction, while SR 29 would experience 21.83 percent of capacity during construction (Table 3-10). Additionally, a temporary interruption of traffic flow would be expected during the upgrade of the gas line in downtown Soperton.

When the Range Fuels facility is fully operational, there will be an additional 579.0007 vehicles per day traveling to and from on SR 15, an increase of 23.38 percent in traffic load from baseline conditions (Table 3-10). During operation, an additional 84 vehicles per day would travel to and from Range Fuels on SR 29, an increase of 2.13 percent in traffic load from baseline conditions (Table 3-10). The capacity for each of these roads is 25,600 vehicles direction in the 16-hour period when feedstock deliveries would occur, which will be the heaviest traffic period. Total traffic volume on SR 15 would be 10.23 percent of capacity during operation, while SR 29 would experience 15.52 percent of capacity during operation (Table 3-10).

The proposed facility will have 12 trucks a day (projected) using SR 29 for access. This will average one truck per hour and possibly 3 trucks in the peak hour. The impact to the capacity of this roadway would be an increase of 0.2 percent. This would elevate the roadway from 21.8 to 22 percent of capacity.

The analyses above indicate that the roadway capacity of both routes (SR 15 and SR 29) is well below existing capacity and the projected increase in traffic during construction and operation of the facility would remain well below the capacity of these roads. Impacts to traffic flow from construction and operation of the Range Fuels facility would be less than significant.

TABLE 3-10
Analyses for Construction and Production Traffic at Range Fuels Facility
Range Fuels EA

Traffic Source	Construction Traffic (Vehicles Per Day)		Production Traffic (Vehicles Per Day)	
	SR 15	SR 29	SR 15	SR 29
Background (AADT)	2,040	3,890	2,040	3,890
General Delivery Trucks	10	10	1	1
Catalyst Trucks	0.015	0	0.0007	0
Workers	290	290	70	70
Product Shipment Trucks	0	0	0	3
Shipments to Solid Waste Landfill or Sod Farm	0	0.20	0	10
Feedstock Delivery Trucks	0	0	508	0
Projected Increase (Number of Vehicles)	300.015	300.20	579.0007	84
Percent Change	14.71%	7.71%	28.38%	2.16%
Total Projected Traffic (Number of Vehicles)	2,340.015	4,190.20	2,619.0007	3,974
Capacity (Number of Vehicles)	19,200	19,200	25,600	25,600
Percent of Capacity	12.19%	21.83%	10.23%	15.52%

Range Fuels would purchase a 250 feet wide corridor of land for the new connecting truck route. Accounting for 24 feet of road bed and 80 feet of ROW, 75 feet of undisturbed buffer on either side of the ROW would prevent future development of residences along this road. This would minimize the long-term potential for local traffic to interact with the truck deliveries.

3.15 Utility Infrastructure

3.15.1 Existing Environment

3.15.1.1 Natural Gas

Natural Gas pipelines, supplied by Atlanta Gas Light, currently run immediately adjacent to Commerce Drive along a portion of the southern border of the parcel for the proposed plant. Additional four inch lines would be installed by Atlanta Gas Light along Commerce Drive and onto the Range Fuels facility.

3.15.1.2 Potable Water

Range Fuels has a signed Memorandum of understanding with the Soperton Municipal Water Supply to receive up to 0.72 mgd of municipal water. Four-inch water lines are in

place in the Industrial Park to provide potable and process water and fire protection for planned industrial development.

3.15.1.3 Wastewater

The City of Soperton WWTP receives flow from the sewer system installed in the Industrial Park. The City has indicated that its WWTP has between 0.1 and 0.2 mgd of available capacity to process wastewater from Range Fuels.

3.15.1.4 Power

Regionally, the existing power infrastructure is adequate to support the requirements of the proposed plant. No power lines are currently on the site and a 115 kV to 25 kV substation must be built on-site to accommodate the Range Fuels project. New 115 kV transmission lines would have to be constructed to connect the substation to the electrical power grid.

3.15.2 Consequences of Proposed Action

3.15.2.1 Natural Gas

Natural gas would be required to provide initial heat to the conversion and catalytic units during cold starts and until tail gas can be generated from the conversion process and subsequently substituted for the natural gas. This is expected to occur four times a year at 20 hours per start. Approximately 18 MMBtu/hr of heat is required for each event. Averaging this heat load on a daily basis requires approximately 3,900 ft^3/day of natural gas.

Natural gas service would require a new tap to the existing gas line along Commerce Drive. Because the right-of-way runs immediately adjacent to the proposed site, environmental impacts associated with establishing gas service on the site would be minimal and short term. Atlanta Gas Light has indicated that before service can be established to the Range Fuels facility, there is a section of undersized gas lines in downtown Soperton that would need to be replaced. As a result, residents may experience a temporary rerouting of traffic through town and a possible temporary loss of gas service during the upgrade.

3.15.2.2 Potable Water

Municipal water supply has been installed on the site. The Range Fuels facility would require 0.005 mgd (5,000 gpd) of municipal water for potable and sanitary uses. The Soperton municipal water supply can provide up to 0.72 mgd of municipal water to the facility and the anticipated daily need is less than one percent of that amount. The treated water demand is within the capacity of the Soperton Municipal Water Supply and the delivery infrastructure. Any impacts would be negligible as there would be no impacts on other users.

3.15.2.3 Wastewater

The 0.005 mgd (5,000 gpd) of sanitary wastewater would be sent to the Soperton WWTP during all phases of operation. This small volume would not impact other users.

Process wastewater would be routed to the onsite WWTP. Range Fuels would obtain a permit to discharge some process wastewater (0.043 mgd or 30 gpm) to the City of Soperton WWTP. This increased load would consume approximately half of the available capacity of the

system, but would not impact current users. Impacts to new users would be minor, as the increase would possibly limit their ability to use the Soperton WWTP.

At completion of construction in January 2009, Range Fuels' onsite WWTP plant with capacity to treat the entire daily process wastewater stream (approximately 0.864 mgd or 864,000 gpd). The treated wastewater would then be recycled on-site as process water as much as possible or discharged to surface water under an individual NPDES Industrial Wastewater Permit. Range Fuels would obtain an individual NPDES Industrial Wastewater Permit from EPD and comply with the limits established in that permit prior to discharging from the onsite WWTP.

3.15.2.4 Power

The new substation and lines would not adversely impact electrical power in the region and could result in improved local service through re-distribution of power transmission.

3.16 Aesthetics

3.16.1 Existing Environment

The proposed location of the Range Fuels facility is predominately within an existing Industrial Park containing seven current businesses. Most of the buildings in the Industrial Park have metal exteriors, with the exception of the Easter Seals and County Training facilities, which have brick facades. None of the existing buildings in the Industrial Park exceed 35 feet in height. There is a water tower located in the Industrial Park that is approximately 120 feet tall. The proposed locations of the production facility, administrative offices, electrical substation, firewater pond, and spray pond are within currently cleared areas with unimproved dirt roads and located at the highest topographical point in the Industrial Park. A forested strip passes through these areas from the northeast to the southwest, following a stream corridor. The immediate surrounding land includes developed Industrial Park with existing roads and railroads, agricultural fields and planted pine plantation. The chipper would be placed adjacent to the production facility in an area that is wooded.

3.16.2 Consequences of Proposed Action

The proposed plant and support facilities would be sited to minimize visibility to all but the neighboring businesses. The proposed plant would not be readily visible from the closest residences, which are south and west of the proposed site. The height of the plant's structures would not exceed 100 feet, which would minimize their visibility to even the closest neighbors. The proposed plant would operate around the clock. Facility and security lighting would be an unavoidable, long-term, adverse impact to views of the night sky in the immediate vicinity of the proposed plant. The power substation would be located in the southwest portion of the site on the south side of Commerce Drive, and would be visible to drivers on Commerce Drive. Any aesthetic impacts would be minor, and the perception of any impacts would decrease with passing time as the community becomes accustomed to the presence of the facility.

Any aesthetic impacts from the 115 kV transmission lines that would connect the new substation with the electric power grid cannot be predicted at this time. Georgia Power has not completed siting analysis for the line route at this time. It is reasonable to expect a slight negative impact to aesthetics from conversion of some amount of forested land to electric transmission right-of-way.

The land cleared for the chipper is not visible from off the property. Clearing for and construction/operation of the chipper would not impact local aesthetics.

Efforts would be made to landscape the site with plants native to the upper Atlantic Coastal Plain and to maintain or improve the plant diversity on the site. This landscaping plan would reduce watering required to maintain the planned landscape around the facility.

3.17 Socioeconomic Factors

3.17.1 Existing Environment

3.17.1.1 Economy

Treutlen County is a rural county and has not been experiencing rapid growth in recent years. The county is not within any defined metropolitan statistical area. The 2006 estimate of the county population was 6,852, which represented a decrease of two individuals from the 2000 census. By comparison, the State of Georgia had undergone a population increase of 14.4 percent in the same time period (US Bureau of Census, 2007). Since 1980, Treutlen County has grown by 12.6 percent, compared to a 50 percent growth rate for Georgia as a whole (Table 3-11). During this same period, the population of Soperton has declined slightly.

TABLE 3-11
Population Changes for Treutlen County, Soperton, Georgia, and the United States: 1980 – 2006
Range Fuels EA

Political Unit	1980 Population	1990 Population	1980-1990 % Change	2000 Population	1990-2000 % Change	2006 Population	2000-2006 % Change	1980-2000 % Change
Treutlen County	6,087	5,994	-1.5	6,854	14.3	6,852	-0.03	12.6
Soperton	2,981	2,797	-6.2	2,824	1.0	2,921	3.4	-5.3
Georgia	5,462,989	6,478,216	18.6	8,186,453	27.0	9,363,941	14.4	50.0
United States	224,810,192	248,709,873	10.6	281,421,906	13.2	299,398,484	6.4	25.2

Source: US Bureau of Census (2007) and Treutlen County (2006).

The home ownership rate was slightly above the state average, at 74.8 percent compared to 67.5 percent statewide. However, property values were well below the state average with the median value of owner-occupied homes at $56,000 compared to a state average of $112,000 (US Bureau of Census, 2007).

The County's labor force numbers 2,545 civilian persons and there is no military labor force in Treutlen County. Employment has grown from 1,726 workers in 1980 to 2,307 in 2006.

Total earnings increased (in constant 1996 dollars) from $27.2 million in 1980 to $34.2 million in 2000. While the trend has shown growth, it has remained substantially lower than state or national growth. From 1980 to 2000, Treutlen County's total employment grew approximately 6 percent and total earnings increased by 25.6 percent, well below the rates for the U.S. (45.5 percent employment and 75.9 percent earnings) and Georgia (76.9 percent employment and 141.2 percent earnings) (Treutlen County, 2006). In the immediate past, growth has been very slow, with only two building permits issued in 2005, the most recent year for which data are available (U.S. Bureau of Census, 2007).

3.17.1.2 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. “Fair treatment” means that no group, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the adverse environmental consequences resulting from industrial, municipal, or commercial operations or the execution of Federal, state, local, and tribal programs and policies.

In February 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629 (1994)). This order directs federal agencies to incorporate environmental justice as part of their missions. Federal agencies are specifically directed to identify and, as appropriate, to address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The CEQ has issued guidance to federal agencies to assist them with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (CEQ, 1997). In this guidance, the Council encouraged Federal agencies to supplement the guidance with their own specific procedures tailored to particular programs or activities of an agency. DOE has prepared a document titled Draft Guidance on Incorporating Environmental Justice Considerations into the Department of Energy’s National Environmental Policy Act Process (DOE, 2000). The draft guidance is based on Executive Order 12898 and the CEQ environmental justice guidance. Among other things, the DOE draft guidance states that even for actions that are at the low end of the sliding scale with respect to the significance of environmental impacts, some consideration (which could be qualitative) is needed to show that DOE considered environmental justice concerns. DOE needs to demonstrate that it considered apparent pathways or uses of resources that are unique to a minority or low-income community before determining that, even in light of these special pathways or practices, there are no disproportionately high and adverse impacts on the minority or low-income population.

The Proposed Action would be located within Census Tract (CT) 9602 and Block Group (BG) 2. Adjacent CTs include 9510 (BG 2), 9601 (BG 2), and 9602 (BGs 1, 3, and 5). CT 9602 BG 2 has a 37.8 percent minority population (Table 3-11), which is higher than adjacent CT 9510 (8.3 percent), CT9601 (6.8 percent), and CT 9602 BG 1 (22.8 percent). The minority population of CT 9602 BG 3 (34.2 percent) is comparable to CT 9602 BG 2. Adjacent CT 9602 BG 5 (50.9 percent) has a higher minority percentage than CT 9602 BG 2. The Hispanic

population for the Proposed Action CT/BG is 2.2 percent and is comparable to the adjacent CTs and BGs, which range from 0.3 percent to 2.1 percent (Table 3-12).

TABLE 3-12
Race, Ethnicity, and Poverty Data for the Proposed Action Census Block and Adjacent Census Tracts
Range Fuels EA

Race	Proposed Action Block Group 2, Census Tract 9602	Block Group 2, Census Tract 9510	Block Group 2, Census Tract 9601	Block Group 1, Census Tract 9602	Block Group 3, Census Tract 9602	Block Group 5, Census Tract 9602
White alone	432	704	657	767	845	855
Black or African American alone	253	60	48	211	425	869
American Indian and Alaska Native alone	0	1	0	0	1	3
Asian alone	4	0	0	3	3	1
Native Hawaiian and Other Pacific Islander alone	0	0	0	0	0	0
Some other race alone	1	3	0	2	4	3
Two or more races	4	0	0	11	7	10
Total Population	694	768	705	994	1285	1741
Hispanic [a]	15	2	15	3	8	27
Minority Population	37.8%	8.3%	6.8%	22.8%	34.2%	50.9%
Hispanic Population	2.2%	0.3%	2.1%	0.3%	0.6%	1.6%
Income below poverty level						
Total in Census Tract	113	103	119	284	305	394
% of population below poverty level	16.0%	13.7%	16.9%	30.0%	23.1%	26.6%

Source: U.S Census Bureau, 2000 Census a

[a] Hispanic: The 2000 Census included a category for Hispanic or Latino. This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories such as "Mexican," Puerto Rican," or "Cuban," as well as those who indicate that they are "other Spanish, Hispanic, or Latino." Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

CT 9602 BG 2 has a 16 percent of its population below the poverty level, which is slightly higher than the adjacent CT 9510 (13.7 percent), and lower than CT 9601 (16.9 percent), CT 9602 BG 1 (30.0 percent), CT 9602 BG 3 (23.1 percent), and BG 5 (26.6 percent) (Table 3-12).

CT 9602 BG 2 (37.8 percent) has a comparable percentage of minority residents compared to Treutlen County (34.3 percent) and the State of Georgia (34.9 percent), but it has a lower percentage of minority residents than the City of Soperton (53.3 percent) (Table 3-13). The Hispanic population of CT 9602 BG 2 (2.2 percent) is slightly higher but comparable to the City of Soperton (0.9 percent) and Treutlen County (1.2 percent). The percent of the population classified as below the poverty level in CT 9602 BG 2 (16 percent) is slightly

higher than that in the State of Georgia (13 percent), and lower than the City of Soperton (31.7 percent) and Treutlen County (26.3 percent) (Table 3-13).

TABLE 3-13
Race, Ethnicity, and Poverty Data for the Proposed Action Census Block, City of Soperton, Treutlen County, and State of Georgia
Range Fuels EA

Race	Proposed Action Block Group 2, Census Tract 9602	Soperton, Georgia	Treutlen County, Georgia	Georgia
White alone	432	1318	4501	5,327,281
Black or African American alone	253	1464	2269	2,349,542
American Indian and Alaska Native alone	0	1	4	21,737
Asian alone	4	10	18	173,170
Native Hawaiian and Other Pacific Islander alone	0	0	0	4,246
Some other race alone	1	11	22	196,289
Two or more races	4	20	40	114,188
Total Population	694	2824	6854	8,186,453
Hispanic [a]	15	26	79	435,227
Minority Population	37.8%	53.3%	34.3%	34.9%
Hispanic Population	2.2%	0.9%	1.2%	5.3%
Income below poverty level				
Total in Census Tract	113	868	1,709	1,033,793
% of population below poverty level	16.0%	31.7%	26.3%	13.0%

Source: U.S Census Bureau, 2000 Census a

[a] Hispanic: The 2000 Census included a category for Hispanic or Latino. This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories such as “Mexican,” Puerto Rican,” or “Cuban,“ as well as those who indicate that they are “other Spanish, Hispanic, or Latino.” Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

The counties surrounding Treutlen County (Johnson, Laurens, Wheeler, Montgomery, Toombs, and Emanuel) have minority populations between 30.3 percent and 37.6 percent of the population (Table 3-14). The minority population of CT 9602 BG 2 (37.8 percent) is slightly than but comparable to that in the surrounding counties. The Hispanic population for the surrounding six counties ranged from 0.9 percent to 8.9 percent of the population, which is comparable to or slightly exceeds that of CT 9602 BG 2. The percentage of the population below the poverty level in the surrounding six counties ranged from 18.4 percent to 27.4 percent, which all exceed that found in CT 9602 BG 2 (16 percent).

TABLE 3-14
Race, Ethnicity, and Poverty Data for Proposed Action, Treutlen County and Adjacent Counties
Range Fuels EA

Race	Proposed Action Block Group 2, Census Tract 9602	Treutlen County	Johnson County	Laurens County	Wheeler County	Montgomery County	Toombs County	Emanuel County
White alone	432	4,501	5,345	28,469	3,989	5,766	18,029	13,909
Black or African American	253	2,269	3,164	15,494	2,050	2,253	6,296	7,267
American Indian and Alaska Native	0	4	11	89	8	6	54	30
Asian	4	18	10	361	6	16	122	53
Native Hawaiian and Other Pacific Islander	0	0	1	13	0	2	2	1
Some other race	1	22	6	178	77	176	1,392	465
Two or more races	4	40	23	270	49	51	172	112
Total Population	694	6,854	8,560	44,874	6,179	8,270	26,067	21,837
Hispanic [a]	15	79	78	529	219	271	2,310	745
Minority Population	37.8%	34.3%	37.6%	36.6%	35.4%	30.3%	30.8%	36.3%
Hispanic Population	2.2%	1.2%	0.9%	1.2%	3.5%	3.3%	8.9%	3.4%
Income below poverty level								
Total in Census Tract	113	1,709	1,800	8,035	1,289	1,485	6,098	5,812
Population Below Poverty Level	16.0%	26.3%	22.6%	18.4%	25.3%	19.9%	23.9%	27.4%

Source: U.S Census Bureau, 2000 Census b
[a] Hispanic: The 2000 Census included a category for Hispanic or Latino. This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories such as “Mexican,” Puerto Rican,” or “Cuban,“ as well as those who indicate that they are “other Spanish, Hispanic, or Latino.” Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

3.17.1.3 Protection of Children

DOE follows the guidelines specified for the protection of children in EO 13045 – *Protection of Children from Environmental Health Risks and Safety Risk* (Federal Register: April 23, 1997,

Volume 62, Number 78). This EO requires that federal agencies make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that policies, programs, and standards address disproportionate risks to children that result from environmental health or safety risks.

There are fewer children, as a percentage of the population, in Treutlen County than in the rest of Georgia, although it is near the state average. Treutlen County has 24.7 percent of the population under the age of 18 compared to the Georgia average of 26 percent. There are no areas, such as schools or libraries, within or adjacent to the project site where children would congregate.

3.17.2 Consequences of Proposed Action

The cellulosic ethanol facility would be expected to employ 70 people when construction of all project components is complete and maximum operation is achieved. In addition, full operation of the facility would result in an increase in the level of truck transport in the region, which would further enhance the local economy by providing a greater level of employment for persons in the trucking industry and also through the increased secondary spending that would be made by Range Fuels employees and truckers and their families.

Construction of a plant for cellulosic ethanol production in Treutlen County would create a one-time economic impact leading to $19.5 million in labor income for 489 jobs in Georgia. At full production, the plant would create an annual $105.7 million output impact in Treutlen County. Total labor income of $5.8 million would be created annually for 194 jobs in the county, including plant workers and secondary jobs created as a result of the plant. Local governments in the county would receive $498,781 annually in tax revenues due to ethanol production, not including taxes on ethanol sales (Flanders and McKissick, 2007; provided as Appendix H).

Regional impacts for an area of 18 counties including Treutlen County lead to a labor income impact of $13.6 million for 432 jobs in the region. Production at the plant would generate a total output impact of $150.3 million for the state economy. Employees in Georgia would earn $17.6 million in wages and benefits for 444 jobs. The state treasury would receive $1.6 million annually, and local treasuries throughout the state would receive $1.3 million from operations related to ethanol production (Flanders and McKissick, 2007).

Construction of phase 1 is planned to begin in the fall of 2007 and would be complete by the fall of 2008. Completion of the final phase of the project is estimated for the winter of 2009. The construction industry is the largest employer in Treutlen County (City-Data.com, 2007). Range Fuels will use local labor force to complete construction and supplement the local labor force with a temporary workforce, as needed. Nearby metropolitan areas, including Savannah, Dublin, and Macon have sufficient labor pools to support construction. It is anticipated that a portion of the temporary workforce would commute, and the remainder would make of use local trailer/recreational vehicle camps for temporary housing during construction. There would be a short-term boost to the local economy resulting from purchases of materials and supplies for the construction effort and also from secondary spending. There would be a minor increased demand on police and fire services from temporary residents.

At the start of production, there would not be a sufficient process in place to ship all the required logging residue and unmerchantable timber to Range Fuels from within the Soperton region. During the period when this process is being developed, Range Fuels may augment feedstock with merchantable pulpwood. This could be a short-term minor impact on pulpwood supplies and other forest industries in the region, depending on market demand for softwood pulp at the time production begins. Long-term, the Soperton area (within 40 miles) has the capability to provide sufficient feedstock for full operation of the Range Fuels facility from logging residues and unmerchantable timber.

Within a 40-mile radius of Soperton, current harvest levels would make 574,500 tpy of logging residues available as feedstock for Range Fuels (General*Bioenergy, 2005). An additional 465,000 tpy of unmerchantable pine timber also would be available for use as feedstock, assuming a 30-year rotation (General*Bioenergy, 2005). In Georgia, timber and pulp rotations typically occur on 20-year or 30-year rotations. The 20-year rotation produces less merchantable timber and approximately 1.5 times as much unmerchantable timber compared to the 30-year rotation (General*Bioenergy, 2005). Based on the conservative estimate of a 30-year rotation, the amount of logging residues and unmerchantable pine available within 40 miles of Soperton exceeds the maximum need of Range Fuels by 163,500 tpy.

Based on the minority populations for the adjacent CT 9602 BG 1 (22.8 percent), BG 3 (34.2 percent), and BG 5 (50.9 percent), City of Soperton (53.3 percent), Treutlen County (34.3 percent), State of Georgia (34.9 percent), and the surrounding counties' average (34.1 percent), no disproportionately high percentage of minority residents would be directly impacted by construction and operation of the proposed project. Soperton contains a minority population, but Soperton is not immediately adjacent to the facility site. The distance separating the cellulosic ethanol facility from the population of Soperton would prevent any disproportionate adverse impacts to this minority population. Additionally, the economic benefits of the facility to the county which were discussed above would likely also benefit the minority population of Soperton to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

Treutlen County and the City of Soperton have a meaningfully higher percentage of individuals below the poverty level than that of the general population of Georgia. The poverty level for CT 9602 BG 2 is only slightly higher than the adjacent CT 9510 and the State of Georgia; however, it is lower than in other adjacent CTs and BGs, the surrounding counties, and City of Soperton. Therefore, no disproportionately high percentage of low income residents would be impacted by the Proposed Action. In addition, because the cellulosic ethanol facility would be located away from any concentration of residences, its construction and operation would not adversely affect any economic subgroup. As has been shown in previous sections, there are only minor adverse environmental impacts associated with the Proposed Action, and none of these impacts would disproportionately impact minority or low income populations. The economic benefits of the facility to the county, which were discussed above, would likely also benefit those currently living below the poverty level to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

Because the cellulosic ethanol facility would be located away from any concentration of residences or any areas where children would congregate, its construction and operation would not pose direct environmental health and safety risks to children in Treutlen County or in Soperton. There are only minor adverse environmental impacts associated with the Proposed Action and none of these minor impacts would create any environmental health and safety risks to children. Additionally, the new EMS facility would enable faster response times north of the railroad and would reduce risks to children.

The proposed plant would be a positive economic stimulus to Treutlen County and the local economy. Any adverse human health and environmental consequences from the Proposed Action would not be borne disproportionately by minority or low-income groups. There would be no increased environmental health and safety risks for children.

3.18 Cumulative Impacts of the Proposed Action

No large projects have occurred in the region or the Industrial Park and none other than the Range Fuels project are planned. The past, present, and reasonably foreseeable actions in the region that could interact with the Proposed Action and generate cumulative impacts are limited to other businesses in the Soperton Industrial Park, regional pine harvest and use, and other ongoing actions in Treutlen County.

The consumption of wood and water are the primary avenues for cumulative impacts associated with the Proposed Action. Woody material and groundwater used by Range Fuels would not be available to other potential users and could constrain future development.

Range Fuels would require a maximum of 0.3168 mgd (316,800 gpd) from the Floridan aquifer at full production and would obtain a water withdrawal permit from EPD for use of up to that amount. The Range Fuels withdrawal would not affect other existing withdrawals from the aquifer.

Range Fuels would require 875,000 tpy (dry weight) of harvested pine (either unmerchantable or merchantable) and logging residues at full operation. Typical logging residues remaining after harvest in Georgia is 21 tons per acre (General*Bioenergy, 2005). At present only 5 percent of logging residues are used, leaving an average of 20 tons per acre of waste material that would be available as feedstock (General*Bioenergy, 2005).

Within a 40-mile radius of Soperton, current harvest levels produce 574,500 tpy of logging residues which would be available as feedstock for Range Fuels (General*Bioenergy, 2005). An additional 465,000 tpy of unmerchantable pine timber also would be available for use as feedstock, assuming a 30-year rotation (General*Bioenergy, 2005). In Georgia, timber and pulp rotations typically occur on 20-year or 30-year rotations. The 20-year rotation produces less merchantable timber and approximately 1.5 times as much unmerchantable timber compared to the 30-year rotation (General*Bioenergy, 2005). Based on the conservative estimate of a 30-year rotation, the amount of logging residues and unmerchantable pine available within 40 miles of Soperton exceeds the maximum need of Range Fuels by 163,500 tpy.

At current pine harvest levels there would be enough annual production of pine logging residues and unmerchantable timber in the immediate Soperton area to supply Range Fuels needs. Sources of available feedstock material are not limited to the 40-mile radius and the logistics of harvest and transport may require that Range Fuels purchase from outside of the 40-mile radius. The cost to obtain feedstock would increase as the distance from the Range Fuels facility increases, which would ultimately bound the potential feedstock service area. However, as the area of supply increases, there would be more potential feedstock available and the potential for impacting other forest industries would be lessened.

The dedicated truck route connecting SR 15 to Old Dairy Road allows the bulk of the truck traffic associated with the Range Fuels facility to avoid negative interaction with truck deliveries to other business that may locate in the Industrial Park. The primary routes of travel to and from other lots in the Industrial Park would remain free of this traffic. By purchasing the buffer along the connecting truck route, Range Fuels has prevented future residential development along the road corridor and minimized the potential for local traffic to be negatively impacted by the feedstock delivery trucks in the future.

The new fire and EMS facility would provide services to all Industrial Park tenants and also to residents of Treutlen County. This facility would be located near the proposed facility north of the local railroad line, providing the area with emergency responders.

3.19 Consequences of the No Action Alternative

Under the No Action Alternative, the Range Fuels facility would not be constructed, there would be no new electrical substation and transmission lines, there would be no new road connecting SR 15 with Old Dairy Road and no paving of currently unpaved roads, and DOE would not provide any funding to Range Fuels. The No Action Alternative further assumes that no industrial development would occur in the Soperton Industrial Park absent the Range Fuels Project.

Under the No Action Alternative, there would be no changes to current land uses and no impacts to soils or geology. Under the No Action Alternative, no change from existing hydrologic conditions would occur and there would be no impacts to water quality. No wetlands or streams would be impacted under the No Action Alternative, but the on-site wetland areas would not be preserved leaving them subject to future impacts.

Under the No Action Alternative, there would be no impacts to biological resources and protected species because conditions would remain as they are. However, there would be no preservation of gopher tortoise habitat, leaving this habitat vulnerable to future development.

Under the No Action Alternative, there would be no health and safety risks, no adverse impacts to any minority or low-income groups and no environmental health and safety risks to children. However, the new fire and EMS station would be built and would provide benefits to the surrounding businesses and residents. Under the No Action Alternative, there would be no changes in the air quality, waste management, hazardous materials, or cultural resources.

Under the No Action Alternative, there would be no changes in area noise levels, transportation, and utility infrastructure. Under the No Action, alternative, it is likely that the natural gas line replacement would occur, but this work would likely be delayed into the future. There would be no change in the aesthetics. Under the No Action Alternative, there would be no short-term boost to the economy from construction and no long-term tax base increase in the county that would result from production at the Range Fuels facility.

The No Action Alternative would not satisfy the purpose and need for the Proposed Action. The benefits that would be gained from the production of ethanol from lignocellulosic feedstock would not be realized by Range Fuels or by DOE.

3.20 Short-Term Uses and Commitment of Resources

Federal agencies are required by NEPA to describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long term productivity. The NEPA evaluation should also characterize any irreversible and irretrievable commitments of resources as a result of the implementation of the Proposed Action.

The Proposed Action would have a designed life cycle of 40 years or more. Equipment would need to be replaced periodically during that period with the replaced items, especially the metals, recycled for other uses.

The Proposed Action would commit 24.6 acres of prime farmland, 9 acres of forested land (hardwood and pine plantation), 67.4 acres of mowed grass field, 875,500 tpy of harvested pine and slash, and 0.316 mgd (316,800 gpd) of groundwater. In addition, there would be a long-term and irreversible commitment of construction material and fuel and energy required to transport plant input and output and run the plant. These commitments would result in the production of approximately 120 million gallons of fuel ethanol and ethanol production by-products per year.

The Proposed Action would require the commitment of local pine forest resources that are normally unusable for the pulp and paper industry. As a result, the Proposed Action would create a regional market for materials that are currently wasted in the harvest process, thereby converting a waste stream into a renewable resource. Because pine production is the primary land use in the area, the Proposed Action is consistent with maintenance of the surrounding land's current and long-term productivity.

The pine required for the plant operations is a renewable resource, which over the long term is a reversible commitment of resources. The groundwater commitment for the Proposed Action would be reversible if and when plant operations cease. While the groundwater removed and used during plant operations would be necessarily irretrievable, the aquifer from which it was withdrawn is expected to recharge and return to its previous level prior to plant operations. The fuel, oil and maintenance costs that would be committed to growing, harvesting, transporting, storing, and processing the pine for the plant and transporting plant output would be irreversible commitments.

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Appendix A
Department of Energy Scoping Letters

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

July 20, 2007

TO: Distribution List

SUBJECT: Notice of Scoping – Range Fuels Proposed Commercial Scale Thermochemical Cellulosic Ethanol Plant, Soperton, Georgia

The U.S. Department of Energy (DOE) is proposing to provide up to $76 Million to Range Fuels for the construction and operation of a commercial scale thermochemical cellulosic ethanol plant near the town of Soperton, Georgia in Treutlen County. Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021), DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects that cannot be avoided should this proposed action be implemented.
- Evaluate viable alternatives to the proposed action, including a no action alternative.
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Characterize any irreversible and irretrievable commitments of resources that would be involved should this proposed action be implemented.

The proposed plant would be located on approximately 160 acres. The site is located approximately 2 miles northwest of Soperton off GA Highway 29 and bordered by Old Dairy Farm Road to the east and Commerce Drive to the south. (See Exhibit 1 Project Location Map attached). The majority of the site is located within a currently designated Industrial Park. The previous owner of the industrial park had cleared the site of timber except for a buffer around the existing wetlands and installed fire and sewer utilities. The coordinates of the approximate center-point of the site are 32° 24' 10" North, 82° 37' 13" West (NAD27).

Prior to being zoned as an industrial park by the Treutlen County Development Authority, the proposed site was historically used for cotton production and pine tree plantations. All surrounding property is currently either planted in pine for future harvest or farmland planted in crops. The closest residential property is located in the southeast corner of the site at the intersection of Dairy Farm and County Road 94 approximately 1,500 feet from the proposed location of the facility on the site.

The proposed facility would be expected to operate up to 350 days per year (8,400 hours per year) and would produce up to 100,000,000 gallons per year (approximately 286,000 gallons per day) of fuel-grade ethanol and up to 20,000,000 gallons per year (approximately 57,000 gallons

per day) of methanol through the use of a proprietary conversion technology. The feedstock for this process would be up to 875,000 dry tons per year (2,500 dry tons per day) of biomass consisting primarily of plantation grown wood and wood waste products from Treutlen County and the surrounding area. Pine plantations in the area have been harvested and replanted sustainably for many generations and forest resource stewardship is a core value of the state and local community. The total footprint of the proposed plant would be approximately 60 acres within the 160 acre site. The project has been planned and sited to maximize conservation of existing wetlands and forest. Construction of the facility will not impact wetlands onsite. Exhibit 4 details the proposed site layout.

The Georgia Environmental Protection Division (EPD) has issued Air Quality Permit No. 2869-283-0005-S-01-0 for the construction and operation of the facility. Total modeled air emissions for the installation meet requirements for classification as a Minor Source under 40 CFR 52.21. The following additional environmental permits are currently in process of being obtained:

- USACE CWA Section 404 Nationwide Permit (NWP) for modification of an existing culvert: Submit application late July 2007, Permit Issuance expected early September 2007.

- Notice of Intent (NOI) for Georgia General NPDES Storm Water Permit due to Construction Activities: Submit early August 2007, Expected Permit coverage granted late August 2007

- Industrial Waste Water Pre-Treatment Discharge Permit: Submit application early August 2007, Expected Permit issued late August 2007

The following is a summary description of the process that the plant would use:

The Range Fuel plant will employ biomass converters and catalytic syngas converters to produce fuel-grade ethanol as well as smaller amounts of methanol and higher molecular weight alcohols. The biomass converters will convert wood into a gaseous mixture of CO and H_2 (synthesis gas or syngas) with a small amount of inert solid material (ash) remaining. The raw syngas will be subjected to a number of cleanup and compression steps before being sent through the catalytic syngas converters.

Wood feedstocks will be chipped either in the field at their point of origin or at the site. If chipped in the field, the feedstock will be delivered to the site as woodchips via truck. If chipped at the site, raw feedstocks will be chipped and transferred to a storage area. From the storage area, chips will be conveyed to the Conversion step which consists of sequential stages (Stage 1 and Stage 2) sections within a Conversion Unit. Chipping, storage, and wood processing operations are planned for a site north of and adjacent to the plant site (see Exhibit 1) that will provide a route for trucks delivering wood that is buffered and routed away from any homes in the area.

Natural gas will be used as a startup fuel, switching to syngas or tail gas once it can be generated on a sustained basis. All heating within the Conversion Units occurs indirectly, and there will be no direct contact between the wood chips and a burner flame. The chips are continuously

conveyed through the Stage 1 sections where they will be indirectly heated to volatilize constituent organics and other components. The chips will then be fed to the Stage 2 section of the Conversion Unit where the temperature will be further increased to reform some of the remaining carbon and hydrocarbons. Air emissions from Conversion Units will be controlled with Catalytic Oxidizers.

After passing through Stage 2 of the Conversion Unit, the ash will be removed from the exit stream by process cyclones and bag filters. The ash will then be cooled and pneumatically conveyed to ash hoppers then to a truck loadout for disposal. Tests will be performed to determine the suitability of the inorganic minerals contained in the ash for land application as a soil amendment. The remaining stream will be quenched and separated into syngas, water, and a liquid hydrocarbon stream. The liquid hydrocarbon stream will be returned to the Stage 2 section of the Conversion Unit for recycle. Quench water will be used to lower the raw syngas temperature and scrub (remove) any remaining solids or liquid hydrocarbons from the raw syngas. The syngas will then be filtered and dewatered before compression prior to alcohol synthesis.

After the raw syngas is compressed, it will be further treated to remove CO_2 and volatile organics. For CO_2 removal, a scrubbing process utilizing an absorption tower followed by a stripping tower will be employed. Volatile organics will be removed with a scrubber. The recovered organics from the syngas stream will be returned to the Conversion Units for further processing.

Converting the syngas to alcohol will be performed through the use of a catalytic, exothermic reaction, resulting in the generation of substantial heat during the conversion process. This heat will be used in the Converter Units to reduce syngas usage. The cleaned syngas will be fed through a series of catalytic syngas converters. The synthesis products will then be cooled and sent to the distillation units for separation. Some un-reacted gases will be recycled back through the catalysts for further conversion with the remaining un-reacted gases combusted as tail gas in the Conversion Units.

The crude liquid alcohol stream produced by the alcohol synthesis process is a mixture of ethanol and methanol, with smaller amounts of higher molecular weight alcohols (propanol through pentanol), water, and minor amounts of other reaction byproducts. A series of distillation columns will separate the crude alcohol stream into purified methanol, ethanol, higher molecular weight alcohols and water streams. The re-boilers on each of the distillation columns will be steam heated.

After distillation, the methanol will be transferred to storage tanks in preparation for loading into tanker trucks or railcars. The wet ethanol will be sent through molecular sieve dryers to remove excess moisture with the water being sent to an onsite wastewater treatment plant for treatment prior to reuse or, when of acceptable quality, discharged to the sewer and the ethanol being sent to storage tanks in preparation for loading into tanker trucks or railcars. The higher molecular weight alcohols will be pumped to an onsite storage tank prior to sale and shipment offsite or recycled back into the process.

The methanol generated on-site will be sold as product. Ethanol and methanol will be shipped by truck or rail to marketing terminals throughout the southeast. Four loadout racks, two for trucks and two for rail cars, will be utilized to dispense the liquid products into either the trucks or railcars. Both truck and rail loadout rack operations will use controls to minimize VOC/HAP emissions.

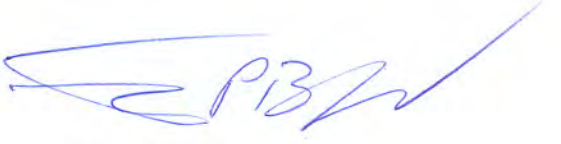
Wastewater streams will be managed through a number of on-site recycling and wastewater treatment processes. Process water will be discharged into the sewer upon meeting acceptable quality standards during early stages of startup and operations, then processed on-site and recycled during later stages. Sanitary water will be discharged to the sewer. More detailed information about Range Fuels is available online at http://www.rangefuels.com.

As part of the process for determining the scope of issues related to the proposed action, we request your comments and any other information that you can identify as important. We request your comments by August 13th, 2007. If you have any comments regarding the enclosed, please direct them to:

Kristin Kerwin
DOE NEPA Document Manager
1617 Cole Blvd.
Golden, Colorado 80401
kristin.kerwin@go.doe.gov

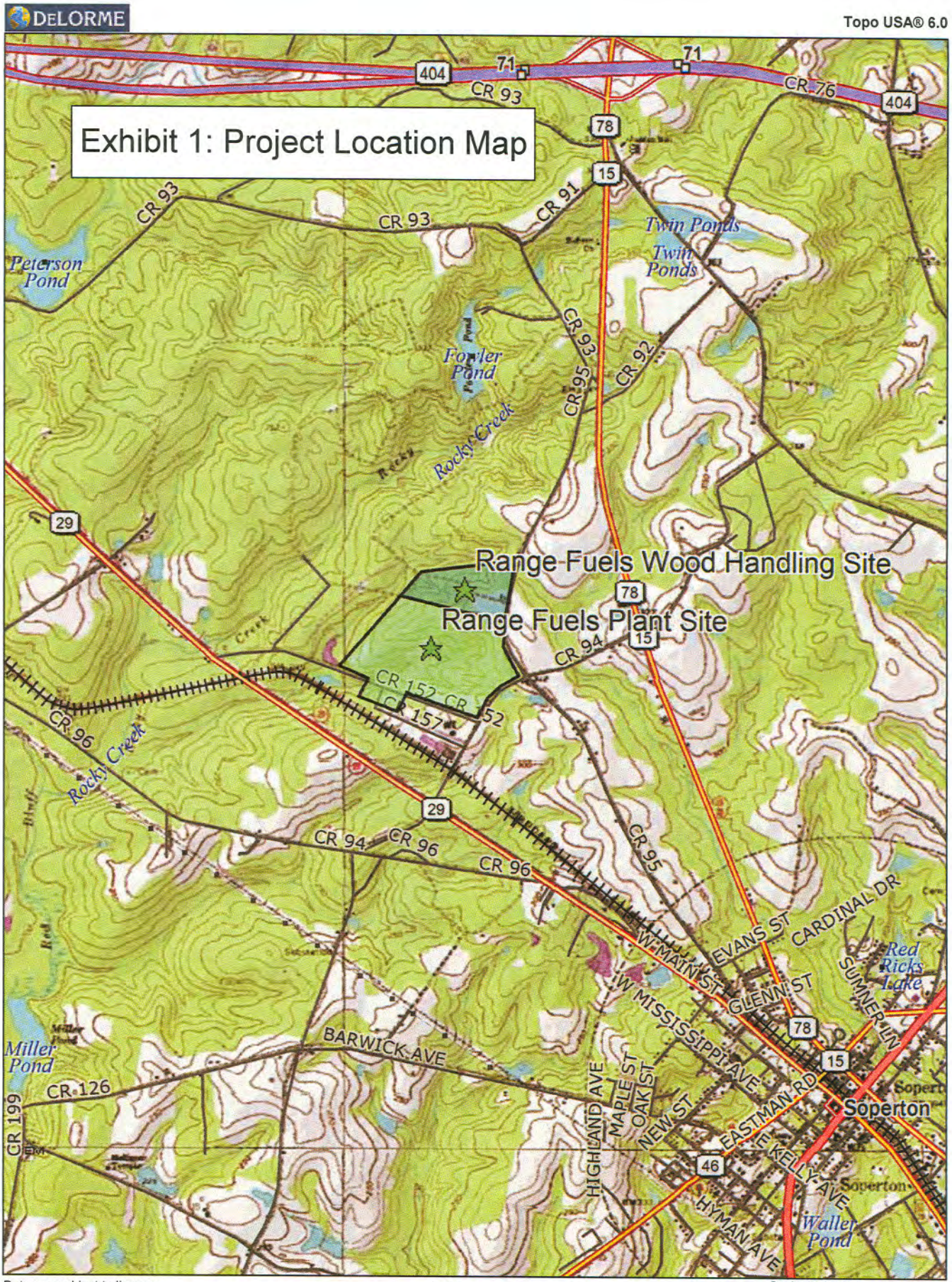
We look forward to hearing from you. You will also be given the opportunity to review and comment on the Draft Environmental Assessment when it is available.

Sincerely,



Steve Blazek
Department of Energy
NEPA Compliance Officer

Enclosure


DeLORME
Topo USA® 6.0
Exhibit 1: Project Location Map
Range Fuels Wood Handling Site
Range Fuels Plant Site
404
71
CR 93
CR 76
78
15
CR 91
Twin Ponds
Peterson Pond
Fowler Pond
Rocky Creek
CR 95
CR 92
29
CR 94
CR 152
CR 157
CR 96
W MAIN ST
EVANS ST
CARDINAL DR
Red Ricks Lake
SUMNER LN
W MISSISSIPPI AVE
GLENN ST
BARWICK AVE
Miller Pond
CR 126
CR 199
HIGHLAND AVE
MAPLE ST
OAK ST
NEW ST
EASTMAN RD
KELLY AVE
HYMAN AVE
Soperton
Waller Pond
46
Data use subject to license.
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www.delorme.com
TN
MN (5.2°W)
Scale 1 : 31,250
1" = 2,604.2 ft
Data Zoom 12-0

Appendix B
Responses to Scoping Letters

Miccosukee Tribe of Indians
of Florida

August 1, 2007

Ms. Kristin Kerwin
DOE NEPA Document Manager
1617 Cole Blvd.
Golden, CO 80401

RE: Range Fuels Proposed Commercial Scale Thermochemical Cellulosic Ethanol Plant, Soperton, GA

Dear Ms. Kerwin:

The Miccosukee Tribe of Indians of Florida received your letter and explanation of the above referenced. The Tribe's concerns would be those of air quality emissions, specifically any emissions that would contain mercury. Florida has mercury in the surface water column throughout the state which in turn through bio-accumulation and methylization, enters into the food chain of aquatic vertebrates and invertebrates. It works itself up through the food chain into fish, which are part of the traditional diet of Miccosukee Tribal Members. Your explanation of this process makes no mention of mercury, so we will assume that there will be no mercury emissions. We applaud your efforts in finding an alternative fuels source while controlling CO_2 emissions.

Our Tribal Elders have decided that on Cultural Issues, the Tribe should limit itself to matters in the State of Florida. We will defer to the wishes of other Tribes which have a more direct affiliation to this area on Cultural Issues.

Thank you for soliciting comments from the Miccosukee Tribe. Please contact Mr. Steve Terry of my staff at the below number, Ext. 2243, or via e-mail at Stevet@miccosukeetribe.com if you require additional information.

Sincerely,

Billy Cypress
Tribal Chairman

PC: Steve Terry, Land Resources Manager

SEMINOLE TRIBE OF FLORIDA

◊ TRIBAL HISTORIC PRESERVATION OFFICE ◊

1 August 2007

Kristin Kerwin
DOE NEPA Document Manager
1617 Cole Blvd.
Golden, Colorado 80401-3305

Subject Project: Range Fuels Proposed Commercial Scale Thermochemical Cellulose Ethanol Plant, Soperton, Georgia.

Dear Ms. Kerwin:

In regard to the above referenced project, the Tribal Historic Preservation Office of the Seminole Tribe of Florida (THPO STOF) has reviewed the Notice of Scoping dated 20 July 2007. We are primarily interested with any potential impact the undertaking will have upon cultural resources in the area. The STOF has a cultural and historic interest in the region and would like to be informed about this project as it develops. Please send copies of any Environmental Assessments or other documentation regarding this project and cultural resources. We thank you for the opportunity to review this correspondence. In any future communication about this project please refer to ***THPO-000588***. Also please note our correct mailing address below.

Respectfully,

Wesley L. Andrews

Willard S. Steele
Tribal Historic Preservation Officer
Seminole Tribe of Florida
HC 61, Box 21-A
Clewiston, FL 33440
Tel: 863.902.1113

Please direct response to:
Wesley L. Andrews
Reviewing Archaeologist
Seminole Tribe of Florida
HC 61, Box 21-A
Clewiston, FL 33440
Tel: 863.902.1113 ext 12248

Appendix C
Scoping Letter Distribution List

Range Fuels Soperton, GA Biomass to Biofuels Facility

Scoping Letter Contacts

Federal

United States Fish and Wildlife Service
Attn: Strant Colwell
4270 Norwich Street
Brunswick, GA 31520
912-265-9336

Natural Resources Conservation Service
Attn: Alex Comegys
District Conservationist
P. O. Box 177
303 S. Richardson Street
Mt. Vernon, GA 30445
912-583-4432

State

State NEPA Point of Contact
Mr. James C. Hardeman
Manager, Environmental Radiation Program
Georgia Department of Natural Resources
4220 International Parkway - Suite 100
Atlanta, GA 30354

Georgia Department of Natural Resources
Historic Preservation Division
Attn: Dr. David Crass
State Archaeologist & Unit Manager
Archaeological Services Unit
34 Peachtree Street, NW
Suite 1600
Atlanta, GA 30303
404-656-9344

Georgia Department of Natural Resources
Wildlife Resources Division
Nongame Program
One Conservation Way
Suite 310
Brunswick, GA 31520-8687
912-264-7218

Georgia Department of Transportation
Mike Thomas, P.E.
District Engineer
801 Highway 15 South
P.O. Box 8
Tennille, GA 31089-0008
(478) 552-4601

Georgia Department of Community Affairs
60 Executive Park South, N.E.
Atlanta, Georgia 30329-2231

Altamaha-Heart of Georgia Regional Development Center
State Data Center Program
Attn: Mr. Rafael Nail
P. O. Box 459
Baxley, Georgia 31513
(478) 367-3648

Local

Treutlen County Development Authority
Attn: John W. Lee
114 Second Street, Suite 104
P.O. Box 662
Soperton, GA 30457
912-529-4496

Soperton Water & Sewer Board
102 Martin Luther King Jr. Drive
Soperton, GA 30457
912-529-6173

Local residents near the proposed facility

James E. Willis
6591 GA Hwy. 15 W.
Soperton, GA 30457

Mr. and Mrs. Jack Ellington
P. O. Box 485
Soperton, GA 30457

Phillip Morris
Rt. 3 Box 101A
Soperton, GA 30457

Mr. and Mrs. Keith Wolfe
Rt. # Box 62
Soperton, GA 30457

Jason Morris
Rt. 4 Box 424
Soperton, GA 30457

Mr. and Mrs. Drexel Braddy
Rt. 3 Box 64
Soperton, GA 30457

Debbie M. McCullough
Rt. 3 Box 101A
Soperton, GA 30457

Mr. and Mrs. JR. Meeks
Rt. 3 Box 65
Soperton, GA 30457

Mr. and Mrs. Frank Crown
49 Commerce Drive
Soperton, GA 30457

Mr. and Mrs. Donavan Horton
Rt. 3 Box 99
Soperton, GA 30457

Mr. and Mrs. Lance Hackle
7126 GA Hwy. 15
Soperton, GA 30457

Mr. and Mrs. Jerry Graham
Rt. 3 Box 225
Soperton, GA 30457

Wendell Powell
Rt. 3
Soperton, GA 30457

Mr. Pat Bova
P. O. Box 658
Soperton, GA 30457

Tribal Contacts

Beryl Battise
Tribal Historic Preservation Officer
Alabama-Coushatta Tribe of Texas
571 State Park Road 56
Livingston, TX 77351
936-563-1282

Ms. Augustine Asbury, Second Chief/NAGPRA Rep.
Alabama-Quassarte Tribal Town of the Creek Nation in Oklahoma
P.O. Box 187
Wetumka, OK 74883
405-452-3987

Mr. John Zachary
Attorney at Law
Coushatta Tribe of Louisiana
Section 106 and NAGPRA Contact
Post Office Box 12730
Alexandria, LA 71315-2730
Phone: 318-442-9533

Mr. Marsey Harjo,
Kialegee Tribal Town of the Creek Nation of Oklahoma
108 N. Main Street
Wetumka, OK 74883
405-452-5200

Mr. Steven Terry
Land Resources Manager
Miccosukee Tribe of Indians of Florida
Real Estate Services
Mile Marker 70
US 41 at Admin. Bldg.
Miami, FL 33194
305-223-8380 ext. 2243

Ms. Joyce Bear
Tribal Historic Preservation Officer
Muscogee (Creek) Nation of Oklahoma
Cultural Preservation Office
Highway 75, Loop 56, PO Box 580
Okmulgee, OK 74447-0580
918-732-7731

Mr. Robert Thrower
Tribal Historic Preservation Officer
Poarch Band of Creek Indians
5811 Jack Springs Road
Atmore, AL 36502-5025
251-368-9136 ext. 2281

Mr. Pare Bowlegs
Historic Preservation Office/NAGPRA Contact
Seminole Nation of Oklahoma
Post Office Box 1498
Wewoka, OK 74884
405-257-6287

Mr. Williard Steele
Seminole Tribe of Florida, THPO
3170 North 64th Avenue
Hollywood, FL 33024
954-965-2424 x 149

Mr. Charles Coleman, Warrior
Thlopthlocco Tribal Town
NAGPRA Rep. and THPO
Rt. 1 Box 190-A
Coleman Road
Weleetka, OK 74880
918-623-2620

Appendix D
Biomass Wood Resource Assessment on a County-by-County Basis for the State of Georgia

Biomass Wood Resource Assessment on a County-by-County Basis for the State of Georgia

Prepared for the
Georgia Forestry Commission
Macon, Georgia

and the
Southern States Energy Board
Norcross, Georgia

Prepared by
General*Bioenergy, Inc.
P.O. Box 26
3115 Northington Court
Florence, AL 35630
256-740-5634

November 9, 2005
(Revised)

TABLE OF CONTENTS

EXECUTIVE SUMMARY

General*Bioenergy, Inc. was selected by the Georgia Forestry Commission to perform a biomass wood resource assessment on a county level basis for the State of Georgia. Assessment findings are on an annual basis and provided in dry tons. The study found that there were 18,871,292 dry tons dry tons of forestry-related biomass materials available annually in Georgia for energy or other purposes.

Unmerchantable standing timber was by far the greatest wood resource available at 13,260,175 dry tons, assuming a 20 year grow cycle. Additionally, unutilized merchantable timber could potentially be available, but was not included in this study. Other wood resources assessed by the study are as follows: harvesting residues 5,314,287 dt/yr, mill residues 6,993,000 dt/yr, urban wood waste 86,209 dt/yr, pecan shells 22,297 dt/yr, paper mill sludge 395,210 dt/yr, and black liquor solids 12,066,840 dt/yr. These wood resources are based on the latest sampling year for which data was available.

INTRODUCTION, GOALS, OBJECTIVES

General*Bioenergy Inc. was selected by the Georgia Forestry Commission to perform a wood resource assessment on a county level basis for the State of Georgia. This assessment was to include wood resources such as unmerchantable standing timber, harvesting residues, mill residues, urban wood waste, paper mill sludge, pecan shells, and black liquor production on a county level basis for the State of Georgia. The study was to determine both quantitatively and qualitatively and using prevailing industry standards, the wood biomass that is currently and potentially available in the pre-defined area.

Project goals included the following:

1. Assess the amount of wood resources (unmerchantable standing timber, harvesting residues, mill residues [sawdust, bark, hog fuel], paper mill sludge, urban wood waste, pecan shells, and black liquor) generated on a county level basis for the state of Georgia.
2. For unmerchantable standing timber and mill residues (sawdust, bark, hog fuel), when feasible, determine the amount available or unutilized.

In addition to providing urban wood waste available at $12.50/ton, General*Bioenergy, Inc. also included information on urban wood waste available at various other price ranges.

RESOURCE ASSESSMENT FINDINGS

Table A-1 shows the calculation for unmerchantable standing timber available annually based on a thirty-year growth cycle and a twenty-year growth cycle. Data for Table A-1 is on a county level basis and in dry tons per year. Additionally, Appendix III shows an alternative method of calculating unmerchantable standing timber for comparison. Table A-2 shows harvesting residues produced on a county level basis. This table converts harvesting residues from (cuft) to dry tons and provides the percent hardwood and softwood for each county in Georgia. Table A-3 displays mill residues broken down into sub categories of fine, bark, and course residues on a county level basis in dry tons. Table A-4 shows urban wood residues and the quantity available at $12.50/dry ton. The data was broken down on a county level basis through correlating population with amounts of urban wood residues produced. This table also contains urban wood residue available at various other price ranges. Table A-5 shows pecan tree bearing acres per county and tons of pecan shells produced on a county level basis. Table A-6 shows paper mill sludge production on an annual basis, mill products produced, and paper plant location. Table A-7 shows board, paper, and pulp production in tons per day and calculates the amounts of black liquor solids produced in dry tons. Table A-8 is a combined resource chart that shows county totals for all assessed wood resources.

Forestry Resources: Unmerchantable Standing Timber

There are two major sources of standing forestry biomass inventory for energy: merchantable and unmerchantable timber. The former may include trees that are useable for commercial purposes, but have no near term market and thus may be available for energy applications.

Unmerchantable material is unsuitable for conversion into industrial wood products due to size, form, or quality. Forests in the South contain a significant amount of small diameter and underutilized material not suitable for lumber or other wood products. These overstocked stands increase the risk of insect, disease, fire, and drought damage, and because of their sparseness and remote location are usually more expensive to recover. The removal of this material could open up space in the forest for growing a new generation of higher quality trees.

These sources could provide the State of Georgia with approximately 8.8 million dry tons of *unmerchantable* wood per year based on a 30 year growth cycle or 13.2 million based on a 20 year grow cycle (Table A-1).

Forestry Resources: Harvesting Residues

Forestry harvesting residues are the unmerchantable tree portions (tops and branches) left from harvesting operations, as well as the small diameter, diseased, crooked, or otherwise defective trees remaining after a harvest has occurred. Landowners prefer that these harvesting residues be removed from the land in order to facilitate new growth. However, such removal creates expense for the landowner. According to the Georgia Forestry Commission (GFC), roughly 21 green tons per acre of harvesting residues are left in the forest. Also according to the GFC, less than 5% of forestry harvesting residues are currently used in Georgia [1]. As shown in Table A-2, there were approximately 5 million dry tons of harvesting residues potentially available in Georgia in 2003.

Primary Processing Residues: Mill Residues

Primary processing (mill) residues occur when logs are processed into boards or other products that are eventually used to manufacture other higher valued products. Examples of primary mills include sawmills and veneer mills. Processing residues consist of sawdust, slabs, end cuts, bark, shavings, and other types of residues. The quantities of mill residues produced at primary wood mills in Georgia were provided by the US Forest Service. These residues are classified into three categories; bark, coarse wood, and fine wood. The coarse material consists of slabs and end cuts and the fine material consists of sawdust and shavings

Advantages of processing resources are that they are already aggregated at a central point and usually require little, if any, additional processing and, if kept off the ground, can be relatively clean, low ash materials.

Markets for mill residues include mulch (especially bark), fuel, feedstock for composite materials (e.g., particleboard and medium density fiberboard), animal bedding, composting bulking agent, and other uses. The dominant unused forest processing residue is green sawdust. Most states in the South report less than 5% of mill resides are unused [2, 3, 4].

According to the US Forest Service, of the approximately 7 million tons of mill residues produced in the State of Georgia, 79,703 tons (Table A-3) or less than 1 percent are unutilized. The majority of mill residues are currently used for fiber, fuel, and other miscellaneous byproducts. However, companies often understate their waste residues; therefore, the amount available is often a greater percentage than the amount reported.

All mill residue data was compiled from the USDA Forest Service, Timber Product Output (TPO) Reports, Forest Inventory and Analysis, Southern Research Station. Mill residue data is from the last sampling year of 2003.

Urban Wood Waste

This biomass consists of used lumber, trim, pallets, wooden packaging materials, trees, branches, and other wood debris that is commonly brought to a landfill for disposal. However, it may also include trees and stumps from land clearing, right-of-way clearing debris, tree trimmings by professional arborists, and tree-related storm debris. An average of 50 acres per day of forests are cleared in the Atlanta area for development [2].

Frequently, urban wood wastes can be obtained in mono-loads—which are loads that are comprised of all one material (e.g., a load of used pallets). Mixed loads may have treated wood or non-wood materials commingled with them, making them less desirable. The moisture content of urban wood waste varies from very high (~50%) for green tree trimmings to very low. Pallets and wooden packaging materials, if kept indoors, will have a moisture content of approximately 12%. Wood residues from furniture manufacturing or any process that requires gluing will have moisture contents of approximately 5-6%, unless exposed to rain or the atmosphere for a long period of time.

Depending on their quality, urban wood residues have several different potential alternatives for disposal. Markets or uses for urban wood wastes include use as feedstocks for engineered woods (particle board, laminated woods, and plywood), landscape mulch, soil conditioner, animal bedding, compost additive, sewage sludge bulk medium, and boiler fuel.

This material is characterized as low in value and usually has a tipping fee associated with it. It may also have treated wood or non-wood materials co-mingled with it (e.g., pallets that are nailed or glued together) and frequently have higher ash and alkaline metal contents relative to other forms of biomass.

For this study, since urban wood wastes normally have a tipping fee associated with them; it was assumed that 100 percent of the urban wood waste would be available. At $12.50 per dry ton value, approximately 86,209 dry tons of urban wood resides would be available annually (Table A-4).

Pecan Shells

Pecan shells are the casings that enclose the nut meat (kernel). At maturity, the outer hulls of the nut split open while still on the tree and allow the nut to fall to the ground, where it is harvested. The nuts are collected and taken to a central location for shelling. Due to shipping costs, 85% of all pecans are shelled and sold as nutmeats [5]. Georgia produces around 160 million lbs of pecans per year. Of the 160 million pounds, 58.5% are kernel or nutmeat. That leaves 41.5% of the pecan as shell [6]

Since complete nutmeat halves are more valuable than nutmeat pieces, shelling practices aim to optimize the production of whole nutmeat halves. To facilitate cracking of the shell and thus minimize nutmeat breakup, approximately 90+% of all pecans shelled are soaked in water before shelling [5].

The average moisture content of pecan shells varies from 11.3% for dry shelled pecans to 15-16% for “rewet” pecans. Harvesting pecans occurs from mid-October through November, and occasionally into December [7].

Current pecan shell uses are (1) air blasting material to strip old paint from metal, (2) filler material in drilling mud used in the oil fields, (3) roughage supplement in cattle feed, (4) particle board manufacture, and (5) landscape mulch-decoration. In reality, there are virtually no markets for pecan shells. Thus for this study it was assumed that 95 percent of the pecan shells would be available. This study found that there was over 26,000 tons of pecan shells generated annually in Georgia (Table A-5).

Paper Mill Sludge

Paper mill sludge (also called bio-solids) is generated from the manufacture of paper. “Wastewater treatment plant sludge is those solid materials collected in the process of treating water used in the mill prior to its release in the environment. Typically, these materials consist of solids collected in primary treatment (separation of solids from raw wastewater) and secondary

treatment (biological treatment followed by clarification to separate sludge). Often primary and secondary residuals are combined to facilitate handling." A nationwide industry survey found that in terms of dry tonnage *as managed*, 54% was combined (primary and secondary), 40% was primary alone, 5% was intermittently dredged material, and 1% was secondary alone [8].

Sludge exits the treatment process as a slurry with a low solids content; therefore, some level of dewatering must be performed before it can be used for fuel. The previously mentioned survey found that the most common method of dewatering is with a belt filter press (50%) followed by a screw press (36%); however, the use of screw presses has nearly doubled since 1988. Filter presses obtained sludge with a 70% moisture content and screw presses, 60%. Disposal was by land filling or lagoons (51%), land application (12%), incineration (26%), other beneficial uses (5.5%), and reuse or recycle in the process, 5.6% [8]. Based on this information, for this study it was assumed that 95 percent of the sludge would be available. This study found that almost 400,000 tons of paper mill sludge is generated in Georgia annually (Table A-6).

Because of its high ash and moisture content, use for fuel is basically a disposal mechanism for paper companies. Because sludge disposal is a problem, a tipping fee is usually associated with its availability. Disposal in landfills must be in Subtitle D landfills, the same as MSW. However, many Subtitle D landfills will not accept sludge. Because of the general decline of the pulp and paper industry, the amount of paper mill sludge will probably decrease some in the future.

Black Liquor

The two main pulping processes are chemical and mechanical. In the chemical process, the lignin in the wood is dissolved in a digester for several hours. After the fibers are removed from this process, the material left over (which contains undersize wood fibers, lignin, and process chemicals) is called pulping liquor or black liquor. The black liquor yield is equal to 40-50% (bleached) and 50-65% (unbleached) of the incoming wood [9]. To recover the chemicals, black liquor is combusted in special boilers and steam generated to provide process heat and electricity for the plant. This resource makes up the largest contributor to power generation for biomass in the United States [10]. Because black liquor is burned to recover the energy and chemicals, none of it was assumed as available for this study.

The water content of black liquor varies from mill to mill, depending upon the type and age of evaporator/concentrator system that the mill has. The average moisture content on wet black liquor is 25% to 35%. All information provided in Table A-8 is in dry tons of black liquor solids. Heating value of the black liquor varies from mill to mill, depending upon the type of wood pulped, the pulp yield, pulping conditions, and other variables. The range is from about 5900 Btu/lb of black liquor solids to 6500 Btu/lb; these values are before recycled boiler ash is mixed with the black liquor [11]. Table A-7 calculates dry tons of black liquor solids produced annually on a county level basis.

CRP Potential

The State of Georgia currently has 7,459,575 acres of crop land throughout the entire state. Through the CRP Program only 25% of the land in each county can be registered in CRP or WRP Programs. This percentage is regulated by law to minimize the CRP programs affects on local agri-business. Georgia currently has 307,825 acres actively enrolled in CRP, which leaves an additional 1,864,893 acres that could become potential CRP land [12]. This land could have trees, grasses, or any other resource planted on it that is designated by the contract. Once under

contract, this land cannot be commercially harvested unless there are extenuating circumstances (i.e. drought and farmers need the hay, research, etc.). However, often CRP land is harvested once the CRP contract expires. Assuming 1.5 dry tons/acre/year these additional CRP acres could potentially provide up to 1,398,669 dry tons/acre/per year of wood resources if 50% of the additional CRP land were planted in trees. Since this resource is considered potential whereas the other resources assessed in this report are existing, the totals potentially available from CRP land was not included in the overall summary.

SUMMARY

Several factors go into selection of feedstocks. This report summarizes the amount of selected forestry-related resources available in dry tons. In some cases little of the feedstock is actually available. Also, some feedstocks may have high moisture and/or ash contents or other factors that may limit their energy value and increase transportation and ash disposal costs. Other feedstocks may have characteristics that make them difficult to handle or process. For example, bark may be stringy and urban wood waste may have non-wood materials commingled with it. Table 1 is a summary of all wood resources in Georgia assessed by this study.

Table 1. Wood Resources Generated and Amount Unutilized

Wood Resources	Units	Amount Generated	% Unutilized	Amount Available
Unmerchantable Timber (20 year Growth Cycle)	dry tons	13,260,175	100%	13,260,175
Harvesting Residues	dry tons	5,314,287	95%	5,048,572
Mill Residues	dry tons	7,970,276	1%	79,703
Urban Wood Waste @ $12.50/dt	dry tons	86,209	100%	86,209
Pecan Shells	dry tons	22,297	95%	21,182
Paper Mill Sludge	dry tons	395,210	95%	375,449
Black Liquor Production	dry tons	12,066,840	0%	-
TOTAL		39,115,295		18,871,292

Of the resources surveyed, 18,871,292 dry tons are currently known available resources. This number primarily contains unmerchantable standing timber and unutilized harvesting residues. The percentages of other resources that are unutilized would require further research. Table A-8 is a summary on a county level basis for all wood resources assessed by this study.

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APPENDIX I

TABLES A-1—A-8

LIST OF TABLES
(All Tables Are County Level Data For The State Of Georgia)

Table A-1. Annual Unmerchantable Timber Calculated with a 20 and 30 Growth Year Cycle.

County	All Live Biomass on Timberland	All Live Merchantable Biomass on Timberland	Unmerchantable standing timber	Growth Cycle (1)	Growth Cycle (2)	Unmerchantable standing timber (Growth Cycle 1)	Unmerchantable standing timber (Growth Cycle 2)
	dry tons	*dry tons*	*dry tons*	*year*	*year*	*dry tons/year*	*dry tons/year*
Appling	9,180,262	6,639,525	2,540,737	30	20	84,691	127,037
Atkinson	4,798,502	3,129,954	1,668,548	30	20	55,618	83,427
Bacon	4,580,111	3,183,016	1,397,095	30	20	46,570	69,855
Baker	5,003,896	3,824,358	1,179,538	30	20	39,318	58,977
Baldwin	4,101,154	2,961,659	1,139,495	30	20	37,983	56,975
Banks	5,212,278	3,910,305	1,301,973	30	20	43,399	65,099
Barrow	2,689,621	2,066,560	623,061	30	20	20,769	31,153
Bartow	5,926,585	4,100,890	1,825,695	30	20	60,857	91,285
Ben Hill	3,478,671	2,325,508	1,153,163	30	20	38,439	57,658
Berrien	6,078,793	4,248,392	1,830,401	30	20	61,013	91,520
Bibb	3,354,910	2,295,655	1,059,255	30	20	35,309	52,963
Bleckley	4,000,187	2,972,815	1,027,372	30	20	34,246	51,369
Brantley	7,227,452	4,776,859	2,450,593	30	20	81,686	122,530
Brooks	7,051,899	4,915,631	2,136,268	30	20	71,209	106,813
Bryan	9,514,401	6,827,058	2,687,343	30	20	89,578	134,367
Bulloch	8,919,719	6,571,216	2,348,503	30	20	78,283	117,425
Burke	14,126,404	10,411,208	3,715,196	30	20	123,840	185,760
Butts	3,273,246	2,410,989	862,257	30	20	28,742	43,113
Calhoun	2,628,643	1,752,118	876,525	30	20	29,218	43,826
Camden	12,788,413	9,382,717	3,405,696	30	20	113,523	170,285
Candler	2,645,197	1,799,872	845,325	30	20	28,178	42,266
Carroll	8,822,448	6,495,656	2,326,792	30	20	77,560	116,340
Catoosa	2,279,496	1,760,470	519,026	30	20	17,301	25,951
Charlton	9,803,235	6,386,135	3,417,100	30	20	113,903	170,855
Chatham	5,632,130	4,314,655	1,317,475	30	20	43,916	65,874
Chattahoochee	4,701,510	3,443,194	1,258,316	30	20	41,944	62,916
Chattooga	5,622,967	3,905,902	1,717,065	30	20	57,236	85,853
Cherokee	10,281,746	7,871,627	2,410,119	30	20	80,337	120,506
Clarke	1,389,505	1,050,030	339,475	30	20	11,316	16,974
Clay	3,126,810	2,197,591	929,219	30	20	30,974	46,461
Clayton	1,213,163	893,409	319,754	30	20	10,658	15,988
Clinch	14,849,804	9,272,391	5,577,413	30	20	185,914	278,871
Cobb	3,804,602	3,133,778	670,824	30	20	22,361	33,541
Coffee	7,752,127	5,332,360	2,419,767	30	20	80,659	120,988
Colquitt	6,019,508	4,721,833	1,297,675	30	20	43,256	64,884
Columbia	6,790,645	5,248,104	1,542,541	30	20	51,418	77,127
Cook	3,469,340	2,509,791	959,549	30	20	31,985	47,977
Coweta	8,418,887	6,241,754	2,177,133	30	20	72,571	108,857
Crawford	5,250,596	3,598,914	1,651,682	30	20	55,056	82,584
Crisp	3,575,827	2,691,458	884,369	30	20	29,479	44,218
Dade	4,299,787	3,275,153	1,024,634	30	20	34,154	51,232
Dawson	6,277,830	4,727,606	1,550,224	30	20	51,674	77,511
De Kalb	7,739,473	5,953,391	1,786,082	30	20	59,536	89,304
Decatur	2,010,769	1,618,522	392,247	30	20	13,075	19,612
Dodge	8,762,584	6,461,582	2,301,002	30	20	76,700	115,050
Dooly	5,038,051	3,528,333	1,509,718	30	20	50,324	75,486

Dougherty	5,435,931	4,218,871	1,217,060	30	20	40,569	60,853
Douglas	5,044,758	3,982,538	1,062,220	30	20	35,407	53,111
Early	5,333,808	4,031,326	1,302,482	30	20	43,416	65,124
Echols	7,120,486	4,782,356	2,338,130	30	20	77,938	116,907
Effingham	9,065,577	6,387,255	2,678,322	30	20	89,277	133,916
Elbert	6,884,686	5,017,819	1,866,867	30	20	62,229	93,343
Emanuel	12,349,382	9,048,644	3,300,738	30	20	110,025	165,037
Evans	3,914,852	3,000,979	913,873	30	20	30,462	45,694
Fannin	10,062,355	7,430,325	2,632,030	30	20	87,734	131,602
Fayette	3,480,030	2,576,367	903,663	30	20	30,122	45,183
Floyd	8,114,208	5,800,203	2,314,005	30	20	77,134	115,700
Forsyth	2,941,997	2,260,130	681,867	30	20	22,729	34,093
Franklin	3,555,924	2,642,977	912,947	30	20	30,432	45,647
Fulton	7,852,136	6,188,700	1,663,436	30	20	55,448	83,172
Gilmer	14,071,142	10,696,735	3,374,407	30	20	112,480	168,720
Glascock	2,654,194	1,948,217	705,977	30	20	23,533	35,299
Glynn	6,501,274	4,812,726	1,688,548	30	20	56,285	84,427
Gordon	3,695,459	2,570,623	1,124,836	30	20	37,495	56,242
Grady	6,130,707	4,575,818	1,554,889	30	20	51,830	77,744
Greene	7,415,014	5,346,596	2,068,418	30	20	68,947	103,421
Gwinnett	4,963,915	3,852,298	1,111,617	30	20	37,054	55,581
Habersham	8,178,684	6,254,665	1,924,019	30	20	64,134	96,201
Hall	7,291,657	5,421,949	1,869,708	30	20	62,324	93,485
Hancock	8,926,635	6,270,491	2,656,144	30	20	88,538	132,807
Haralson	5,503,717	4,090,739	1,412,978	30	20	47,099	70,649
Harris	9,338,619	6,642,946	2,695,673	30	20	89,856	134,784
Hart	2,910,524	2,270,470	640,054	30	20	21,335	32,003
Heard	4,837,191	3,330,996	1,506,195	30	20	50,207	75,310
Henry	5,226,860	3,966,277	1,260,583	30	20	42,019	63,029
Houston	6,294,151	4,608,491	1,685,660	30	20	56,189	84,283
Irwin	4,708,431	3,523,345	1,185,086	30	20	39,503	59,254
Jackson	5,705,895	4,143,114	1,562,781	30	20	52,093	78,139
Jasper	8,693,379	6,377,232	2,316,147	30	20	77,205	115,807
Jeff Davis	4,076,674	2,684,671	1,392,003	30	20	46,400	69,600
Jefferson	8,922,677	6,692,585	2,230,092	30	20	74,336	111,505
Jenkins	5,024,737	3,671,629	1,353,108	30	20	45,104	67,655
Johnson	4,576,255	3,242,843	1,333,412	30	20	44,447	66,671
Jones	7,667,452	5,378,471	2,288,981	30	20	76,299	114,449
Lamar	2,367,374	1,585,477	781,897	30	20	26,063	39,095
Lanier	4,162,628	3,100,963	1,061,665	30	20	35,389	53,083
Laurens	11,447,347	7,972,730	3,474,617	30	20	115,821	173,731
Lee	4,267,900	3,297,618	970,282	30	20	32,343	48,514
Liberty	10,242,820	7,987,604	2,255,216	30	20	75,174	112,761
Lincoln	4,413,108	3,340,600	1,072,508	30	20	35,750	53,625
Long	12,027,085	8,582,860	3,444,225	30	20	114,808	172,211
Lowndes	7,002,121	5,063,808	1,938,313	30	20	64,610	96,916
Lumpkin	9,213,913	6,882,383	2,331,530	30	20	77,718	116,577
Macon	5,950,519	4,578,355	1,372,164	30	20	45,739	68,608
Madison	5,031,471	3,412,710	1,618,761	30	20	53,959	80,938
Marion	7,212,399	5,547,638	1,664,761	30	20	55,492	83,238
McDuffie	4,448,755	3,292,013	1,156,742	30	20	38,558	57,837
McIntosh	4,480,197	2,962,267	1,517,930	30	20	50,598	75,897
Meriwether	9,064,306	6,521,928	2,542,378	30	20	84,746	127,119

Miller	2,970,417	2,056,910	913,507	30	20	30,450	45,675
Mitchell	3,275,257	2,365,066	910,191	30	20	30,340	45,510
Monroe	6,723,657	4,999,188	1,724,469	30	20	57,482	86,223
Montgomery	3,323,553	2,375,583	947,970	30	20	31,599	47,399
Morgan	6,976,656	5,155,542	1,821,114	30	20	60,704	91,056
Murray	7,824,429	5,716,639	2,107,790	30	20	70,260	105,390
Muscogee	3,050,476	2,176,475	874,001	30	20	29,133	43,700
Newton	5,167,558	4,129,447	1,038,111	30	20	34,604	51,906
Oconee	2,669,055	1,990,082	678,973	30	20	22,632	33,949
Oglethorpe	10,103,590	7,505,699	2,597,891	30	20	86,596	129,895
Paulding	6,735,385	4,916,699	1,818,686	30	20	60,623	90,934
Peach	850,032	617,191	232,841	30	20	7,761	11,642
Pickens	5,426,775	3,789,635	1,637,140	30	20	54,571	81,857
Pierce	5,945,414	4,289,742	1,655,672	30	20	55,189	82,784
Pike	3,595,891	2,554,403	1,041,488	30	20	34,716	52,074
Polk	4,687,032	3,397,484	1,289,548	30	20	42,985	64,477
Pulaski	2,573,579	1,887,284	686,295	30	20	22,877	34,315
Putnam	6,333,496	4,584,535	1,748,961	30	20	58,299	87,448
Quitman	3,113,873	2,052,790	1,061,083	30	20	35,369	53,054
Rabun	14,140,807	10,906,877	3,233,930	30	20	107,798	161,697
Randolph	5,949,748	4,073,327	1,876,421	30	20	62,547	93,821
Richmond	4,098,764	3,001,166	1,097,598	30	20	36,587	54,880
Rockdale	1,849,103	1,460,002	389,101	30	20	12,970	19,455
Schley	2,814,773	2,016,197	798,576	30	20	26,619	39,929
Screven	13,168,133	9,767,866	3,400,267	30	20	113,342	170,013
Seminole	1,630,954	1,261,054	369,900	30	20	12,330	18,495
Spalding	2,860,637	2,109,936	750,701	30	20	25,023	37,535
Stephens	2,917,352	2,125,219	792,133	30	20	26,404	39,607
Stewart	7,158,845	4,571,646	2,587,199	30	20	86,240	129,360
Sumter	5,525,895	3,767,174	1,758,721	30	20	58,624	87,936
Talbot	7,773,753	5,110,099	2,663,654	30	20	88,788	133,183
Taliaferro	4,200,761	3,015,867	1,184,894	30	20	39,496	59,245
Tattnall	5,415,297	3,877,102	1,538,195	30	20	51,273	76,910
Taylor	4,893,768	3,009,272	1,884,496	30	20	62,817	94,225
Telfair	6,661,705	4,622,224	2,039,481	30	20	67,983	101,974
Terelll	3,967,599	2,802,174	1,165,425	30	20	38,848	58,271
Thomas	7,822,364	6,195,240	1,627,124	30	20	54,237	81,356
Tift	2,926,865	2,188,899	737,966	30	20	24,599	36,898
Toombs	3,731,953	2,592,235	1,139,718	30	20	37,991	56,986
Towns	4,629,245	3,506,029	1,123,216	30	20	37,441	56,161
Treutlen	3,471,506	2,685,642	785,864	30	20	26,195	39,293
Troup	9,563,067	7,081,228	2,481,839	30	20	82,728	124,092
Turner	2,292,853	1,654,088	638,765	30	20	21,292	31,938
Twiggs	8,468,609	5,951,091	2,517,518	30	20	83,917	125,876
Union	7,739,589	5,816,212	1,923,377	30	20	64,113	96,169
Upson	6,189,517	4,418,680	1,770,837	30	20	59,028	88,542
Walker	9,497,211	7,088,477	2,408,734	30	20	80,291	120,437
Walton	5,377,253	4,182,579	1,194,674	30	20	39,822	59,734
Ware	11,422,143	7,424,001	3,998,142	30	20	133,271	199,907
Warren	6,291,337	4,746,742	1,544,595	30	20	51,487	77,230
Washington	10,780,566	7,650,554	3,130,012	30	20	104,334	156,501
Wayne	9,141,492	6,226,078	2,915,414	30	20	97,180	145,771
Webster	2,467,716	1,523,231	944,485	30	20	31,483	47,224

Wheeler	6,615,268	4,841,924	1,773,344	30	20	59,111	88,667
White	7,118,913	5,351,110	1,767,803	30	20	58,927	88,390
Whitfield	3,929,925	2,987,888	942,037	30	20	31,401	47,102
Wilcox	6,571,876	4,676,593	1,895,283	30	20	63,176	94,764
Wilkes	8,749,655	6,398,824	2,350,831	30	20	78,361	117,542
Wilkinson	9,346,615	6,512,091	2,834,524	30	20	94,484	141,726
Worth	9,465,295	7,329,499	2,135,796	30	20	71,193	106,790
Total	969,301,356	704,097,848	265,203,508	30	20	8,840,117	13,260,175

Table A-2. Harvesting Residues, Volume and Weight of logging residues by county, 2003

	County Totals				
	Hardwood	***Softwood***	**Total Hardwood & Softwood**		
	thousand cubic feet/year			*cubic feet/year*	*dry tons/year*
APPLING	976	3,183	4,159	4,159,000	67,168
ATKINSON	279	1,440	1,719	1,719,000	27,762
BACON	789	1,588	2,377	2,377,000	38,389
BAKER	541	446	987	987,000	15,940
BALDWIN	655	963	1,618	1,618,000	26,131
BANKS	510	647	1,157	1,157,000	18,686
BARROW	96	106	202	202,000	3,262
BARTOW	594	1,466	2,060	2,060,000	33,269
BEN HILL	723	902	1,625	1,625,000	26,244
BERRIEN	324	1,322	1,646	1,646,000	26,583
BIBB	144	407	551	551,000	8,899
BLECKLEY	242	329	571	571,000	9,222
BRANTLEY	431	3,732	4,163	4,163,000	67,232
BROOKS	432	1,508	1,940	1,940,000	31,331
BRYAN	757	1,618	2,375	2,375,000	38,356
BULLOCH	1,013	2,440	3,453	3,453,000	55,766
BURKE	3,272	2,740	6,012	6,012,000	97,094
BUTTS	552	500	1,052	1,052,000	16,990
CALHOUN	665	692	1,357	1,357,000	21,916
CAMDEN	185	3,373	3,558	3,558,000	57,462
CANDLER	339	1,109	1,448	1,448,000	23,385
CARROLL	710	2,501	3,211	3,211,000	51,858
CATOOSA	344	58	402	402,000	6,492
CHARLTON	5	3,149	3,154	3,154,000	50,937
CHATHAM	973	1,713	2,686	2,686,000	43,379
CHATTAHOOCHEE	709	707	1,416	1,416,000	22,868
CHATTOOGA	267	892	1,159	1,159,000	18,718
CHEROKEE	356	1,797	2,153	2,153,000	34,771
CLARKE	12	68	80	80,000	1,292
CLAY	367	930	1,297	1,297,000	20,947
CLAYTON	347	148	495	495,000	7,994
CLINCH	831	5,484	6,315	6,315,000	101,987
COBB	90	86	176	176,000	2,842
COFFEE	613	1,783	2,396	2,396,000	38,695
COLQUITT	165	2,251	2,416	2,416,000	39,018
COLUMBIA	831	944	1,775	1,775,000	28,666
COOK	51	401	452	452,000	7,300
COWETA	642	2,238	2,880	2,880,000	46,512
CRAWFORD	1,230	1,072	2,302	2,302,000	37,177
CRISP	680	612	1,292	1,292,000	20,866
DADE	274	173	447	447,000	7,219
DAWSON	146	424	570	570,000	9,206
DECATUR	1,390	2,561	3,951	3,951,000	63,809
DEKALB	158	86	244	244,000	3,941
DODGE	1,957	2,200	4,157	4,157,000	67,136
DOOLY	404	1,857	2,261	2,261,000	36,515

DOUGHERTY	813	543	1,356	1,356,000	21,899
DOUGLAS	135	180	315	315,000	5,087
EARLY	747	1,398	2,145	2,145,000	34,642
ECHOLS	254	2,330	2,584	2,584,000	41,732
EFFINGHAM	1,193	2,491	3,684	3,684,000	59,497
ELBERT	1,293	768	2,061	2,061,000	33,285
EMANUEL	1,956	3,137	5,093	5,093,000	82,252
EVANS	488	836	1,324	1,324,000	21,383
FANNIN	661	255	916	916,000	14,793
FAYETTE	446	298	744	744,000	12,016
FLOYD	709	3,185	3,894	3,894,000	62,888
FORSYTH	357	409	766	766,000	12,371
FRANKLIN	63	339	402	402,000	6,492
FULTON	513	1,425	1,938	1,938,000	31,299
GILMER	260	395	655	655,000	10,578
GLASCOCK	622	554	1,176	1,176,000	18,992
GLYNN	84	2,713	2,797	2,797,000	45,172
GORDON	393	506	899	899,000	14,519
GRADY	843	1,468	2,311	2,311,000	37,323
GREENE	606	1,916	2,522	2,522,000	40,730
GWINNETT	592	790	1,382	1,382,000	22,319
HABERSHAM	820	717	1,537	1,537,000	24,823
HALL	138	584	722	722,000	11,660
HANCOCK	2,343	2,531	4,874	4,874,000	78,715
HARALSON	266	1,089	1,355	1,355,000	21,883
HARRIS	845	1,929	2,774	2,774,000	44,800
HART	85	100	185	185,000	2,988
HEARD	254	2,307	2,561	2,561,000	41,360
HENRY	664	958	1,622	1,622,000	26,195
HOUSTON	387	1,252	1,639	1,639,000	26,470
IRWIN	184	969	1,153	1,153,000	18,621
JACKSON	107	742	849	849,000	13,711
JASPER	570	1,163	1,733	1,733,000	27,988
JEFF DAVIS	5,589	2,290	7,879	7,879,000	127,246
JEFFERSON	3,371	2,263	5,634	5,634,000	90,989
JENKINS	1,124	2,168	3,292	3,292,000	53,166
JOHNSON	1,827	1,538	3,365	3,365,000	54,345
JONES	606	1,213	1,819	1,819,000	29,377
LAMAR	348	361	709	709,000	11,450
LANIER	1	876	877	877,000	14,164
LAURENS	1,733	2,216	3,949	3,949,000	63,776
LEE	1,032	946	1,978	1,978,000	31,945
LIBERTY	1,176	2,168	3,344	3,344,000	54,006
LINCOLN	368	1,023	1,391	1,391,000	22,465
LONG	1,569	2,726	4,295	4,295,000	69,364
LOWNDES	422	1,729	2,151	2,151,000	34,739
LUMPKIN	210	282	492	492,000	7,946
MCDUFFIE	505	1,129	1,634	1,634,000	26,389
MCINTOSH	658	1,319	1,977	1,977,000	31,929
MACON	1,294	1,444	2,738	2,738,000	44,219
MADISON	67	992	1,059	1,059,000	17,103
MARION	529	1,756	2,285	2,285,000	36,903
MERIWETHER	825	1,606	2,431	2,431,000	39,261

MILLER	146	238	384	384,000	6,202
MITCHELL	1,046	1,755	2,801	2,801,000	45,236
MONROE	1,283	1,949	3,232	3,232,000	52,197
MONTGOMERY	914	1,169	2,083	2,083,000	33,640
MORGAN	407	1,612	2,019	2,019,000	32,607
MURRAY	976	772	1,748	1,748,000	28,230
MUSCOGEE	465	917	1,382	1,382,000	22,319
NEWTON	276	601	877	877,000	14,164
OCONEE	98	542	640	640,000	10,336
OGLETHORPE	962	2,139	3,101	3,101,000	50,081
PAULDING	841	1,456	2,297	2,297,000	37,097
PEACH	-	261	261	261,000	4,215
PICKENS	137	932	1,069	1,069,000	17,264
PIERCE	590	1,522	2,112	2,112,000	34,109
PIKE	338	400	738	738,000	11,919
POLK	276	1,354	1,630	1,630,000	26,325
PULASKI	558	857	1,415	1,415,000	22,852
PUTNAM	446	1,412	1,858	1,858,000	30,007
QUITMAN	276	654	930	930,000	15,020
RABUN	116	114	230	230,000	3,715
RANDOLPH	1,502	1,716	3,218	3,218,000	51,971
RICHMOND	1,199	537	1,736	1,736,000	28,036
ROCKDALE	14	126	140	140,000	2,261
SCHLEY	439	1,096	1,535	1,535,000	24,790
SCREVEN	1,885	3,495	5,380	5,380,000	86,887
SEMINOLE	130	712	842	842,000	13,598
SPALDING	68	226	294	294,000	4,748
STEPHENS	514	298	812	812,000	13,114
STEWART	2,133	2,530	4,663	4,663,000	75,307
SUMTER	2,075	1,488	3,563	3,563,000	57,542
TALBOT	892	1,401	2,293	2,293,000	37,032
TALIAFERRO	531	1,214	1,745	1,745,000	28,182
TATTNALL	724	1,092	1,816	1,816,000	29,328
TAYLOR	1,929	1,077	3,006	3,006,000	48,547
TELFAIR	1,218	2,578	3,796	3,796,000	61,305
TERRELL	1,074	1,204	2,278	2,278,000	36,790
THOMAS	871	2,300	3,171	3,171,000	51,212
TIFT	352	461	813	813,000	13,130
TOOMBS	859	2,114	2,973	2,973,000	48,014
TOWNS	29	23	52	52,000	840
TREUTLEN	410	1,424	1,834	1,834,000	29,619
TROUP	1,501	1,019	2,520	2,520,000	40,698
TURNER	83	799	882	882,000	14,244
TWIGGS	874	1,098	1,972	1,972,000	31,848
UNION	201	103	304	304,000	4,910
UPSON	279	954	1,233	1,233,000	19,913
WALKER	352	803	1,155	1,155,000	18,653
WALTON	101	473	574	574,000	9,270
WARE	168	3,619	3,787	3,787,000	61,160
WARREN	1,683	1,987	3,670	3,670,000	59,271
WASHINGTON	3,588	2,954	6,542	6,542,000	105,653
WAYNE	669	4,189	4,858	4,858,000	78,457
WEBSTER	801	1,530	2,331	2,331,000	37,646

WHEELER	1,107	1,596	2,703	2,703,000	43,653
WHITE	291	360	651	651,000	10,514
WHITFIELD	779	670	1,449	1,449,000	23,401
WILCOX	461	1,894	2,355	2,355,000	38,033
WILKES	2,385	2,685	5,070	5,070,000	81,881
WILKINSON	1,825	1,436	3,261	3,261,000	52,665
WORTH	194	1,796	1,990	1,990,000	32,139
Total	116,357	212,701	329,058	329,058,000	5,314,287

Table A- 3. Mill Residues, 2003

	Mill Residue Categories			
County	**bark (dry tons/yr)**	**wood residue: coarse (dry tons/yr)**	**wood residue: fines (dry tons/yr)**	**Amount Unutilized County Total (dry tons/yr)**
Appling	69,000	147,000	113,000	329,000
Atkinson	-	-	-	-
Bacon	-	-	-	-
Baker	-	-	-	-
Baldwin	-	-	-	-
Banks	-	-	-	-
Barrow	-	-	-	-
Bartow	-	-	-	-
Ben Hill	54,000	115,000	79,000	248,000
Berrien	-	-	-	-
Bibb	-	-	-	-
Bleckley	-	-	-	-
Brantley	38,000	128,000	99,000	265,000
Brooks	-	-	-	-
Bryan	-	-	-	-
Bulloch	44,000	128,000	117,000	289,000
Burke	-	-	-	-
Butts	-	-	-	-
Calhoun	-	-	-	-
Camden	-	-	-	-
Candler	-	-	-	-
Carroll	1,000	3,000	2,000	6,000
Catoosa	-	-	-	-
Charlton	-	-	-	-
Chatham	149,000	2,000	2,000	153,000
Chattahoochee	-	-	-	-
Chattooga	-	-	-	-
Cherokee	-	-	-	-
Clarke	-	-	-	-
Clay	-	-	-	-
Clayton	-	-	-	-
Clinch	25,000	53,000	23,000	101,000
Cobb	-	-	-	-
Coffee	-	-	-	-
Colquitt	-	-	-	-
Columbia	-	-	-	-
Cook	5,000	16,000	10,000	31,000
Coweta	-	-	-	-
Crawford	-	-	-	-
Crisp	90,000	22,000	21,000	133,000

Dade	-	-	-	-
Dawson	-	-	-	-
De Kalb	-	-	-	-
Decatur	-	-	-	-
Dodge	25,000	14,000	11,000	50,000
Dooly	-	-	-	-
Dougherty	-	-	-	-
Douglas	-	-	-	-
Early	157,000	-	-	157,000
Echols	-	-	-	-
Effingham	26,000	90,000	68,000	184,000
Elbert	-	-	-	-
Emanuel	57,000	128,000	109,000	294,000
Evans	-	-	-	-
Fannin	1,000	3,000	3,000	7,000
Fayette	-	-	-	-
Floyd	177,000	115,000	94,000	386,000
Forsyth	-	-	-	-
Franklin	-	-	-	-
Fulton	-	-	-	-
Gilmer	5,000	16,000	8,000	29,000
Glascock	-	-	-	-
Glynn	-	-	-	-
Gordon	-	-	-	-
Grady	11,000	29,000	25,000	65,000
Greene	-	-	-	-
Gwinnett	-	-	-	-
Habersham	3,000	7,000	5,000	15,000
Hall	1,000	2,000	1,000	4,000
Hancock	-	-	-	-
Haralson	-	-	-	-
Harris	-	-	-	-
Hart	-	-	-	-
Heard	-	-	-	-
Henry	-	-	-	-
Houston	-	-	-	-
Irwin	-	-	-	-
Jackson	-	-	-	-
Jasper	65,000	222,000	172,000	459,000
Jeff Davis	32,000	71,000	68,000	171,000
Jefferson	29,000	78,000	55,000	162,000
Jenkins	-	-	-	-
Johnson	-	-	-	-
Jones	-	-	-	-
Lamar	-	-	-	-
Lanier	-	-	-	-
Laurens	20,000	69,000	54,000	143,000

Lee	-	-	-	-
Liberty	151,000	7,000	6,000	164,000
Lincoln	-	-	-	-
Long	-	-	-	-
Lowndes	160,000	95,000	85,000	340,000
Lumpkin	2,000	4,000	4,000	10,000
Macon	89,000	59,000	56,000	204,000
Madison	131,000	23,000	30,000	184,000
Marion	-	-	-	-
McDuffie	-	-	-	-
McIntosh	-	-	-	-
Meriwether	49,000	131,000	127,000	307,000
Miller	-	-	-	-
Mitchell	-	-	-	-
Monroe	84,000	30,000	21,000	135,000
Montgomery	-	-	-	-
Morgan	-	-	-	-
Murray	-	-	-	-
Muscogee	-	-	-	-
Newton	-	-	-	-
Oconee	-	-	-	-
Oglethorpe	-	-	-	-
Paulding	-	-	-	-
Peach	-	-	-	-
Pickens	-	-	-	-
Pierce	148,000	100,000	62,000	310,000
Pike	-	-	-	-
Polk	-	-	-	-
Pulaski	-	-	-	-
Putnam	28,000	86,000	65,000	179,000
Quitman	-	-	-	-
Rabun	-	-	-	-
Randolph	-	-	-	-
Richmond	139,000	106,000	97,000	342,000
Rockdale	-	-	-	-
Schley	-	-	-	-
Screven	2,000	5,000	3,000	10,000
Seminole	-	-	-	-
Spalding	-	-	-	-
Stephens	-	-	-	-
Stewart	-	-	-	-
Sumter	-	-	-	-
Talbot	-	-	-	-
Taliaferro	-	-	-	-
Tattnall	-	-	-	-
Taylor	-	-	-	-
Telfair	-	-	-	-

Terelll	-	-	-	-
Thomas	61,000	139,000	104,000	304,000
Tift	-	-	-	-
Toombs	31,000	13,000	3,000	47,000
Towns	-	-	-	-
Treutlen	-	-	-	-
Troup	-	-	-	-
Turner	-	-	-	-
Twiggs	-	-	-	-
Union	-	-	-	-
Upson	37,000	125,000	99,000	261,000
Walker	-	-	-	-
Walton	-	-	-	-
Ware	-	-	-	-
Warren	28,000	90,000	70,000	188,000
Washington	-	-	-	-
Wayne	-	-	-	-
Webster	27,000	68,000	65,000	160,000
Wheeler	-	-	-	-
White	6,000	19,000	14,000	39,000
Whitfield	6,000	15,000	13,000	34,000
Wilcox	-	-	-	-
Wilkes	7,000	21,000	17,000	45,000
Wilkinson	9,000	24,000	16,000	49,000
Worth	-	-	-	-
Total	2,279,000	2,618,000	2,096,000	6,993,000

Reference: Timber Product Output (TPO) Reports, Forest Inventory and Analysis, Southern Research Station, USDA Forest Service

Table A-4. Georgia Urban Wood Waste Supply Curve

	7/1/1999		Dry tons available at different prices				
	Estimate		Qty @ $12.50/dt	Qty @ $15/dt	Qty @ $20/dt	Qty @ $25/dt	Qty @ $30/dt
Counties	**7,788,240**		**86,209**	**172,419**	**862,094**	**1,149,459**	**1,436,823**
APPLING	16,675	0.00	185	369	1,846	2,461	3,076
ATKINSON	7,295	0.00	81	161	807	1,077	1,346
BACON	10,365	0.00	115	229	1,147	1,530	1,912
BAKER	3,617	0.00	40	80	400	534	667
BALDWIN	42,181	0.01	467	934	4,669	6,225	7,782
BANKS	13,166	0.00	146	291	1,457	1,943	2,429
BARROW	41,891	0.01	464	927	4,637	6,183	7,728
BARTOW	74,607	0.01	826	1,652	8,258	11,011	13,764
BEN HILL	17,474	0.00	193	387	1,934	2,579	3,224
BERRIEN	16,529	0.00	183	366	1,830	2,439	3,049
BIBB	155,441	0.02	1,721	3,441	17,206	22,941	28,677
BLECKLEY	11,314	0.00	125	250	1,252	1,670	2,087
BRANTLEY	13,895	0.00	154	308	1,538	2,051	2,563
BROOKS	16,122	0.00	178	357	1,785	2,379	2,974
BRYAN	24,394	0.00	270	540	2,700	3,600	4,500
BULLOCH	50,777	0.01	562	1,124	5,621	7,494	9,368
BURKE	23,217	0.00	257	514	2,570	3,427	4,283
BUTTS	18,380	0.00	203	407	2,035	2,713	3,391
CALHOUN	4,936	0.00	55	109	546	728	911
CAMDEN	47,032	0.01	521	1,041	5,206	6,941	8,677
CANDLER	8,953	0.00	99	198	991	1,321	1,652
CARROLL	84,765	0.01	938	1,877	9,383	12,510	15,638
CATOOSA	52,100	0.01	577	1,153	5,767	7,689	9,612
CHARLTON	9,462	0.00	105	209	1,047	1,396	1,746
CHATHAM	225,662	0.03	2,498	4,996	24,979	33,305	41,632
CHATTAHOOCHEE	16,654	0.00	184	369	1,843	2,458	3,072
CHATTOOGA	22,858	0.00	253	506	2,530	3,374	4,217
CHEROKEE	141,686	0.02	1,568	3,137	15,683	20,911	26,139
CLARKE	90,638	0.01	1,003	2,007	10,033	13,377	16,721
CLAY	3,524	0.00	39	78	390	520	650
CLAYTON	213,727	0.03	2,366	4,732	23,658	31,544	39,430
CLINCH	6,677	0.00	74	148	739	985	1,232
COBB	583,541	0.07	6,459	12,919	64,593	86,124	107,655
COFFEE	34,958	0.00	387	774	3,870	5,159	6,449
COLQUITT	40,724	0.01	451	902	4,508	6,010	7,513
COLUMBIA	93,312	0.01	1,033	2,066	10,329	13,772	17,215
COOK	15,197	0.00	168	336	1,682	2,243	2,804
COWETA	89,401	0.01	990	1,979	9,896	13,195	16,493
CRAWFORD	10,414	0.00	115	231	1,153	1,537	1,921
CRISP	20,637	0.00	228	457	2,284	3,046	3,807
DADE	15,344	0.00	170	340	1,698	2,265	2,831
DAWSON	15,945	0.00	176	353	1,765	2,353	2,942
DE KALB	596,853	0.08	6,607	13,213	66,067	88,089	110,111
DECATUR	27,128	0.00	300	601	3,003	4,004	5,005
DODGE	18,146	0.00	201	402	2,009	2,678	3,348
DOOLY	10,433	0.00	115	231	1,155	1,540	1,925
DOUGHERTY	94,080	0.01	1,041	2,083	10,414	13,885	17,356

DOUGLAS	91,175	0.01	1,009	2,018	10,092	13,456	16,821
EARLY	12,127	0.00	134	268	1,342	1,790	2,237
ECHOLS	2,534	0.00	28	56	280	374	467
EFFINGHAM	38,370	0.00	425	849	4,247	5,663	7,079
ELBERT	19,363	0.00	214	429	2,143	2,858	3,572
EMANUEL	21,042	0.00	233	466	2,329	3,106	3,882
EVANS	10,089	0.00	112	223	1,117	1,489	1,861
FANNIN	18,945	0.00	210	419	2,097	2,796	3,495
FAYETTE	92,378	0.01	1,023	2,045	10,225	13,634	17,042
FLOYD	85,512	0.01	947	1,893	9,465	12,621	15,776
FORSYTH	96,686	0.01	1,070	2,140	10,702	14,270	17,837
FRANKLIN	19,311	0.00	214	428	2,138	2,850	3,563
FULTON	744,827	0.10	8,245	16,489	82,446	109,928	137,410
GILMER	19,766	0.00	219	438	2,188	2,917	3,647
GLASCOCK	2,544	0.00	28	56	282	375	469
GLYNN	67,945	0.01	752	1,504	7,521	10,028	12,535
GORDON	41,966	0.01	465	929	4,645	6,194	7,742
GRADY	21,600	0.00	239	478	2,391	3,188	3,985
GREENE	14,094	0.00	156	312	1,560	2,080	2,600
GWINNETT	545,632	0.07	6,040	12,079	60,397	80,529	100,662
HABERSHAM	32,530	0.00	360	720	3,601	4,801	6,001
HALL	123,290	0.02	1,365	2,729	13,647	18,196	22,745
HANCOCK	9,046	0.00	100	200	1,001	1,335	1,669
HARALSON	25,070	0.00	278	555	2,775	3,700	4,625
HARRIS	22,634	0.00	251	501	2,505	3,341	4,176
HART	22,124	0.00	245	490	2,449	3,265	4,082
HEARD	10,490	0.00	116	232	1,161	1,548	1,935
HENRY	113,443	0.01	1,256	2,511	12,557	16,743	20,929
HOUSTON	107,644	0.01	1,192	2,383	11,915	15,887	19,859
IRWIN	9,181	0.00	102	203	1,016	1,355	1,694
JACKSON	39,057	0.01	432	865	4,323	5,764	7,205
JASPER	10,589	0.00	117	234	1,172	1,563	1,954
JEFF DAVIS	12,714	0.00	141	281	1,407	1,876	2,346
JEFFERSON	17,858	0.00	198	395	1,977	2,636	3,295
JENKINS	8,401	0.00	93	186	930	1,240	1,550
JOHNSON	8,293	0.00	92	184	918	1,224	1,530
JONES	23,307	0.00	258	516	2,580	3,440	4,300
LAMAR	15,010	0.00	166	332	1,661	2,215	2,769
LANIER	6,959	0.00	77	154	770	1,027	1,284
LAURENS	43,927	0.01	486	972	4,862	6,483	8,104
LEE	23,341	0.00	258	517	2,584	3,445	4,306
LIBERTY	59,694	0.01	661	1,322	6,608	8,810	11,013
LINCOLN	8,339	0.00	92	185	923	1,231	1,538
LONG	8,709	0.00	96	193	964	1,285	1,607
LOWNDES	85,413	0.01	945	1,891	9,455	12,606	15,758
LUMPKIN	19,772	0.00	219	438	2,189	2,918	3,648
MACON	13,126	0.00	145	291	1,453	1,937	2,422
MADISON	25,208	0.00	279	558	2,790	3,720	4,651
MARION	6,779	0.00	75	150	750	1,001	1,251
MCDUFFIE	21,814	0.00	241	483	2,415	3,220	4,024
MCINTOSH	10,114	0.00	112	224	1,120	1,493	1,866
MERIWETHER	23,043	0.00	255	510	2,551	3,401	4,251
MILLER	6,318	0.00	70	140	699	932	1,166

MITCHELL	21,219	0.00	235	470	2,349	3,132	3,915
MONROE	20,032	0.00	222	443	2,217	2,957	3,696
MONTGOMERY	7,854	0.00	87	174	869	1,159	1,449
MORGAN	15,437	0.00	171	342	1,709	2,278	2,848
MURRAY	33,922	0.00	375	751	3,755	5,007	6,258
MUSCOGEE	182,058	0.02	2,015	4,030	20,152	26,870	33,587
NEWTON	60,583	0.01	671	1,341	6,706	8,941	11,177
OCONEE	24,526	0.00	271	543	2,715	3,620	4,525
OGLETHORPE	11,564	0.00	128	256	1,280	1,707	2,133
PAULDING	79,587	0.01	881	1,762	8,810	11,746	14,683
PEACH	24,996	0.00	277	553	2,767	3,689	4,611
PICKENS	21,024	0.00	233	465	2,327	3,103	3,879
PIERCE	15,804	0.00	175	350	1,749	2,332	2,916
PIKE	13,104	0.00	145	290	1,451	1,934	2,418
POLK	36,627	0.00	405	811	4,054	5,406	6,757
PULASKI	8,359	0.00	93	185	925	1,234	1,542
PUTNAM	18,199	0.00	201	403	2,014	2,686	3,357
QUITMAN	2,449	0.00	27	54	271	361	452
RABUN	13,687	0.00	152	303	1,515	2,020	2,525
RANDOLPH	8,012	0.00	89	177	887	1,182	1,478
RICHMOND	190,310	0.02	2,107	4,213	21,066	28,088	35,110
ROCKDALE	68,968	0.01	763	1,527	7,634	10,179	12,724
SCHLEY	3,949	0.00	44	87	437	583	729
SCREVEN	14,463	0.00	160	320	1,601	2,135	2,668
SEMINOLE	9,803	0.00	109	217	1,085	1,447	1,809
SPALDING	57,825	0.01	640	1,280	6,401	8,534	10,668
STEPHENS	25,332	0.00	280	561	2,804	3,739	4,673
STEWART	5,374	0.00	59	119	595	793	991
SUMTER	31,362	0.00	347	694	3,472	4,629	5,786
TALBOT	6,969	0.00	77	154	771	1,029	1,286
TALIAFERRO	1,924	0.00	21	43	213	284	355
TATTNALL	19,171	0.00	212	424	2,122	2,829	3,537
TAYLOR	8,287	0.00	92	183	917	1,223	1,529
TELFAIR	11,406	0.00	126	253	1,263	1,683	2,104
TERRELL	11,205	0.00	124	248	1,240	1,654	2,067
THOMAS	42,896	0.01	475	950	4,748	6,331	7,914
TIFT	36,975	0.00	409	819	4,093	5,457	6,821
TOOMBS	25,990	0.00	288	575	2,877	3,836	4,795
TOWNS	8,800	0.00	97	195	974	1,299	1,623
TREUTLEN	5,933	0.00	66	131	657	876	1,095
TROUP	58,801	0.01	651	1,302	6,509	8,678	10,848
TURNER	9,249	0.00	102	205	1,024	1,365	1,706
TWIGGS	10,198	0.00	113	226	1,129	1,505	1,881
UNION	17,234	0.00	191	382	1,908	2,544	3,179
UPSON	27,079	0.00	300	599	2,997	3,997	4,996
WALKER	62,963	0.01	697	1,394	6,969	9,293	11,616
WALTON	58,498	0.01	648	1,295	6,475	8,634	10,792
WARE	35,232	0.00	390	780	3,900	5,200	6,500
WARREN	6,075	0.00	67	134	672	897	1,121
WASHINGTON	20,198	0.00	224	447	2,236	2,981	3,726
WAYNE	25,610	0.00	283	567	2,835	3,780	4,725
WEBSTER	2,203	0.00	24	49	244	325	406
WHEELER	4,864	0.00	54	108	538	718	897

WHITE	18,195	0.00	201	403	2,014	2,685	3,357
WHITFIELD	83,220	0.01	921	1,842	9,212	12,282	15,353
WILCOX	7,419	0.00	82	164	821	1,095	1,369
WILKES	10,556	0.00	117	234	1,168	1,558	1,947
WILKINSON	10,908	0.00	121	241	1,207	1,610	2,012
WORTH	22,483	0.00	249	498	2,489	3,318	4,148
TOTAL	7,788,240		86,209	172,419	862,094	1,149,459	1,436,823
Source: Marie Walsh, ORNL, Biomass Feedstock Development Program, Oak Ridge, TN							

Table A-5. Georgia Pecan Shells, 2002

0.415 lb shell	1200 lb of pecans
lb of pecan	acre

Georgia Counties	Bearing Acres	lbs of pecans	lbs of pecan shell	tons of pecan shells	Dry tons/year of pecan shells
Appling	1,073	1,287,600	534,354	267	226
Atkinson	197	236,400	98,106	49	41
Bacon	213	255,600	106,074	53	45
Baker	100	120,000	49,800	25	21
Baldwin	74	88,800	36,852	18	16
Banks		-	-	-	-
Barrow		-	-	-	-
Bartow		-	-	-	-
Ben Hill	210	252,000	104,580	52	44
Berrien	1,699	2,038,800	846,102	423	357
Bibb	336	403,200	167,328	84	71
Bleckley	249	298,800	124,002	62	52
Brantley	153	183,600	76,194	38	32
Brooks	1,836	2,203,200	914,328	457	386
Bryan		-	-	-	-
Bulloch	1,002	1,202,400	498,996	249	211
Burke	637	764,400	317,226	159	134
Butts	107	128,400	53,286	27	23
Calhoun	2,413	2,895,600	1,201,674	601	508
Camden		-	-	-	-
Candler	345	414,000	171,810	86	73
Carroll	15	18,000	7,470	4	3
Catoosa	11	13,200	5,478	3	2
Charlton		-	-	-	-
Chatham		-	-	-	-
Chattahoochee		-	-	-	-
Chattooga		-	-	-	-
Cherokee		-	-	-	-
Clarke		-	-	-	-
Clay		-	-	-	-
Clayton		-	-	-	-
Clinch	25	30,000	12,450	6	5
Cobb		-	-	-	-
Coffee	487	584,400	242,526	121	102
Colquitt	1,262	1,514,400	628,476	314	266
Columbia	51	61,200	25,398	13	11
Cook	279	334,800	138,942	69	59
Coweta	12	14,400	5,976	3	3
Crawford	3,019	3,622,800	1,503,462	752	635
Crisp	3,832	4,598,400	1,908,336	954	806
Dade	738	885,600	367,524	184	155
Dawson		-	-	-	-
De Kalb		-	-	-	-
Decatur		-	-	-	-
Dodge		-	-	-	-

Dooly	2,549	3,058,800	1,269,402	635	536
Dougherty	12,185	14,622,000	6,068,130	3,034	2,564
Douglas		-	-	-	-
Early	497	596,400	247,506	124	105
Echols		-	-	-	-
Effingham		-	-	-	-
Elbert	46	55,200	22,908	11	10
Emanuel	1,346	1,615,200	670,308	335	283
Evans	679	814,800	338,142	169	143
Fannin		-	-	-	-
Fayette		-	-	-	-
Floyd		-	-	-	-
Forsyth		-	-	-	-
Franklin	4	4,800	1,992	1	1
Fulton		-	-	-	-
Gilmer		-	-	-	-
Glascock	21	25,200	10,458	5	4
Glynn		-	-	-	-
Gordon		-	-	-	-
Grady	2,519	3,022,800	1,254,462	627	530
Greene	28	33,600	13,944	7	6
Gwinnett	22	26,400	10,956	5	5
Habersham		-	-	-	-
Hall		-	-	-	-
Hancock	339	406,800	168,822	84	71
Haralson		-	-	-	-
Harris	74	88,800	36,852	18	16
Hart		-	-	-	-
Heard		-	-	-	-
Henry		-	-	-	-
Houston	1,196	1,435,200	595,608	298	252
Irwin	1,320	1,584,000	657,360	329	278
Jackson	6	7,200	2,988	1	1
Jasper		-	-	-	-
Jeff Davis	88	105,600	43,824	22	19
Jefferson	1,416	1,699,200	705,168	353	298
Jenkins	401	481,200	199,698	100	84
Johnson	123	147,600	61,254	31	26
Jones		-	-	-	-
Lamar	461	553,200	229,578	115	97
Lanier	1,335	1,602,000	664,830	332	281
Laurens	249	298,800	124,002	62	52
Lee	5,923	7,107,600	2,949,654	1,475	1,246
Liberty	31	37,200	15,438	8	7
Lincoln		-	-	-	-
Long		-	-	-	-
Lowndes	2,866	3,439,200	1,427,268	714	603
Lumpkin		-	-	-	-
Macon	3,677	4,412,400	1,831,146	916	774
Madison	10	12,000	4,980	2	2
Marion	74	88,800	36,852	18	16
McDuffie	249	298,800	124,002	62	52
McIntosh		-	-	-	-

Meriwether	104	124,800	51,792	26	22
Miller		-	-	-	-
Mitchell	7,968	9,561,600	3,968,064	1,984	1,677
Monroe		-	-	-	-
Montgomery	824	988,800	410,352	205	173
Morgan	361	433,200	179,778	90	76
Murray		-	-	-	-
Muscogee		-	-	-	-
Newton	20	24,000	9,960	5	4
Oconee	33	39,600	16,434	8	7
Oglethorpe	12	14,400	5,976	3	3
Paulding		-	-	-	-
Peach	6,321	7,585,200	3,147,858	1,574	1,330
Pickens	1,040	1,248,000	517,920	259	219
Pierce		-	-	-	-
Pike	197	236,400	98,106	49	41
Polk	833	999,600	414,834	207	175
Pulaski		-	-	-	-
Putnam	10	12,000	4,980	2	2
Quitman		-	-	-	-
Rabun		-	-	-	-
Randolph		-	-	-	-
Richmond	47	56,400	23,406	12	10
Rockdale		-	-	-	-
Schley	98	117,600	48,804	24	21
Screven		-	-	-	-
Seminole	169	202,800	84,162	42	36
Spalding	102	122,400	50,796	25	21
Stephens		-	-	-	-
Stewart	150	180,000	74,700	37	32
Sumter	2,964	3,556,800	1,476,072	738	624
Talbot	112	134,400	55,776	28	24
Taliaferro		-	-	-	-
Tattnall	2,442	2,930,400	1,216,116	608	514
Taylor		-	-	-	-
Telfair	1,722	2,066,400	857,556	429	362
Terelll	1,225	1,470,000	610,050	305	258
Thomas	3,393	4,071,600	1,689,714	845	714
Tift	969	1,162,800	482,562	241	204
Toombs	780	936,000	388,440	194	164
Towns		-	-	-	-
Treutlen	31	37,200	15,438	8	7
Troup	23	27,600	11,454	6	5
Turner	5,651	6,781,200	2,814,198	1,407	1,189
Twiggs	44	52,800	21,912	11	9
Union		-	-	-	-
Upson		-	-	-	-
Walker		-	-	-	-
Walton		-	-	-	-
Ware	1,019	1,222,800	507,462	254	214
Warren	202	242,400	100,596	50	43
Washington	3,696	4,435,200	1,840,608	920	778
Wayne	444	532,800	221,112	111	93

Webster	922	1,106,400	459,156	230	194
Wheeler	246	295,200	122,508	61	52
White	2	2,400	996	0	0
Whitfield	598	717,600	297,804	149	126
Wilcox		-	-	-	-
Wilkes		-	-	-	-
Wilkinson		-	-	-	-
Worth	1,090	1,308,000	542,820	271	229
Total	105,973	127,167,600	52,774,554	26,387	22,297

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Table A-6. Papermill Sludge Production, 2002

Georgia Counties	Cities	Tons/day	Product (Total) production tons/day/county	Product category (NCASI)	mean dry lb per short ton shipped product	Dry tons/ year/sludge
Bibb	Macon	Armstrong World Industries Inc.- moulded pulp egg cartons 100, Riverwood International Corp- coated unbleached kraft and mottled white linearboard 1600	1700	**R** - recycle container & box - nondeinked 53, unbleached container & box - unbleached kraft 47, **A**- construction 100%	53 of 88.1 and 47 of 56 and 20.4 of 100	5,960
Camden	St. Marys	**Kraft**-Durango-Georgia Paper Co.-specialty and converting papers 700, C1S bleached board 500	1200	bleached container & box (or plus market pulp) -bleached kraft 56.96%,unbleached container & box - unbleached kraft 27.93%,printing & writing bleached kraft 15.11%	81.2 of 56.96% and 56 of 27.93% and 138 of 15.11%	18,121
Chatham	Savannah	International Paper Co.- Kraft bag and wrapping,coated papers 3400	3400	unbleached container & box- unbleached kraft 100%	56	34,748
Cobb	Roswell, Marietta,Austell	headquarters and pulp mills				-
Dougherty	Albany	Procter & Gamble Paper Products Co.- sanitary tissue,household paper products	tel 229-883-2000	printing & writing - purchased	130	-

Early	Cedar Springs	Geogia-Pacific Corp- unbleached kraft linear board 2270,Semichemical corrugation medium 665	2935	unbleached container & box- unbleached kraft 100%	56	29,996
Effingham	Rincon	Geogia-Pacific Corp- call 912-826-5216		tissue & toweling - deinked 100%		-
Floyd	Rome	Inland Paper Board & Packaging, Inc.- Unlbleached kraft linear board 2350	2350	unbleached container & box - unbleached kraft 100%	56	24,017
Glynn	Brunswick	Geogia-Pacific Corp.- bleached container board,linerboard,packaging board 400; bleached softwood kraft filter paper grade and fluff market pulps 1860 airdry tonnes.	2260	market pulp - bleached kraft or sulfite 100%	70.4	29,036
Laurens	Dublin	SP Newsprint Co.- recycled containerboard 1525	1525	newsprint - deinked 100%	524	145,836
Liberty	Riceboro	Interstate Paper L.L.C.- unbleached kraft linerboard,drum liners 760	760	unbleached container & box - unbleached kraft 100%	56	7,767
Lowndes	Valdosta	Packaging Corp of America- unbleached kraft linerboard 1250	1250	unbleached container & box - unbleached kraft 100%	56	12,775
Macon	Oglethorpe	just pulp mill				-
Polk	Cedartown	Smurfit-Stone Container Corp- tube stock 70.	70	recycle container & box - nondeinked 100%	88.1	1,125

Pulaski	Hawkinsville	Hollingsworth & Vose Co.- industrial and technical specialty papers 35	35	packaging & industrial - purchased 100%	178	1,137
Richmond	Augusta	*Augusta Newsprint Co.*- recycled content newsprint 1200 metric tons or 1181 tons; *Deerfield Specialty Papers Inc* .- Grease proof and glassine specialty papers 45; *International Paper Co.*- blister board, bleached paperboard and linerboard 1860	3105	*n*ewsprint - mechanical (or plus deinked) 100%, **D** - packaging & industrial -purchased 100%, **I** - market pulp-bleached kraft or sulfite 6%, bleached container & kraft (or plus market pulp)-bleached kraft 94%	**N**- 197 of 100%,**D**- 178 of 100%, **I**- 70.4 0f 6% and 81.2 of 94%	71,265
Rockdale	Conyers	Pratt Industries Inc. headquarters; Visy Paper Inc.- recycled container board 780	780	recycle container & box - nondeinked 100%	88.1	12,541
Wayne	Jesup	just pulp mill				
Wilkes	Washington	Paper-Pak Products, Inc.- Cellulose wadding 25	25	tissue and toweling - nondeinked 100%	194	885
Total						395,210

Table A-7. Black Liquor Production, Georgia, 2002

		Production tons/day			Estimated Black Liqour Solids (dry tons)/day	County Annual (dry tons/year)
County	**Company**	**Pulp**	**Paper**	**Board**		
Bibb	Armstrong	900			1,350	
	Pactiv Corp.			100		
	Graphics Packaging			1,600	2,400	1,350,000
Chatham	Smurfit Stone (board)/Weyerhaeuser (pulp)			950	1,425	
	IP			3,400	5,100	2,349,000
Cobb	Austell Boxboard			420	630	
	Sweetwater Paper		340		510	410,400
Decatur	G-P			2,935	4,403	1,584,900
Floyd	Temple-Inland			2,350	3,525	1,269,000
Glynn	G-P	1,860		400	3,390	1,220,400
Laurens	SP Newsprint		1,525		572	205,875
Liberty	Interstate			760	1,140	410,400
Lowndess	PCA			1,250	1,875	675,000
Macon	Weyerhaeuser	1,050			1,575	567,000
Richmond	Augusta Newsprint		1,200		450	
	Deerfield Specialty Papers		45			
	IP			1,860	2,790	1,166,400
Wayne	Rayonier	1,589			2,384	858,060
Total		5,399	3,110	16,025	33,518	12,066,435

Reference: Jim Frederick, Georgia Institute of Technology, Institute of Paper Science & Technology

**Calculated on a 360 day year*

Table A-8. Georgia Combined Resource Chart (Residues GENERATED), Dry tons per year

	Forestry		Forestry Primary Processing Residues							
Georgia Counties	Unmerchantable standing timber, 20 year Growth Cycle (dry tons/year)	Harvesting Residues (dry tons/year)	Mill residues - bark (dry tons/year)	Mill residues - coarse wood (dry tons/year)	Mill residues - fine wood (dry tons/year)	Urban Wood Waste $12.50/(dry tons/year)	Pecan shells (dry tons/year)	Papermill Sludge (dry tons/year)	Black Liquor Production (dry tons/year)	County Totals (dry tons/year)
APPLING	127,037	67,168	69,000	147,000	113,000	185	226	-		523,615
ATKINSON	83,427	27,762	0	0	0	81	41	-		111,311
BACON	69,855	38,389	0	0	0	115	45	-		108,403
BAKER	58,977	15,940	0	0	0	40	21	-		74,978
BALDWIN	56,975	26,131	0	0	0	467	16	-		83,588
BANKS	65,099	18,686	0	0	0	146	-	-		83,930
BARROW	31,153	3,262	0	0	0	464	-	-		34,879
BARTOW	91,285	33,269	0	0	0	826	-	-		125,380
BEN HILL	57,658	26,244	54,000	115,000	79,000	193	44	-		332,140
BERRIEN	91,520	26,583	0	0	0	183	357	-		118,643
BIBB	52,963	8,899	0	0	0	1,721	71	5,961	1,350,000	1,419,613
BLECKLEY	51,369	9,222	0	0	0	125	52	-		60,768
BRANTLEY	122,530	67,232	38,000	128,000	99,000	154	32	-		454,948
BROOKS	106,813	31,331	0	0	0	178	386	-		138,709
BRYAN	134,367	38,356	0	0	0	270	-	-		172,993
BULLOCH	117,425	55,766	44,000	128,000	117,000	562	211	-		462,964
BURKE	185,760	97,094	0	0	0	257	134	-		283,245
BUTTS	43,113	16,990	0	0	0	203	23	-		60,329
CALHOUN	43,826	21,916	0	0	0	55	508	-		66,304
CAMDEN	170,285	57,462	0	0	0	521	-	18,121		246,388
CANDLER	42,266	23,385	0	0	0	99	73	-		65,823
CARROLL	116,340	51,858	1,000	3,000	2,000	938	3	-		175,139
CATOOSA	25,951	6,492	0	0	0	577	2	-		33,023
CHARLTON	170,855	50,937	0	0	0	105	-	-		221,897
CHATHAM	65,874	43,379	149,000	2,000	2,000	2,498	-	34,748	2,349,000	2,648,499
CHATTAHOOCHEE	62,916	22,868	0	0	0	184	-	-		85,969
CHATTOOGA	85,853	18,718	0	0	0	253	-	-		104,824
CHEROKEE	120,506	34,771	0	0	0	1,568	-	-		156,845

CLARKE	16,974	1,292	0	0	0	1,003	-	-		19,269
CLAY	46,461	20,947	0	0	0	39	-	-		67,447
CLAYTON	15,988	7,994	0	0	0	2,366	-	-		26,348
CLINCH	278,871	101,987	25,000	53,000	23,000	74	5	-		481,937
COBB	33,541	2,842	0	0	0	6,459	-	-	410,400	453,243
COFFEE	120,988	38,695	0	0	0	387	102	-		160,173
COLQUITT	64,884	39,018	0	0	0	451	266	-		104,618
COLUMBIA	77,127	28,666	0	0	0	1,033	11	-		106,837
COOK	47,977	7,300	5,000	16,000	10,000	168	59	-		86,504
COWETA	108,857	46,512	0	0	0	990	3	-		156,361
CRAWFORD	82,584	37,177	0	0	0	115	635	-		120,512
CRISP	44,218	20,866	90,000	22,000	21,000	228	806	-		199,119
DADE	51,232	7,219	0	0	0	170	155	-		58,776
DAWSON	77,511	9,206	0	0	0	176	-	-		86,893
DECATUR	89,304	63,809	0	0	0	6,607	-	-	1,585,080	1,744,799
DEKALB	19,612	3,941	0	0	0	300	-	-		23,853
DODGE	115,050	67,136	25,000	14,000	11,000	201	-	-		232,387
DOOLY	75,486	36,515	0	0	0	115	536	-		112,653
DOUGHERTY	60,853	21,899	0	0	0	1,041	2,564	-		86,358
DOUGLAS	53,111	5,087	0	0	0	1,009	-	-		59,207
EARLY	65,124	34,642	157000	0	0	134	105	29,996		287,000
ECHOLS	116,907	41,732	0	0	0	28	-	-		158,666
EFFINGHAM	133,916	59,497	26,000	90,000	68,000	425	-	-		377,837
ELBERT	93,343	33,285	0	0	0	214	10	-		126,853
EMANUEL	165,037	82,252	57,000	128,000	109,000	233	283	-		541,805
EVANS	45,694	21,383	0	0	0	112	143	-		67,331
FANNIN	131,602	14,793	1,000	3,000	3,000	210	-	-		153,605
FAYETTE	45,183	12,016	0	0	0	1,023	-	-		58,221
FLOYD	115,700	62,888	177,000	115,000	94,000	947	-	24,017	1,269,000	1,858,552
FORSYTH	34,093	12,371	0	0	0	1,070	-	-		47,534
FRANKLIN	45,647	6,492	0	0	0	214	1	-		52,354
FULTON	83,172	31,299	0	0	0	8,245	-	-		122,715
GILMER	168,720	10,578	5,000	16,000	8,000	219	-	-		208,517
GLASCOCK	35,299	18,992	0	0	0	28	4	-		54,324
GLYNN	84,427	45,172	0	0	0	752	-	29,037	1,220,400	1,379,788
GORDON	56,242	14,519	0	0	0	465	-	-		71,225

GRADY	77,744	37,323	11000	29000	25000	239	530	-		180,836
GREENE	103,421	40,730	0	0	0	156	6	-		144,313
GWINNETT	55,581	22,319	0	0	0	6,040	5	-		83,944
HABERSHAM	96,201	24,823	3,000	7,000	5,000	360	-	-		136,384
HALL	93,485	11,660	1,000	2,000	1,000	1,365	-	-		110,510
HANCOCK	132,807	78,715	0	0	0	100	71	-		211,694
HARALSON	70,649	21,883	0	0	0	278	-	-		92,810
HARRIS	134,784	44,800	0	0	0	251	16	-		179,850
HART	32,003	2,988	0	0	0	245	-	-		35,235
HEARD	75,310	41,360	0	0	0	116	-	-		116,786
HENRY	63,029	26,195	0	0	0	1,256	-	-		90,480
HOUSTON	84,283	26,470	0	0	0	1,192	252	-		112,196
IRWIN	59,254	18,621	0	0	0	102	278	-		78,255
JACKSON	78,139	13,711	0	0	0	432	1	-		92,284
JASPER	115,807	27,988	65,000	222,000	172,000	117	-	-		602,913
JEFF DAVIS	69,600	127,246	32,000	71,000	68,000	141	19	-		368,005
JEFFERSON	111,505	90,989	29,000	78,000	55,000	198	298	-		364,989
JENKINS	67,655	53,166	0	0	0	93	84	-		120,999
JOHNSON	66,671	54,345	0	0	0	92	26	-		121,133
JONES	114,449	29,377	0	0	0	258	-	-		144,084
LAMAR	39,095	11,450	0	0	0	166	97	-		50,808
LANIER	53,083	14,164	0	0	0	77	281	-		67,605
LAURENS	173,731	63,776	20,000	69,000	54,000	486	52	145,836	205,920	732,802
LEE	48,514	31,945	0	0	0	258	1,246	-		81,963
LIBERTY	112,761	54,006	151000	7000	6000	661	7	7,767	410,400	749,601
LINCOLN	53,625	22,465	0	0	0	92	-	-		76,182
LONG	172,211	69,364	0	0	0	96	-	-		241,672
LOWNDES	96,916	34,739	160,000	95,000	85,000	945	603	12,775	675,000	1,160,978
LUMPKIN	116,577	7,946	2000	4,000	4,000	219	-	-		134,741
MCDUFFIE	68,608	26,389	89000	59000	56000	145	774	-		299,916
MCINTOSH	80,938	31,929	131000	23000	30000	279	2	-		297,148
MACON	83,238	44,219	0	0	0	75	16	-	567,000	694,547
MADISON	57,837	17,103	0	0	0	241	52	-		75,234
MARION	75,897	36,903	0	0	0	112	-	-		112,911
MERIWETHER	127,119	39,261	49,000	131,000	127,000	255	22	-		473,656
MILLER	45,675	6,202	0	0	0	70	-	-		51,947

MITCHELL	45,510	45,236	0	0	0	235	1,677	-		92,657
MONROE	86,223	52,197	84,000	30,000	21,000	222	-	-		273,642
MONTGOMERY	47,399	33,640	0	0	0	87	173	-		81,299
MORGAN	91,056	32,607	0	0	0	171	76	-		123,909
MURRAY	105,390	28,230	0	0	0	375	-	-		133,995
MUSCOGEE	43,700	22,319	0	0	0	2,015	-	-		68,035
NEWTON	51,906	14,164	0	0	0	671	4	-		66,744
OCONEE	33,949	10,336	0	0	0	271	7	-		44,563
OGLETHORPE	129,895	50,081	0	0	0	128	3	-		180,106
PAULDING	90,934	37,097	0	0	0	881	-	-		128,912
PEACH	11,642	4,215	0	0	0	277	1,330	-		17,464
PICKENS	81,857	17,264	0	0	0	233	219	-		99,573
PIERCE	82,784	34,109	148,000	100,000	62,000	175	-	-		427,067
PIKE	52,074	11,919	0	0	0	145	41	-		64,180
POLK	64,477	26,325	0	0	0	405	175	1,126		92,508
PULASKI	34,315	22,852	0	0	0	93	-	1,137		58,396
PUTNAM	87,448	30,007	28,000	86,000	65,000	201	2	-		296,658
QUITMAN	53,054	15,020	0	0	0	27	-	-		68,101
RABUN	161,697	3,715	0	0	0	152	-	-		165,563
RANDOLPH	93,821	51,971	0	0	0	89	-	-		145,880
RICHMOND	54,880	28,036	139,000	106,000	97,000	2,107	10	71,265	1,166,400	1,664,698
ROCKDALE	19,455	2,261	0	0	0	763	-	12,541		35,020
SCHLEY	39,929	24,790	0	0	0	44	21	-		64,783
SCREVEN	170,013	86,887	2000	5000	3000	160	-	-		267,060
SEMINOLE	18,495	13,598	0	0	0	109	36	-		32,237
SPALDING	37,535	4,748	0	0	0	640	21	-		42,945
STEPHENS	39,607	13,114	0	0	0	280	-	-		53,001
STEWART	129,360	75,307	0	0	0	59	32	-		204,758
SUMTER	87,936	57,542	0	0	0	347	624	-		146,449
TALBOT	133,183	37,032	0	0	0	77	24	-		170,315
TALIAFERRO	59,245	28,182	0	0	0	21	-	-		87,448
TATTNALL	76,910	29,328	0	0	0	212	514	-		106,964
TAYLOR	94,225	48,547	0	0	0	92	-	-		142,863
TELFAIR	101,974	61,305	0	0	0	126	362	-		163,768
TERRELL	58,271	36,790	0	0	0	124	258	-		95,443
THOMAS	81,356	51,212	61,000	139,000	104,000	475	714	-		437,757

TIFT	36,898	13,130	0	0	0	409	204	-		50,641
TOOMBS	56,986	48,014	31,000	13,000	3,000	288	164	-		152,452
TOWNS	56,161	840	0	0	0	97	-	-		57,098
TREUTLEN	39,293	29,619	0	0	0	66	7	-		68,984
TROUP	124,092	40,698	0	0	0	651	5	-		165,446
TURNER	31,938	14,244	0	0	0	102	1,189	-		47,474
TWIGGS	125,876	31,848	0	0	0	113	9	-		157,846
UNION	96,169	4,910	0	0	0	191	-	-		101,269
UPSON	88,542	19,913	37000	125000	99000	300	-	-		369,755
WALKER	120,437	18,653	0	0	0	697	-	-		139,787
WALTON	59,734	9,270	0	0	0	648	-	-		69,651
WARE	199,907	61,160	0	0	0	390	214	-		261,672
WARREN	77,230	59,271	28,000	90,000	70,000	67	43	-		324,610
WASHINGTON	156,501	105,653	0	0	0	224	778	-		263,155
WAYNE	145,771	78,457	0	0	0	283	93	-	858,240	1,082,844
WEBSTER	47,224	37,646	27,000	68,000	65,000	24	194	-		245,088
WHEELER	88,667	43,653	0	0	0	54	52	-		132,426
WHITE	88,390	10,514	6,000	19,000	14,000	201	0	-		138,106
WHITFIELD	47,102	23,401	6,000	15,000	13,000	921	126	-		105,550
WILCOX	94,764	38,033	0	0	0	82	-	-		132,880
WILKES	117,542	81,881	7,000	21,000	17,000	117	-	885		245,424
WILKINSON	141,726	52,665	9,000	24,000	16,000	121	-	-		243,512
WORTH	106,790	32,139	0	0	0	249	229	-		139,407
Total	13,260,175	5,314,287	2,279,000	2,618,000	2,096,000	86,209	22,297	395,210	12,066,840	38,138,019

APPENDIX II

SOURCES OF INFORMATION AND METHODS OF CALCULATING INFORMATION IN TABLES A-1—A-8

APPENDIX II

Sources of Information and Methods of Calculating Information in Tables A-1—A-8

The following methodologies are presented in order of the appearance of the columns in the spreadsheets.

Forest Resources: Unused merchantable and Unmerchantable Standing Timber

Base information for this calculation was obtained from the U.S. Forest Service, Forest Inventory and Analysis Mapmaker Program 2003 data [1][*]. This website gave all live biomass per county, and all live merchantable biomass, with all values in dry tons. To calculate the amount of unmerchantable standing timber, the amount of all merchantable standing timber was subtracted from the amount of total biomass.

- Unmerchantable standing timber = all live biomass - all live merchantable standing timber

To calculate the amount of timber available annually, a 30-year growth cycle was assumed. This method was used by ORNL in its study entitled *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion Ton Annual Supply, April 2005* [2]. Since the 30-year grow cycle is an average national number, and the grow cycle is actually shorter in Georgia due to the state's climatic conditions and good soils, the use of the 30-year grow cycle for Georgia was considered conservative. Therefore GBI has also included a calculation using a 20 year growth cycle, which we felt was closer to Georgia's grow cycle. The numbers obtained using a growth cycle of 20 years are much closer to those calculated using an alternative method based on harvesting rates for merchantable wood. This method is described below and the results shown in Appendix III.

$$\frac{Y\ \text{Unmerchantable Standing Timber (dry tons)}}{} \times \frac{}{30\ \text{Growth Cycle (years)}} = \frac{Z\ \text{Unmerchantable Standing Timber (dry tons)}}{\text{year}}$$

$$\frac{Y\ \text{Unmerchantable Standing Timber (dry tons)}}{} \times \frac{}{20\ \text{Growth Cycle (years)}} = \frac{Z\ \text{Unmerchantable Standing Timber (dry tons)}}{\text{year}}$$

Alternative method for calculating availability of unmerchantable standing timber

Table A3-1 and A3-2 in Appendix III show the results of calculating the amount of unmerchantable wood using an alternative method, which also shows that forestry calculations are not an exact science. For the alternative method, the amount of merchantable standing timber was obtained from the US Forest Service, Forest Inventory and Analysis Mapmaker Program 2003 data [1]. This data was provided in dry tons. Annual removals of growing stock in (cuft) were obtained from the USDA Forest Service, Forest Inventory and Analysis, Southern Research Station, 2003. A conversion factor of 75 lbs/cuft for

[*] *References for the Appendix are listed at the end of the Appendix, and are separate from the main body References*.

softwood and 78 lbs/cuft of hardwood was obtained from Tony Johnson at the US Forest Service [3] to convert cuft to dry tons. He also suggested that we assume a moisture content of 50% for standing timber.

After converting the removals of growing stock from cubic feet to dry tons, the amount of removals of growing stock was divided by the amount of merchantable standing timber. This provided a percentage rate for the amount of merchantable currently being harvested annually in each county. GBI then calculated the unmerchantable standing timber by taking all live biomass – all live merchantable = unmerchantable standing timber. It was then assumed that the unmerchantable harvesting rate would be similar as to the merchantable standing timber. Therefore, unmerchantable standing timber was multiplied by the harvest rate to get the amount in dry tons available on an annual basis.

$$\frac{Y \ \text{Removals of Growing Stock (dry tons)}}{} \times \frac{}{Y \ \text{Merchantable Standing Timber (dry tons}} = \frac{Z \ \%\ \text{currently being harvested}}{\text{year}}$$

$$\frac{Y \ \text{Unmerchantable Standing Timber (dry tons)}}{} \times \frac{Y \ \%\ \text{currently being harvested}}{\text{year}} = \frac{Z \ \text{Unmerchantable Timber Available Rate (dry tons)}}{\text{year}}$$

Forest Residues: Harvesting Residues and Primary Processing Residues

Base information for harvesting residues was obtained from the U.S. Forest Service, Southern Research Station, Timber Product Output Reports from the website which is based on field data collected in 2003 [1].

Data from the website listed harvesting residues in MCF (1,000 cubic feet). To convert to dry tons, the average density of several species of wood (Oak: red, black, live, white and Pine: red, white, and southern) was calculated to be 36.71 lb/cf based on information from *The Standard Handbook for Mechanical Engineers*, Baumeister & Marks, seventh edition, pages 6-7 and 6-8 [5]. This information was given for "air-dry" conditions, and based on personal experience was assumed to be 12% moisture content. The "dry density" was then obtained by multiplying by 0.88 to get 32.30 lb/cf.

$$\frac{Z \ \text{MCF}}{\text{yr}} \times \frac{1000 \ \text{cf}}{1 \ \text{MCF}} \times \frac{32.30 \ \text{dry lb}}{\text{cf}} \times \frac{1 \ \text{dry ton}}{2000 \ \text{lb}} = \frac{Y \ \text{dry ton}}{\text{yr}}$$

The percent hardwood and softwood for the state of Georgia was obtained from the US Forest Timber Product Output program. Volume of logging residue was charted into major species groups then divided by the total product produced (Table 2). Hardwood/Softwood percentages averaged 50% for both hard and soft woods. Therefore a standard average instead of a weighted average was obtained using the wood densities.

Mill Residues

The data provided on mill residues was from USDA Forest Service, Timber Product Output (TPO) Reports, Forest Inventory and Analysis, Southern Research Station [4]. Mill residue data is from the last sampling year of 2003. All data was provided in thousand dry tons per year on a county level basis for bark, coarse wood residues, and fine wood residues. The 1% percent unutilized mill residue was provided by the US Forest Service, Forest Inventory and Analysis Mapmaker Program, Version 2.1 [1].

Urban Wood Waste

Data for urban wood waste (in the form of an urban wood waste supply curve) for all counties was obtained from the Oak Ridge National Laboratory [6].

Pecan shells

Pecan bearing acres were obtained from the USDA 2002 Census of Agriculture [7] on a county level basis.

A yield of 1200 lbs of pecans per acre was provided by Dr. Wojciech Florkowski, Department of Agricultural and Applied Economics at the University of Georgia, Griffin Campus [8].

The average ratio of shell to total nut weight was determined to be 41.5% (*kernel yield* of 1,485.2 lb/acre and "*in shell yield"* of 2,539.7 lb/acre = 58.5% kernel) [9]. The average moisture content of pecan shells varies from 11.3% for dry shelled pecans to 15-16% for "rewet" pecans [10]. For this analysis a weighted average moisture content of 15.5% was used.

Due to shipping costs, 85% of all pecans are sold shelled. An estimated 90+% of all pecans harvested in the Southeast are soaked (rewet) in water before shelling. Soaking mitigates meat shatter. Pecans are shelled from mid-October through January in all Southeast states. It was assumed that all shelled pecans were shelled in the county that they were produced.

$$\frac{Z \text{ acres}}{\text{yr}} \times \frac{1200 \text{ lb nuts}}{1 \text{ acre}} \times \frac{0.415 \text{ lb shell}}{1 \text{ lb nut}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{0.845 \text{ ton dry shell}}{1 \text{ ton shell}} = \frac{Y \text{ dry ton shell}}{\text{yr}}$$

Paper mill Sludge

The location of each paper mill, along with its product line and tonnage of product produced were obtained from the *2002 Lockwood – Post's Directory of the Pulp, Paper, and Allied Trades* [11]. Information on the dry pounds of sludge produced per ton of each type of paper product produced was obtained from the National Council for Air and Stream Improvement, Inc [12].

Since factors were available to directly estimate sludge production in dry tons based on the type and amount of product output, information on sludge moisture content was not needed. Actual factors for each type of paper plant were used for this study; however, on average about 87 dry pounds of sludge is generated per ton of product produced.

$$\frac{Z \text{ tons of product}}{\text{day}} \times \frac{\%\text{ of each product}}{} \times \frac{W \text{ mean dry lb sludge}}{1 \text{ dry ton product}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{365 \text{ day}}{\text{yr}} = \frac{y \text{ dry ton}}{\text{yr}}$$

Black Liquor

Black Liquor production was provided on a dry tons/day output based on paper, board and pulp production of the plant. Data in dry tons per day of Black Liquor production per plant was provided by the Georgia Institute of Technology through the Paper Science & Technology Division [13].

$$\frac{Z \text{ Black Liquor (dry tons)}}{\text{day}} \times \frac{360 \text{ days}}{1 \text{ yr}} = \frac{Y \text{ dry tons}}{\text{yr}}$$

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APPENDIX III

Results Of An Alternative Method For
Calculating Availability Of Unmerchantable Standing Timber

Table A3-1. Removals of Growing Stock

State	Species Group	Removals of Growing Stock		Weight Conversion	Moisture Content		Removals of Growing Stock
		Thousand cubic feet	*cubic feet*	*lbs/cuft*	*mc*	*dry tons/yr*	*dry tons/yr/county*
Appling, GA	Softwood	15,631	15,631,000	75	0.5	293,081	341,519
	Hardwood	2,484	2,484,000	78	0.5	48,438	
Atkinson, GA	Softwood	7,072	7,072,000	75	0.5	132,600	146,660
	Hardwood	721	721,000	78	0.5	14,060	
Bacon, GA	Softwood	7,798	7,798,000	75	0.5	146,213	185,349
	Hardwood	2,007	2,007,000	78	0.5	39,137	
Baker, GA	Softwood	2,187	2,187,000	75	0.5	41,006	67,624
	Hardwood	1,365	1,365,000	78	0.5	26,618	
Baldwin, GA	Softwood	4,728	4,728,000	75	0.5	88,650	121,449
	Hardwood	1,682	1,682,000	78	0.5	32,799	
Banks, GA	Softwood	3,139	3,139,000	75	0.5	58,856	84,499
	Hardwood	1,315	1,315,000	78	0.5	25,643	
Barrow, GA	Softwood	514	514,000	75	0.5	9,638	14,435
	Hardwood	246	246,000	78	0.5	4,797	
Bartow, GA	Softwood	7,196	7,196,000	75	0.5	134,925	164,214
	Hardwood	1,502	1,502,000	78	0.5	29,289	
Ben Hill, GA	Softwood	4,412	4,412,000	75	0.5	82,725	118,371
	Hardwood	1,828	1,828,000	78	0.5	35,646	
Berrien, GA	Softwood	6,496	6,496,000	75	0.5	121,800	138,005
	Hardwood	831	831,000	78	0.5	16,205	
Bibb, GA	Softwood	1,998	1,998,000	75	0.5	37,463	44,541
	Hardwood	363	363,000	78	0.5	7,079	
Bleckley, GA	Softwood	1,616	1,616,000	75	0.5	30,300	42,488
	Hardwood	625	625,000	78	0.5	12,188	
Brantley, GA	Softwood	18,329	18,329,000	75	0.5	343,669	365,197
	Hardwood	1,104	1,104,000	78	0.5	21,528	
Brooks, GA	Softwood	7,407	7,407,000	75	0.5	138,881	160,546
	Hardwood	1,111	1,111,000	78	0.5	21,665	
Bryan, GA	Softwood	7,944	7,944,000	75	0.5	148,950	186,390
	Hardwood	1,920	1,920,000	78	0.5	37,440	
Bulloch, GA	Softwood	11,987	11,987,000	75	0.5	224,756	275,222
	Hardwood	2,588	2,588,000	78	0.5	50,466	
Burke, GA	Softwood	13,454	13,454,000	75	0.5	252,263	413,937
	Hardwood	8,291	8,291,000	78	0.5	161,675	
Butts, GA	Softwood	2,456	2,456,000	75	0.5	46,050	73,857
	Hardwood	1,426	1,426,000	78	0.5	27,807	
Calhoun, GA	Softwood	3,396	3,396,000	75	0.5	63,675	96,806
	Hardwood	1,699	1,699,000	78	0.5	33,131	
Camden, GA	Softwood	16,564	16,564,000	75	0.5	310,575	319,838
	Hardwood	475	475,000	78	0.5	9,263	
Candler, GA	Softwood	5,443	5,443,000	75	0.5	102,056	118,807
	Hardwood	859	859,000	78	0.5	16,751	
Carroll, GA	Softwood	12,273	12,273,000	75	0.5	230,119	265,862
	Hardwood	1,833	1,833,000	78	0.5	35,744	
Catoosa, GA	Softwood	285	285,000	75	0.5	5,344	22,601
	Hardwood	885	885,000	78	0.5	17,258	

	Softwood	15,464	15,464,000	75	0.5	289,950	
Charlton, GA	Hardwood	13	13,000	78	0.5	254	290,204
	Softwood	8,408	8,408,000	75	0.5	157,650	
Chatham, GA	Hardwood	2,456	2,456,000	78	0.5	47,892	205,542
	Softwood	3,472	3,472,000	75	0.5	65,100	
Chattahoochee, GA	Hardwood	1,803	1,803,000	78	0.5	35,159	100,259
	Softwood	4,378	4,378,000	75	0.5	82,088	
Chattooga, GA	Hardwood	680	680,000	78	0.5	13,260	95,348
	Softwood	8,822	8,822,000	75	0.5	165,413	
Cherokee, GA	Hardwood	905	905,000	78	0.5	17,648	183,060
	Softwood	331	331,000	75	0.5	6,206	
Clarke, GA	Hardwood	31	31,000	78	0.5	605	6,811
	Softwood	4,564	4,564,000	75	0.5	85,575	
Clay, GA	Hardwood	927	927,000	78	0.5	18,077	103,652
	Softwood	726	726,000	75	0.5	13,613	
Clayton, GA	Hardwood	896	896,000	78	0.5	17,472	31,085
	Softwood	26,925	26,925,000	75	0.5	504,844	
Clinch, GA	Hardwood	2,103	2,103,000	78	0.5	41,009	545,852
	Softwood	422	422,000	75	0.5	7,913	
Cobb, GA	Hardwood	228	228,000	78	0.5	4,446	12,359
	Softwood	8,752	8,752,000	75	0.5	164,100	
Coffee, GA	Hardwood	1,744	1,744,000	78	0.5	34,008	198,108
	Softwood	11,044	11,044,000	75	0.5	207,075	
Colquitt, GA	Hardwood	416	416,000	78	0.5	8,112	215,187
	Softwood	4,636	4,636,000	75	0.5	86,925	
Columbia, GA	Hardwood	2,096	2,096,000	78	0.5	40,872	127,797
	Softwood	1,972	1,972,000	75	0.5	36,975	
Cook, GA	Hardwood	129	129,000	78	0.5	2,516	39,491
	Softwood	10,987	10,987,000	75	0.5	206,006	
Coweta, GA	Hardwood	1,650	1,650,000	78	0.5	32,175	238,181
	Softwood	5,261	5,261,000	75	0.5	98,644	
Crawford, GA	Hardwood	3,104	3,104,000	78	0.5	60,528	159,172
	Softwood	3,004	3,004,000	75	0.5	56,325	
Crisp, GA	Hardwood	1,716	1,716,000	78	0.5	33,462	89,787
	Softwood	840	840,000	75	0.5	15,750	
Dade, GA	Hardwood	692	692,000	78	0.5	13,494	29,244
	Softwood	2,083	2,083,000	75	0.5	39,056	
Dawson, GA	Hardwood	376	376,000	78	0.5	7,332	46,388
	Softwood	12,572	12,572,000	75	0.5	235,725	
Decatur, GA	Hardwood	3,510	3,510,000	78	0.5	68,445	304,170
	Softwood	423	423,000	75	0.5	7,931	
DeKalb, GA	Hardwood	415	415,000	78	0.5	8,093	16,024
	Softwood	10,784	10,784,000	75	0.5	202,200	
Dodge, GA	Hardwood	4,965	4,965,000	78	0.5	96,818	299,018
	Softwood	9,107	9,107,000	75	0.5	170,756	
Dooly, GA	Hardw ood	1,030	1,030,000	78	0.5	20,085	190,841
	Softwood	2,662	2,662,000	75	0.5	49,913	
Dougherty, GA	Hardwood	2,073	2,073,000	78	0.5	40,424	90,336
	Softwood	884	884,000	75	0.5	16,575	
Douglas, GA	Hardwood	345	345,000	78	0.5	6,728	23,303
	Softwood	6,861	6,861,000	75	0.5	128,644	
Early, GA	Hardwood	1,892	1,892,000	78	0.5	36,894	165,538
Echols, GA	Softwood	11,438	11,438,000	75	0.5	214,463	226,904

	Hardwood	638	638,000	78	0.5	12,441	
	Softwood	12,235	12,235,000	75	0.5	229,406	
Effingham, GA	Hardwood	2,920	2,920,000	78	0.5	56,940	286,346
	Softwood	3,741	3,741,000	75	0.5	70,144	
Elbert, GA	Hardwood	3,331	3,331,000	78	0.5	64,955	135,098
	Softwood	15,405	15,405,000	75	0.5	288,844	
Emanuel, GA	Hardwood	4,997	4,997,000	78	0.5	97,442	386,285
	Softwood	4,102	4,102,000	75	0.5	76,913	
Evans, GA	Hardwood	1,232	1,232,000	78	0.5	24,024	100,937
	Softwood	1,253	1,253,000	75	0.5	23,494	
Fannin, GA	Hardwood	1,707	1,707,000	78	0.5	33,287	56,780
	Softwood	1,463	1,463,000	75	0.5	27,431	
Fayette, GA	Hardwood	1,149	1,149,000	78	0.5	22,406	49,837
	Softwood	15,638	15,638,000	75	0.5	293,213	
Floyd, GA	Hardwood	1,800	1,800,000	78	0.5	35,100	328,313
	Softwood	1,998	1,998,000	75	0.5	37,463	
Forsyth, GA	Hardwood	915	915,000	78	0.5	17,843	55,305
	Softwood	1,649	1,649,000	75	0.5	30,919	
Franklin, GA	Hardwood	165	165,000	78	0.5	3,218	34,136
	Softwood	6,998	6,998,000	75	0.5	131,213	
Fulton, GA	Hardwood	1,326	1,326,000	78	0.5	25,857	157,070
	Softwood	1,938	1,938,000	75	0.5	36,338	
Gilmer, GA	Hardwood	668	668,000	78	0.5	13,026	49,364
	Softwood	2,722	2,722,000	75	0.5	51,038	
Glascock, GA	Hardwood	1,583	1,583,000	78	0.5	30,869	81,906
	Softwood	13,320	13,320,000	75	0.5	249,750	
Glynn, GA	Hardwood	219	219,000	78	0.5	4,271	254,021
	Softwood	2,482	2,482,000	75	0.5	46,538	
Gordon, GA	Hardwood	999	999,000	78	0.5	19,481	66,018
	Softwood	7,209	7,209,000	75	0.5	135,169	
Grady, GA	Hardwood	2,127	2,127,000	78	0.5	41,477	176,645
	Softwood	9,393	9,393,000	75	0.5	176,119	
Greene, GA	Hardwood	1,545	1,545,000	78	0.5	30,128	206,246
	Softwood	3,860	3,860,000	75	0.5	72,375	
Gwinnett, GA	Hardwood	1,539	1,539,000	78	0.5	30,011	102,386
	Softwood	3,523	3,523,000	75	0.5	66,056	
Habersham, GA	Hardwood	2,129	2,129,000	78	0.5	41,516	107,572
	Softwood	2,844	2,844,000	75	0.5	53,325	
Hall, GA	Hardwood	355	355,000	78	0.5	6,923	60,248
	Softwood	12,423	12,423,000	75	0.5	232,931	
Hancock, GA	Hardwood	5,981	5,981,000	78	0.5	116,630	349,561
	Softwood	5,344	5,344,000	75	0.5	100,200	
Haralson, GA	Hardwood	685	685,000	78	0.5	13,358	113,558
	Softwood	9,470	9,470,000	75	0.5	177,563	
Harris, GA	Hardwood	2,145	2,145,000	78	0.5	41,828	219,390
	Softwood	489	489,000	75	0.5	9,169	
Hart, GA	Hardwood	219	219,000	78	0.5	4,271	13,439
	Softwood	11,324	11,324,000	75	0.5	212,325	
Heard, GA	Hardwood	659	659,000	78	0.5	12,851	225,176
	Softwood	4,708	4,708,000	75	0.5	88,275	
Henry, GA	Hardwood	1,709	1,709,000	78	0.5	33,326	121,601
	Softwood	6,144	6,144,000	75	0.5	115,200	
Houston, GA	Hardwood	993	993,000	78	0.5	19,364	134,564

	Softwood	4,757	4,757,000	75	0.5	89,194	
Irwin, GA	Hardwood	466	466,000	78	0.5	9,087	98,281
	Softwood	3,617	3,617,000	75	0.5	67,819	
Jackson, GA	Hardwood	279	279,000	78	0.5	5,441	73,259
	Softwood	5,713	5,713,000	75	0.5	107,119	
Jasper, GA	Hardwood	1,469	1,469,000	78	0.5	28,646	135,764
	Softwood	11,225	11,225,000	75	0.5	210,469	
Jeff Davis, GA	Hardwood	14,114	14,114,000	78	0.5	275,223	485,692
	Softwood	11,117	11,117,000	75	0.5	208,444	
Jefferson, GA	Hardwood	8,616	8,616,000	78	0.5	168,012	376,456
	Softwood	10,646	10,646,000	75	0.5	199,613	
Jenkins, GA	Hardwood	2,852	2,852,000	78	0.5	55,614	255,227
	Softwood	7,552	7,552,000	75	0.5	141,600	
Johnson, GA	Hardwood	4,691	4,691,000	78	0.5	91,475	233,075
	Softwood	5,963	5,963,000	75	0.5	111,806	
Jones, GA	Hardwood	1,568	1,568,000	78	0.5	30,576	142,382
	Softwood	1,775	1,775,000	75	0.5	33,281	
Lamar, GA	Hardwood	891	891,000	78	0.5	17,375	50,656
	Softwood	4,303	4,303,000	75	0.5	80,681	
Lanier, GA	Hardwood	3	3,000	78	0.5	59	80,740
	Softwood	10,864	10,864,000	75	0.5	203,700	
Laurens, GA	Hardwood	4,439	4,439,000	78	0.5	86,561	290,261
	Softwood	4,646	4,646,000	75	0.5	87,113	
Lee, GA	Hardwood	2,604	2,604,000	78	0.5	50,778	137,891
	Softwood	10,640	10,640,000	75	0.5	199,500	
Liberty, GA	Hardwood	2,982	2,982,000	78	0.5	58,149	257,649
	Softwood	5,026	5,026,000	75	0.5	94,238	
Lincoln, GA	Hardwood	933	933,000	78	0.5	18,194	112,431
	Softwood	13,386	13,386,000	75	0.5	250,988	
Long, GA	Hardwood	3,994	3,994,000	78	0.5	77,883	328,871
	Softwood	8,493	8,493,000	75	0.5	159,244	
Lowndes, GA	Hardwood	1,067	1,067,000	78	0.5	20,807	180,050
	Softwood	1,385	1,385,000	75	0.5	25,969	
Lumpkin, GA	Hardwood	542	542,000	78	0.5	10,569	36,538
	Softwood	5,546	5,546,000	75	0.5	103,988	
McDuffie, GA	Hardwood	1,288	1,288,000	78	0.5	25,116	129,104
	Softwood	6,475	6,475,000	75	0.5	121,406	
McIntosh, GA	Hardwood	1,664	1,664,000	78	0.5	32,448	153,854
	Softwood	7,086	7,086,000	75	0.5	132,863	
Macon, GA	Hardwood	3,263	3,263,000	78	0.5	63,629	196,491
	Softwood	4,836	4,836,000	75	0.5	90,675	
Madison, GA	Hardwood	173	173,000	78	0.5	3,374	94,049
	Softwood	8,620	8,620,000	75	0.5	161,625	
Marion, GA	Hardwood	1,347	1,347,000	78	0.5	26,267	187,892
	Softwood	7,886	7,886,000	75	0.5	147,863	
Meriwether, GA	Hardwood	2,142	2,142,000	78	0.5	41,769	189,632
	Softwood	1,169	1,169,000	75	0.5	21,919	
Miller, GA	Hardwood	369	369,000	78	0.5	7,196	29,114
	Softwood	8,581	8,581,000	75	0.5	160,894	
Mitchell, GA	Hardwood	2,638	2,638,000	78	0.5	51,441	212,335
	Softwood	9,571	9,571,000	75	0.5	179,456	
Monroe, GA	Hardwood	3,288	3,288,000	78	0.5	64,116	243,572
Montgomery, GA	Softwood	5,743	5,743,000	75	0.5	107,681	153,136

	Hardwood	2,331	2,331,000	78	0.5	45,455	
	Softwood	7,903	7,903,000	75	0.5	148,181	
Morgan, GA	Hardwood	1,051	1,051,000	78	0.5	20,495	168,676
	Softwood	3,788	3,788,000	75	0.5	71,025	
Murray, GA	Hardwood	2,473	2,473,000	78	0.5	48,224	119,249
	Softwood	4,501	4,501,000	75	0.5	84,394	
Muscogee, GA	Hardwood	1,206	1,206,000	78	0.5	23,517	107,911
	Softwood	2,953	2,953,000	75	0.5	55,369	
Newton, GA	Hardwood	714	714,000	78	0.5	13,923	69,292
	Softwood	2,638	2,638,000	75	0.5	49,463	
Oconee, GA	Hardwood	251	251,000	78	0.5	4,895	54,357
	Softwood	10,454	10,454,000	75	0.5	196,013	
Oglethorpe, GA	Hardwood	2,470	2,470,000	78	0.5	48,165	244,178
	Softwood	7,146	7,146,000	75	0.5	133,988	
Paulding, GA	Hardwood	2,167	2,167,000	78	0.5	42,257	176,244
Peach, GA	Softwood	1,283	1,283,000	75	0.5	24,056	24,056
	Softwood	4,575	4,575,000	75	0.5	85,781	
Pickens, GA	Hardwood	348	348,000	78	0.5	6,786	92,567
	Softwood	7,478	7,478,000	75	0.5	140,213	
Pierce, GA	Hardwood	1,505	1,505,000	78	0.5	29,348	169,560
	Softwood	1,967	1,967,000	75	0.5	36,881	
Pike, GA	Hardwood	876	876,000	78	0.5	17,082	53,963
	Softwood	6,650	6,650,000	75	0.5	124,688	
Polk, GA	Hardwood	699	699,000	78	0.5	13,631	138,318
	Softwood	4,201	4,201,000	75	0.5	78,769	
Pulaski, GA	Hardwood	1,428	1,428,000	78	0.5	27,846	106,615
	Softwood	6,937	6,937,000	75	0.5	130,069	
Putnam, GA	Hardwood	1,198	1,198,000	78	0.5	23,361	153,430
	Softwood	3,208	3,208,000	75	0.5	60,150	
Quitman, GA	Hardwood	699	699,000	78	0.5	13,631	73,781
	Softwood	559	559,000	75	0.5	10,481	
Rabun, GA	Hardwood	299	299,000	78	0.5	5,831	16,312
	Softwood	8,419	8,419,000	75	0.5	157,856	
Randolph, GA	Hardwood	3,846	3,846,000	78	0.5	74,997	232,853
	Softwood	2,637	2,637,000	75	0.5	49,444	
Richmond, GA	Hardwood	3,028	3,028,000	78	0.5	59,046	108,490
	Softwood	617	617,000	75	0.5	11,569	
Rockdale, GA	Hardwood	36	36,000	78	0.5	702	12,271
	Softwood	5,380	5,380,000	75	0.5	100,875	
Schley, GA	Hardwood	1,116	1,116,000	78	0.5	21,762	122,637
	Softwood	17,164	17,164,000	75	0.5	321,825	
Screven, GA	Hardwood	4,789	4,789,000	78	0.5	93,386	415,211
	Softwood	3,494	3,494,000	75	0.5	65,513	
Seminole, GA	Hardwood	334	334,000	78	0.5	6,513	72,026
	Softwood	1,111	1,111,000	75	0.5	20,831	
Spalding, GA	Hardwood	174	174,000	78	0.5	3,393	24,224
	Softwood	1,459	1,459,000	75	0.5	27,356	
Stephens, GA	Hardwood	1,330	1,330,000	78	0.5	25,935	53,291
	Softwood	12,418	12,418,000	75	0.5	232,838	
Stewart, GA	Hardwood	5,398	5,398,000	78	0.5	105,261	338,099
	Softwood	7,295	7,295,000	75	0.5	136,781	
Sumter, GA	Hardwood	5,285	5,285,000	78	0.5	103,058	239,839
Talbot, GA	Softwood	6,879	6,879,000	75	0.5	128,981	173,539

	Hardwood	2,285	2,285,000	78	0.5	44,558	
	Softw ood	5,949	5,949,000	75	0.5	111,544	
Taliaferro, GA	Hardwood	1,359	1,359,000	78	0.5	26,501	138,044
	Softwood	5,362	5,362,000	75	0.5	100,538	
Tattnall, GA	Hardwood	1,842	1,842,000	78	0.5	35,919	136,457
	Softwood	5,287	5,287,000	75	0.5	99,131	
Taylor, GA	Hardwood	4,915	4,915,000	78	0.5	95,843	194,974
	Softwood	12,640	12,640,000	75	0.5	237,000	
Telfair, GA	Hardwood	3,119	3,119,000	78	0.5	60,821	297,821
	Softwood	5,909	5,909,000	75	0.5	110,794	
Terrell, GA	Hardwood	2,746	2,746,000	78	0.5	53,547	164,341
	Softwood	11,299	11,299,000	75	0.5	211,856	
Thomas, GA	Hardwood	2,219	2,219,000	78	0.5	43,271	255,127
	Softwood	2,263	2,263,000	75	0.5	42,431	
Tift, GA	Hardwood	916	916,000	78	0.5	17,862	60,293
	Softwood	10,381	10,381,000	75	0.5	194,644	
Toombs, GA	Hardwood	2,200	2,200,000	78	0.5	42,900	237,544
	Softwood	111	111,000	75	0.5	2,081	
Towns, GA	Hardwood	74	74,000	78	0.5	1,443	3,524
	Softwood	6,996	6,996,000	75	0.5	131,175	
Treutlen, GA	Hardwood	1,037	1,037,000	78	0.5	20,222	151,397
	Softwood	5,007	5,007,000	75	0.5	93,881	
Troup, GA	Hardwood	3,821	3,821,000	78	0.5	74,510	168,391
	Softwood	3,908	3,908,000	75	0.5	73,275	
Turner, GA	Hardwood	112	112,000	78	0.5	2,184	75,459
	Softwood	5,391	5,391,000	75	0.5	101,081	
Twiggs, GA	Hardwood	2,249	2,249,000	78	0.5	43,856	144,937
	Softwood	505	505,000	75	0.5	9,469	
Union, GA	Hardwood	521	521,000	78	0.5	10,160	19,628
	Softwood	4,685	4,685,000	75	0.5	87,844	
Upson, GA	Hardwood	715	715,000	78	0.5	13,943	101,786
	Softwood	3,931	3,931,000	75	0.5	73,706	
Walker, GA	Hardwood	896	896,000	78	0.5	17,472	91,178
	Softwood	2,326	2,326,000	75	0.5	43,613	
Walton, GA	Hardwood	262	262,000	78	0.5	5,109	48,722
	Softwood	17,772	17,772,000	75	0.5	333,225	
Ware, GA	Hardwood	435	435,000	78	0.5	8,483	341,708
	Softwood	9,751	9,751,000	75	0.5	182,831	
Warren, GA	Hardwood	4,292	4,292,000	78	0.5	83,694	266,525
	Softwood	14,509	14,509,000	75	0.5	272,044	
Washington, GA	Hardwood	9,151	9,151,000	78	0.5	178,445	450,488
	Softwood	20,573	20,573,000	75	0.5	385,744	
Wayne, GA	Hardwood	1,687	1,687,000	78	0.5	32,897	418,640
	Softwood	7,509	7,509,000	75	0.5	140,794	
Webster, GA	Hardwood	2,045	2,045,000	78	0.5	39,878	180,671
	Softwood	7,837	7,837,000	75	0.5	146,944	
Wheeler, GA	Hardwood	2,830	2,830,000	78	0.5	55,185	202,129
	Softwood	1,769	1,769,000	75	0.5	33,169	
White, GA	Hardwood	751	751,000	78	0.5	14,645	47,813
	Softwood	3,287	3,287,000	75	0.5	61,631	
Whitfield, GA	Hardwood	1,996	1,996,000	78	0.5	38,922	100,553
	Softwood	9,275	9,275,000	75	0.5	173,906	
Wilcox, GA	Hardwood	1,185	1,185,000	78	0.5	23,108	197,014

	Softwood	13,162	13,162,000	75	0.5	246,788	
Wilkes, GA	Hardwood	6,085	6,085,000	78	0.5	118,658	365,445
	Softwood	7,049	7,049,000	75	0.5	132,169	
Wilkinson, GA	Hardwood	4,668	4,668,000	78	0.5	91,026	223,195
	Softwood	8,799	8,799,000	75	0.5	164,981	
Worth, GA	Hardwood	501	501,000	78	0.5	9,770	174,751
Total		1,340,536	1,340,536,000			25,357,603	25,357,603

Table A3-2. Calculation Sheet for Unmerchantable Standing Timber, and Underutilized Standing Timber, 2003

County	Removals of growing stock	Merchantable standing timber	% Currently being harvested	Unmerchantable standing timber	Unmerchantable timber available rate
	dry ton/yr	*dry tons*		*dry tons*	*dry tons/yr*
Appling	341,519	6,639,525	0.051	2,540,737	130,689
Atkinson	146,660	3,129,954	0.047	1,668,548	78,183
Bacon	185,349	3,183,016	0.058	1,397,095	81,354
Baker	67,624	3,824,358	0.018	1,179,538	20,857
Baldwin	121,449	2,961,659	0.041	1,139,495	46,727
Banks	84,499	3,910,305	0.022	1,301,973	28,135
Barrow	14,435	2,066,560	0.007	623,061	4,352
Bartow	164,214	4,100,890	0.040	1,825,695	73,107
Ben Hill	118,371	2,325,508	0.051	1,153,163	58,697
Berrien	138,005	4,248,392	0.032	1,830,401	59,459
Bibb	44,541	2,295,655	0.019	1,059,255	20,552
Bleckley	42,488	2,972,815	0.014	1,027,372	14,683
Brantley	365,197	4,776,859	0.076	2,450,593	187,351
Brooks	160,546	4,915,631	0.033	2,136,268	69,771
Bryan	186,390	6,827,058	0.027	2,687,343	73,369
Bulloch	275,222	6,571,216	0.042	2,348,503	98,362
Burke	413,937	10,411,208	0.040	3,715,196	147,712
Butts	73,857	2,410,989	0.031	862,257	26,414
Calhoun	96,806	1,752,118	0.055	876,525	48,428
Camden	319,838	9,382,717	0.034	3,405,696	116,093
Candler	118,807	1,799,872	0.066	845,325	55,799
Carroll	265,862	6,495,656	0.041	2,326,792	95,234
Catoosa	22,601	1,760,470	0.013	519,026	6,663
Charlton	290,204	6,386,135	0.045	3,417,100	155,282
Chatham	205,542	4,314,655	0.048	1,317,475	62,762
Chattahoochee	100,259	3,443,194	0.029	1,258,316	36,639
Chattooga	95,348	3,905,902	0.024	1,717,065	41,916
Cherokee	183,060	7,871,627	0.023	2,410,119	56,049
Clarke	6,811	1,050,030	0.006	339,475	2,202
Clay	103,652	2,197,591	0.047	929,219	43,828
Clayton	31,085	893,409	0.035	319,754	11,125
Clinch	545,852	9,272,391	0.059	5,577,413	328,334
Cobb	12,359	3,133,778	0.004	670,824	2,645
Coffee	198,108	5,332,360	0.037	2,419,767	89,899
Colquitt	215,187	4,721,833	0.046	1,297,675	59,139
Columbia	127,797	5,248,104	0.024	1,542,541	37,563
Cook	39,491	2,509,791	0.016	959,549	15,098
Cow eta	238,181	6,241,754	0.038	2,177,133	83,078
Crawford	159,172	3,598,914	0.044	1,651,682	73,050
Crisp	89,787	2,691,458	0.033	884,369	29,503
Dade	29,244	3,275,153	0.009	1,024,634	9,149
Dawson	46,388	4,727,606	0.010	1,550,224	15,211
De Kalb	304,170	5,953,391	0.051	1,786,082	91,254
Decatur	16,024	1,618,522	0.010	392,247	3,883
Dodge	299,018	6,461,582	0.046	2,301,002	106,482
Dooly	190,841	3,528,333	0.054	1,509,718	81,658

Dougherty	90,336	4,218,871	0.021	1,217,060	26,060
Douglas	23,303	3,982,538	0.006	1,062,220	6,215
Early	165,538	4,031,326	0.041	1,302,482	53,484
Echols	226,904	4,782,356	0.047	2,338,130	110,935
Effingham	286,346	6,387,255	0.045	2,678,322	120,072
Elbert	135,098	5,017,819	0.027	1,866,867	50,263
Emanuel	386,285	9,048,644	0.043	3,300,738	140,908
Evans	100,937	3,000,979	0.034	913,873	30,738
Fannin	56,780	7,430,325	0.008	2,632,030	20,113
Fayette	49,837	2,576,367	0.019	903,663	17,480
Floyd	328,313	5,800,203	0.057	2,314,005	130,981
Forsyth	55,305	2,260,130	0.024	681,867	16,685
Franklin	34,136	2,642,977	0.013	912,947	11,791
Fulton	157,070	6,188,700	0.025	1,663,436	42,218
Gilmer	49,364	10,696,735	0.005	3,374,407	15,572
Glascock	81,906	1,948,217	0.042	705,977	29,680
Glynn	254,021	4,812,726	0.053	1,688,548	89,123
Gordon	66,018	2,570,623	0.026	1,124,836	28,888
Grady	176,645	4,575,818	0.039	1,554,889	60,025
Greene	206,246	5,346,596	0.039	2,068,418	79,790
Gwinnett	102,386	3,852,298	0.027	1,111,617	29,544
Habersham	107,572	6,254,665	0.017	1,924,019	33,091
Hall	60,248	5,421,949	0.011	1,869,708	20,776
Hancock	349,561	6,270,491	0.056	2,656,144	148,072
Haralson	113,558	4,090,739	0.028	1,412,978	39,224
Harris	219,390	6,642,946	0.033	2,695,673	89,027
Hart	13,439	2,270,470	0.006	640,054	3,789
Heard	225,176	3,330,996	0.068	1,506,195	101,819
Henry	121,601	3,966,277	0.031	1,260,583	38,648
Houston	134,564	4,608,491	0.029	1,685,660	49,220
Irwin	98,281	3,523,345	0.028	1,185,086	33,057
Jackson	73,259	4,143,114	0.018	1,562,781	27,633
Jasper	135,764	6,377,232	0.021	2,316,147	49,308
Jeff Davis	485,692	2,684,671	0.181	1,392,003	251,831
Jefferson	376,456	6,692,585	0.056	2,230,092	125,442
Jenkins	255,227	3,671,629	0.070	1,353,108	94,059
Johnson	233,075	3,242,843	0.072	1,333,412	95,837
Jones	142,382	5,378,471	0.026	2,288,981	60,595
Lamar	50,656	1,585,477	0.032	781,897	24,981
Lanier	80,740	3,100,963	0.026	1,061,665	27,643
Laurens	290,261	7,972,730	0.036	3,474,617	126,499
Lee	137,891	3,297,618	0.042	970,282	40,573
Liberty	257,649	7,987,604	0.032	2,255,216	72,744
Lincoln	112,431	3,340,600	0.034	1,072,508	36,096
Long	328,871	8,582,860	0.038	3,444,225	131,973
Lowndes	180,050	5,063,808	0.036	1,938,313	68,919
Lumpkin	36,538	6,882,383	0.005	2,331,530	12,378
Macon	129,104	4,578,355	0.028	1,372,164	38,693
Madison	153,854	3,412,710	0.045	1,618,761	72,978
Marion	196,491	5,547,638	0.035	1,664,761	58,964
McDuffie	94,049	3,292,013	0.029	1,156,742	33,047
McIntosh	187,892	2,962,267	0.063	1,517,930	96,280
Meriwether	189,632	6,521,928	0.029	2,542,378	73,922

Miller	29,114	2,056,910	0.014	913,507	12,930
Mitchell	212,335	2,365,066	0.090	910,191	81,717
Monroe	243,572	4,999,188	0.049	1,724,469	84,020
Montgomery	153,136	2,375,583	0.064	947,970	61,108
Morgan	168,676	5,155,542	0.033	1,821,114	59,582
Murray	119,249	5,716,639	0.021	2,107,790	43,968
Muscogee	107,911	2,176,475	0.050	874,001	43,333
Newton	69,292	4,129,447	0.017	1,038,111	17,419
Oconee	54,357	1,990,082	0.027	678,973	18,545
Oglethorpe	244,178	7,505,699	0.033	2,597,891	84,515
Paulding	176,244	4,916,699	0.036	1,818,686	65,193
Peach	24,056	617,191	0.039	232,841	9,075
Pickens	92,567	3,789,635	0.024	1,637,140	39,989
Pierce	169,560	4,289,742	0.040	1,655,672	65,444
Pike	53,963	2,554,403	0.021	1,041,488	22,002
Polk	138,318	3,397,484	0.041	1,289,548	52,500
Pulaski	106,615	1,887,284	0.056	686,295	38,770
Putnam	153,430	4,584,535	0.033	1,748,961	58,532
Quitman	73,781	2,052,790	0.036	1,061,083	38,137
Rabun	16,312	10,906,877	0.001	3,233,930	4,836
Randolph	232,853	4,073,327	0.057	1,876,421	107,266
Richmond	108,490	3,001,166	0.036	1,097,598	39,677
Rockdale	12,271	1,460,002	0.008	389,101	3,270
Schley	122,637	2,016,197	0.061	798,576	48,574
Screven	415,211	9,767,866	0.043	3,400,267	144,538
Seminole	72,026	1,261,054	0.057	369,900	21,127
Spalding	24,224	2,109,936	0.011	750,701	8,619
Stephens	53,291	2,125,219	0.025	792,133	19,863
Stewart	338,099	4,571,646	0.074	2,587,199	191,338
Sumter	239,839	3,767,174	0.064	1,758,721	111,970
Talbot	173,539	5,110,099	0.034	2,663,654	90,458
Taliaferro	138,044	3,015,867	0.046	1,184,894	54,236
Tattnall	136,457	3,877,102	0.035	1,538,195	54,138
Taylor	194,974	3,009,272	0.065	1,884,496	122,098
Telfair	297,821	4,622,224	0.064	2,039,481	131,408
Terelll	164,341	2,802,174	0.059	1,165,425	68,349
Thomas	255,127	6,195,240	0.041	1,627,124	67,007
Tift	60,293	2,188,899	0.028	737,966	20,327
Toombs	237,544	2,592,235	0.092	1,139,718	104,440
Towns	3,524	3,506,029	0.001	1,123,216	1,129
Treutlen	151,397	2,685,642	0.056	785,864	44,301
Troup	168,391	7,081,228	0.024	2,481,839	59,018
Turner	75,459	1,654,088	0.046	638,765	29,140
Twiggs	144,937	5,951,091	0.024	2,517,518	61,313
Union	19,628	5,816,212	0.003	1,923,377	6,491
Upson	101,786	4,418,680	0.023	1,770,837	40,792
Walker	91,178	7,088,477	0.013	2,408,734	30,983
Walton	48,722	4,182,579	0.012	1,194,674	13,916
Ware	341,708	7,424,001	0.046	3,998,142	184,024
Warren	266,525	4,746,742	0.056	1,544,595	86,728
Washington	450,488	7,650,554	0.059	3,130,012	184,305
Wayne	418,640	6,226,078	0.067	2,915,414	196,032
Webster	180,671	1,523,231	0.119	944,485	112,026

Wheeler	202,129	4,841,924	0.042	1,773,344	74,029
White	47,813	5,351,110	0.009	1,767,803	15,796
Whitfield	100,553	2,987,888	0.034	942,037	31,703
Wilcox	197,014	4,676,593	0.042	1,895,283	79,844
Wilkes	365,445	6,398,824	0.057	2,350,831	134,259
Wilkinson	223,195	6,512,091	0.034	2,834,524	97,150
Worth	174,751	7,329,499	0.024	2,135,796	50,922
Total	25,357,603	704,097,848		265,203,508	10,109,645

Appendix E
Archaeological Sites and Isolated Finds

TABLE E-1
Results of Archeological Survey

Site	Description	Register Eligibility
9TU28	This site is located along a field road between a recently cultivated field to the south and mixed oak and planted pines to the north. It consists of a light scatter of whiteware, salt-glazed stoneware, and amethyst glass found along an eroded road surface. There are no structural remains present and no indication of features. The site has been heavily disturbed by agricultural and silvicultural activities and all shovel tests were negative.	We do not find the site eligible for listing in the NRHP as no significant cultural resources were located.
9TU29	This site is located along an eroded terrace, in an overgrown clearcut, and just southwest of planted pines. It consists of a light scatter of whiteware, glass, and brick fragments. Although brick fragments are present, there are no indications of structural remains. The site has been graded as well as heavily disturbed by agricultural and, silvicultural activities. All shovel tests were negative, and artifacts were recovered entirely from the surface.	We do not find the site eligible for listing in the NRHP as no significant cultural resources were located.
9TU30	This site is located within a clearcut with good surface visibility. It consists of a light scatter of glass fragments on the surface, and one positive shovel test containing 3 chert flakes and on eroded ceramic. There are no indications of structural remains or potential for intact subsurface features. The location was probably light prehistoric activity scatter and an even lighted historic debris scatter. The site has been heavily disturbed by past agricultural and silvicultural activities. Only one shovel test was positive, and the few historic artifacts were recovered entirely from the surface.	We do not find the site eligible for listing in the NRHP as no significant cultural resources were located.

TABLE E-1
Results of Archeological Survey

Site	Description	Register Eligibility
9TU31	This site is located adjacent to an open field. It consists of the collapsed structural remains of a house, a standing barn, two additional concrete foundations, plus a light scatter of modern debris. The house appears to have built in the early twentieth century and occupied until the 1980's. The house and barn are a wood frame structure, clad with clapboard. The roof was most likely gabled. The house is currently almost completely collapsed and was not considered a standing structure (i.e., part of the architectural survey). The barn is in slightly better condition, but does not have distinctive architectural elements. The barn is abandoned as well. The site has been heavily disturbed by past agricultural and silvicultural activities. Two shovel tests were positive, and all artifacts recovered appear to be less than 50 years of age.	We do not find the site eligible for listing in the NRHP as the structure is almost completely collapsed and the integrity of the structure has been severely compromised.
Isolated Find #1	Isolated Find #1 consists of a single chert flake and three sherd fragments recovered from the surface along a clearcut ridgetop.	We do not find the site eligible for listing in the NRHP as no significant cultural resources were located.

Source: (Brockington and Associates, 2007)

Appendix F
Archaeological Sites and Isolated Finds

Jurisdictional Wetland and Protected Species Reconnaissance of Proposed Facility Site and Associated Parcels

PREPARED FOR: Larry Robinson/Range Fuels, Inc.

PREPARED BY: Melanie Wiggins/CH2M HILL

DATE: July 24, 2007

Purpose

This technical memorandum (TM) presents findings from site visits conducted to evaluate the presence of wetlands or other waters of the United States that require delineation and potential permitting in accordance with Section 404 of the Clean Water Act (CWA). This TM also reviews the evaluations related to the occurrence of species listed as threatened or endangered or proposed for listing under the Endangered Species Act (ESA) of 1973, as amended, or potentially suitable habitat for listed or proposed species in the project area. Regulation of waters of the United States is through the Savannah District of the U.S. Army Corps of Engineers (USACE), who also would make the final determination of regulatory wetland jurisdiction, and verification of report findings. The U.S. Fish and Wildlife Service (FWS) is responsible for the implementation of the ESA. CH2M HILL conducted an evaluation of the proposed facility site (Figure 1 and Figure 2) March 29, 2007. An evaluation of an adjacent parcel for planned tank farm and rail lines was conducted on April 6, May 30, and June 29, 2007. This TM represents the professional opinion of CH2M HILL regarding the presence or absence of wetlands and other waters of the United States and their boundaries within the study area and the presence or absence of protected species or their potentially suitable habitat within the study area.

Wetland Determination Methodology

Wetland Definition

Wetlands for the purpose of this study were defined as:

> *"...those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas"* (USACE, January 1987, pg. 12).

This definition identifies three essential characteristics possessed by wetlands: 1) hydrophytic vegetation; 2) hydric soils; and 3) wetland hydrology.

Waters of the United States

The term "waters of the United States" has broad meaning and incorporates both deepwater aquatic habitats and special aquatic sites, including wetlands, as follows (33 *Code of Federal Regulations* [CFR] Part 328.3(a)):

"1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

Which are used or could be used for industrial purpose by industries in interstate commerce;

4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;

6. The territorial seas;

7. Wetlands adjacent to waters, (other than waters that are themselves wetlands) identified in paragraphs (a)(1)-(6) of this section;

8. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR 123.11 (m) which also meet the criteria of this definition) are not waters of the United States.

9. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

For the purpose of this TM, discussion of "waters of the United States" occurring within the project area will be separated into wetlands and non-wetland waters. Non-wetland waters refer to all waters that do not meet the wetland criteria (hydrophytic vegetation, hydric soils, and hydrology), as defined in the 1987 Manual (USACE, 1987). Lakes, ponds, impoundments, and permanent and intermittent streams outside of wetlands are commonly included as non-wetland waters. Recent federal court rulings have limited the scope of CWA jurisdiction such that isolated wetlands and ephemeral streams are not considered waters of the United States. However, the determination of CWA jurisdiction lies with the USACE.

Site Descriptions

The proposed facility site is two parcels totaling approximately 150 acres. Approximately 65 of the 150 acres would be developed for the project and the remaining acreage would be left as greenspace.

The main facility site is approximately 120 acres in an industrial park that has been previously cleared, with the exception of the areas surrounding wetlands and non-wetland waters, where a 30-100 foot buffer of mature trees, dominated by red maple (*Acer rubrum*) sweetbay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*) and willow oak (*Quercus phellos*), remains (Figure 3). A stream originates from a spring/seep in the northeast portion of the property. This stream, approximately two feet wide, flows from the northeast to the southwest and is joined by two additional streams within the property boundary, a perennial stream and an intermittent stream that flows only in response to an offsite water discharge. The stream exits the property to the southwest through a culverted road crossing. The wooded area immediately adjacent to the channel that runs northeast to southwest exhibits characteristics of wetlands with hydrophytic vegetation, hydric soils and positive indicators of wetland hydrology. This forested wetland extends approximately 30-40 feet from the stream channel on both sides.

Existing infrastructure on the property includes a dirt road and sewer lines/manholes on the northwest and northern portions of the property. Much of the northern and western areas of the site are vegetated with grasses dominated by broomsedge (*Andropogon virginicus*). The southern and eastern portions of the site are bare dirt, with one area in the southern portion that has been recently seeded and mulched. The northeastern portion appears to have burned in the fall or winter, probably to remove logging debris from recent harvest activities. This area contains an emergent wetland dominated by black willow (*Salix nigra*) and two species of rush (*Juncus* spp.). The soils in this area had redoximorphic features characteristic of hydric soils and were saturated to the surface.

The proposed site for the rail spur is within an existing industrial area containing a concrete batch plant with a two-lane paved road bisecting the property. A small (approximately 1 foot wide) ephemeral stream runs between the area of the proposed loadout racks and the existing railroad. An area of forested wetland is present immediately to the north and south of the ephemeral channel, after it passes Parkview Drive. This wetland contained royal fern (*Osmunda regalis*), soft rush (*Juncus effusus*), sweet bay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), willow oak (*Quercus phellos*) and red maple (*Acer rubrum*). Soils in the area had redoximorphic features characteristic of hydric soils and were saturated to within three inches of the surface.

The property that contains the proposed chip mill site, is immediately adjacent to the facility site the north and is approximately 30 acres. An unpaved road bisects the property from east to west. Approximately 5 acres along the southeastern boundary of the secondary site was planted with wheat during the May site visit which had been harvested by the June site visit. The remainder of the site is hardwood forest dominated by oaks. There are two small areas of forested wetlands in the parcel. The first is located on the western half of the property and is estimated to be less than 0.5 acre in size. A second forested wetland area is located to the north of the unpaved road on the property. Both wetland areas are located outside of the area that would be used for the chip mill.

Protected Species

The threatened and endangered species evaluation included a literature search and field survey. The literature search included a review of the FWS and the Georgia Department of Natural Resources (GA DNR) databases for potential and known locations of protected species.

The GNHP database contains records of occurrences of eight rare, threatened, and endangered (RTE) species in Treutlen County. Of the eight RTE species, six have state protection status. None of the species known from Treutlen County have federal protection status. Table 1 lists these eight protected species, their protection status, and their typical habitats.

Table 1 Rare, Threatened, and Endangered Species in Treutlen County, GA

Species	Common Name	State Status	Habitat
Animals			
Spotted Turtle	*Clemmys guttata*	SP	Heavily vegetated swamps, marshes, bogs, and small ponds; nest and possibly hibernate in surrounding uplands
Ironcolor Shiner	*Notropis chalybaeus*		Coastal Plain streams and floodplain swamps
Plants			
Pineland Barbara Buttons	*Marshallia ramosa*	SP	Altamaha Grit outcrops; open forests over ultramafic rock
Cutleaf Beardtongue	*Penstemon dissectus*	SP	Altamaha Grit outcrops and adjacent pine savannas; rarely sandridges
Yellow Flytrap	*Sarracenia flava*	SP	Wet savannas, pitcherplant bogs
Ocmulgee Skullcap	*Scutellaria ocmulgee*	SP	Mesic hardwood forests; bluff forests
Ohoopee Bumelia	*Sideroxylon macrocarpum*	SP	Dry longleaf pine woods with oak understory; often hidden in wiregrass
Wire-leaf Dropseed	*Sporobolus teretifolius*		Longleaf pine-wiregrass savannas, pitcherplant bogs

Notes:
SP: Listed as protected by the State of Georgia

None of the species listed in Table 1 were observed on either property.

Although not reported from Treutlen County, nine gopher tortoise (*Gopherus polyphemus*) burrows were identified on the facility site and the proposed chip mill site (Figure 3). Gopher tortoises inhabit sand hills, dry hammocks, longleaf pine-turkey oak woods, and old fields. The burrows were located along the northwest border of the main facility site and adjacent to and south of an unpaved road on the proposed chip mill site. Gopher tortoise burrows are often inhabited by other species and these dens are commonly used by the indigo snake, a federally protected species, where the species co-occur. No gopher tortoises

were identified during the site visit, nor were any other animal species seen near their burrows.

Conclusions and Permitting Requirements

CH2M HILL identified four streams with adjoining wetlands on or adjacent to the two properties. Current site construction layouts would avoid encroachment on any of the streams or wetlands identified during the site visits. The current undersized, culverted stream crossing of Commerce Drive will be replaced with a larger culvert capable of handling stream flows from the site during heavy rainfalls. This culvert replacement would need to be permitted with a pre-construction notification (PCN) submitted to the USACE for authorization under the CWA Nationwide Permit (NWP) program before the start of the project. The NWP program has a time limit of 45 days for processing by USACE following its receipt of a complete application. Should the District Engineer decide to require mitigation, the application would not be deemed complete until after receipt of an acceptable mitigation plan. A delay in the USACE coordination regarding potential mitigation could result in delays to the project implementation.

References

Georgia Department of Natural Resources. Rare species and Natural Community Information. Accessed from http://georgiawildlife.dnr.state.ga.us/content/displaycontent.asp?txtDocument=89&txtPage=6.

U.S. Army Corps of Engineers. January 1987. *Corps of Engineers Wetlands Delineation Manual.* Environmental Laboratory, Department of the Army.

Attachments

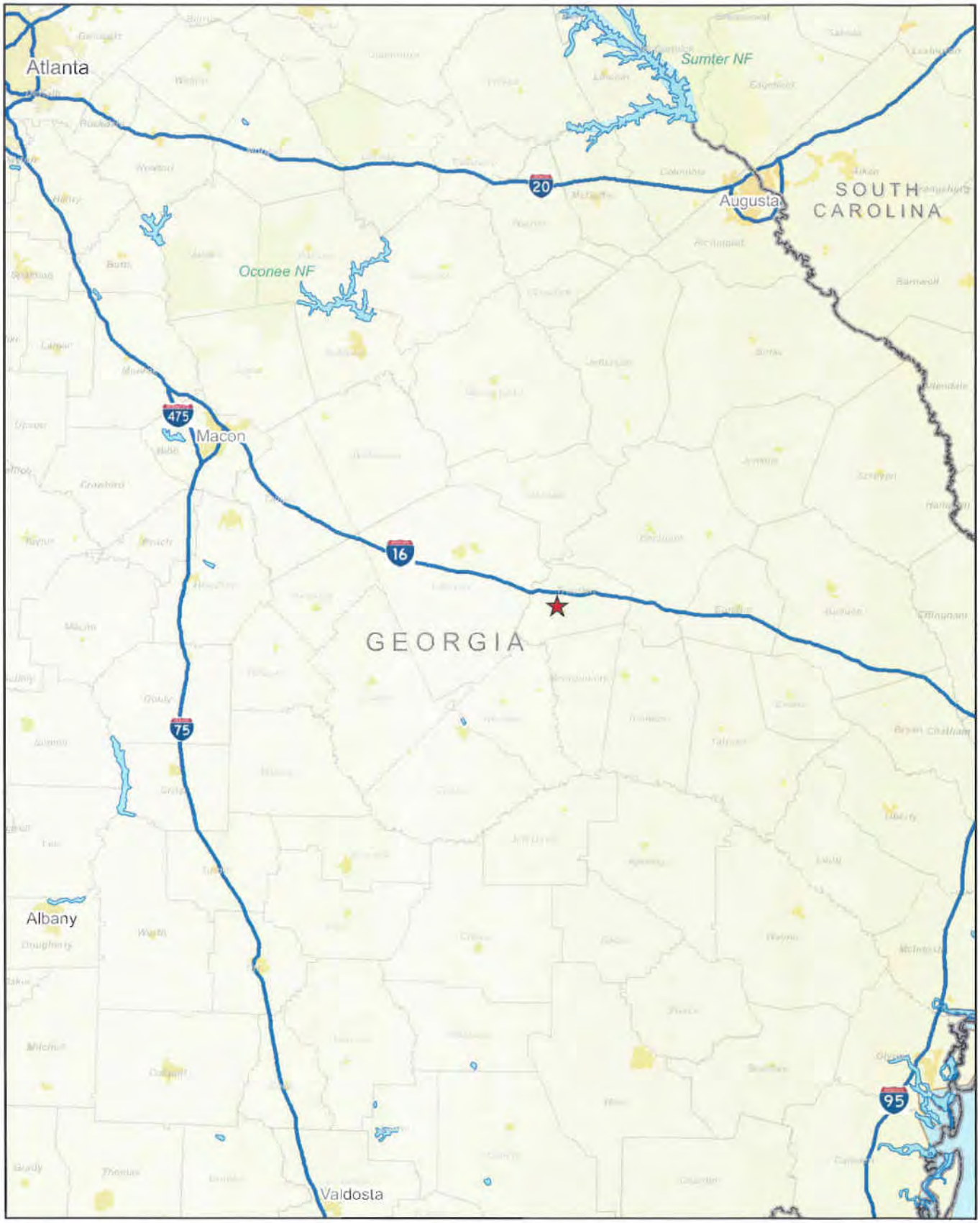

FIGURE 1
Project Vicinity
Range Fuels – Treutlen County, GA

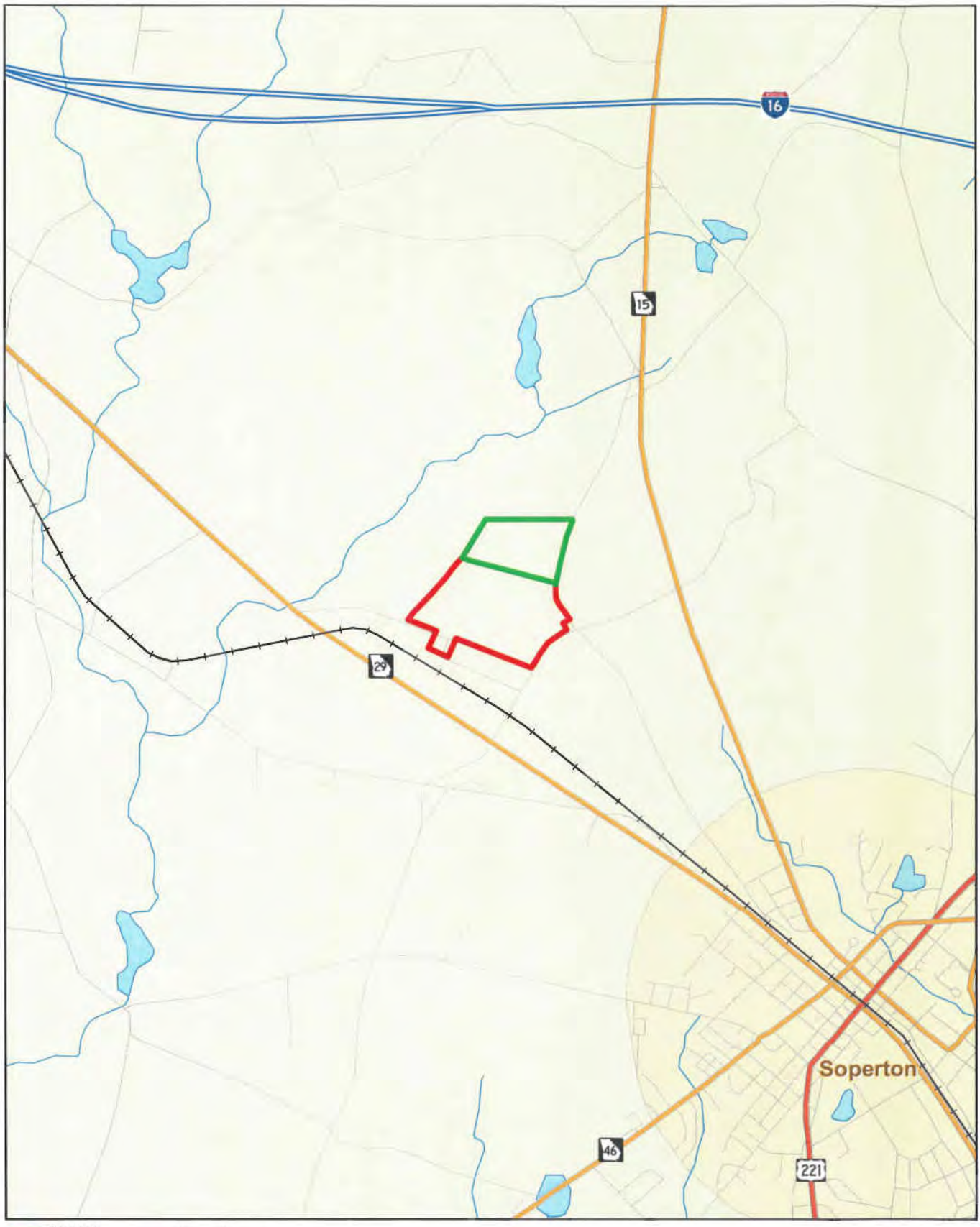

FIGURE 2
Project Location
Range Fuels – Treutlen County, GA

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CH2MHILL

FIGURE 3
Wetland and Gopher Tortoise Locations
Range Fuels, Soperton, GA

\\boomer\G\Projects2\RangeFuels\mxd\Gopher_Burrow.mxd; Date: 07/25/07; User: DDickman

Appendix G
SHPO Concurrence Letter

Noel Holcomb, Commissioner

Georgia Department of Natural Resources

Historic Preservation Division

W. Ray Luce, Division Director and Deputy State Historic Preservation Officer
34 Peachtree Street NW, Suite 1600, Atlanta, Georgia 30303-2316
Telephone (404) 656-2840 Fax (404) 657-1040 http://www.gashpo.org

August 28, 2007

Steve Blazek
NEPA Compliance Officer
Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

AUG 31 RECD

RE: Construct/Operate Commercial Thermochemical Cellulosic Ethanol Plant
Treutlen County, Georgia
HP-070813-016

Dear Mr. Blazek:

The Historic Preservation Division (HPD) has reviewed the report entitled *Cultural Resourcse Survey of the Proposed Range Fuels Plant*, dated August 2007, by Brockington and Associates, Inc. Our comments are offered to assist the U.S. Department of Energy (DOE) and its applicants in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information provided, HPD concurs with the DOE that the proposed undertaking will have **no effect** on historic structures or archaeological resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP), as defined in 36 CFR Part 800.4(d)(1). Specifically, HPD concurs with the DOE that archaeological sites 9TU28, 9TU29, 9TU30, 9TU31, and Isolated Find # 1 do not appear to be eligible for listing in the NRHP. Please note that historic and/or archaeological resources may be located within the project's area of potential effect (APE), however, at this time it has been determined that they will not be impacted by the above-referenced project. Furthermore, any changes to this project as proposed will require further review by our office for compliance with Section 106.

Please submit an additional copy of the survey report to HPD. For your information, HPD will retain one copy in our files and will forward the second copy to the Georgia Archaeological Site File.

Please refer to the project number referenced above in any future correspondence regarding this matter. If we may be of further assistance, please contact Elizabeth Shirk, Environmental Review Coordinator at (404) 651-6624, or Bob Entorf, Review Archaeologist, at (404) 651-6775.

Sincerely,

Elizabeth Shirk
Environmental Review Coordinator

ES:jph

cc: Thomas Whitley, Brockington and Associates, Inc.
Robin B. Nail, Heart of Georgia Altamaha RDC

Appendix H
Economic Impact of Cellulosic Ethanol Production in Treutlen County

The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

Economic Impact of Cellulosic Ethanol Production in Treutlen County

Prepared by:
Archie Flanders and John McKissick
Center Report: CR-07-07
April 2007

Economic Impact of Cellulosic Ethanol Production in Treutlen County

Executive Summary

A proposed operation for wood cellulosic ethanol production in Treutlen County would lead to economic activity throughout Georgia. Ethanol will be produced by utilizing wood waste and residue from harvested Georgia timber as a feedstock. With a large timber industry, cellulosic ethanol technology makes Georgia a highly desirable location for alternative energy production. Construction of a plant for wood cellulosic ethanol production in Treutlen County would create a one-time economic impact leading to $19.5 million in labor income for 489 jobs in Georgia. Operation of the plant would create an annual $105.7 million output impact in Treutlen County. Total labor income of $5.8 million would be created annually for 194 jobs in the county. Local governments in the county would receive $498,781 annually in tax revenues due to ethanol production, not including taxes on ethanol sales. Regional impacts for an area of 18 counties including Treutlen County lead to a labor income impact of $13.6 million for 432 jobs in the region. Production at the plant would generate a total output impact of $150.3 million for the state economy. Employees in Georgia would earn $17.6 million in wages and benefits for 444 jobs. The state treasury would receive $1.6 million annually, and local treasuries throughout the state would receive $1.3 million from operations related to ethanol production.

Economic Impact of Cellulosic Ethanol Production in Treutlen County

A proposed operation for wood cellulosic ethanol production in Treutlen County would lead to economic activity throughout Georgia. Ethanol will be produced by utilizing wood waste and residue from harvested Georgia timber as a feedstock. Construction activity leads to one-time impacts during the period of building the ethanol plant. Operation generates annual impacts due to purchasing of inputs for production. Officials of the proposed plant have provided revenue and itemized costs data for construction and annual production. The Center for Agribusiness and Economic Development (CAED) at the University of Georgia has applied these data for estimating economic impacts due to the proposed ethanol production.

Range Fuels, Inc. of Broomfield, CO has developed innovative processes to produce alternative energy fuels which are renewable, sustainable, and protective of the environment. The technology utilizes otherwise useless products from timber harvesting for conversion into cellulosic ethanol. With a large timber industry, this technology makes Georgia a highly desirable location for alternative energy production. Use of timber waste products creates a value-added activity for the Georgia forest industry.

Officials of Range Fuels state that the plant will produce 49 million gallons of ethanol and methanol per year. Construction costs for the plant total $225.0 million, not including land. Expectations are for plant annual revenues of $93.1 million from ethanol and methanol sales. All feedstock will be acquired from within Georgia, mostly within a 50-mile radius of Treutlen County. Consultations with representatives of the Georgia Forestry Commission indicate that Treutlen County has sufficient capacity to supply 10% of feedstock needs.

Principles of Economic Impact Analysis

Economic impacts can be estimated with input-output models (IMPLAN) that separate the economy into various industrial sectors such as agriculture, construction, manufacturing, trade, and services. The input-output model then calculates how a change in one industry changes output, income, and employment in other industries. These changes, or impacts, are expressed in terms of direct and indirect effects. Impacts are interpreted as the contribution of the enterprise to the total economy. Direct effects represent the initial impact on the economy of either construction or operations of an enterprise. Indirect effects are changes in other industries caused by direct effects of an enterprise and include changes in household spending due to changes in economic activity generated by direct effects. Thus, the total economic impact is the sum of direct and indirect effects. Input-output analysis can interpret the effects of an enterprise in a number of ways including output (sales), labor income (employee compensation and proprietary income), employment (jobs), and tax revenue.

Economic impacts result from a multiplier effect that begins with expenditures of an enterprise stimulating business to business spending, personal income, employment, and tax revenue. IMPLAN models include a regional purchase coefficient (RPC) for each impact variable that represents percentage of demand that is satisfied by production within an impact area. Demand for inputs not satisfied within the impact area represent leakages that have no indirect impacts in the impact area. Enterprises vary in their multiplier effects due to differing expenditure levels,

RPC's, and sectors in which their expenditures are directed. Impact analysis involves quantification of spending levels and proper allocation to impacted sectors.

Output impacts are a measure of economic activity that results from enterprise expenditures in a specific industrial sector. Output is equivalent to sales, and this multiplier offers insights into how initial economic activity in one sector leads to sales in other sectors. Personal income impacts measure purchasing power that is created due to the output impacts. This impact provides the best measure of how standards of living are affected for residents in the impact area.

An enterprise involves a specified number of employees that is determined by the technology of the enterprise. Employment multipliers indicate the effect on employment resulting from the enterprise initiating economic activity. IMPLAN indirect employment includes both full-time and part-time jobs without any distinction. Jobs calculated within an IMPLAN industrial sector are not limited to whole numbers and fractional amounts represent additional hours worked without an additional employee. With no measure of hours involved in employment impacts, IMPLAN summations for industrial sectors which include fractional employment represent both jobs and job equivalents. Since employment may result from some employees working additional hours in existing jobs, instead of terming indirect employment impacts as "creating" jobs, a more accurate term is "involving" jobs or job equivalents.

Economic Impacts of Ethanol Plant Construction

One-time economic impacts to the Georgia economy due to plant construction are presented in Table 1. Direct impact of $30.4 million is equal to construction expenditures in Georgia. The difference between total construction costs of $225.0 million and the direct output impact indicates significant leakages from the Georgia economy. Construction of the plant involves 313 jobs in Georgia with wages and benefits of $12.7 million. Direct jobs are equivalents based on the structure of the Georgia economy, and the actual number of individuals involved in construction may differ from the 313 jobs indicated by the direct employment impact. Indirect output is $20.5 million for a total output impact of $50.9 million. Indirect employment and labor income impacts lead to total labor income of $19.5 million for 489 jobs, or $39,888 per job in wages and benefits. Taxes generated total $1.8 million of which $1.0 million goes to the state government, and $767,275 goes to local governments throughout Georgia. Appendix 1 shows the allocation of economic impacts among major industrial sectors of the Georgia economy due to ethanol plant construction.

Table 1. Plant Construction: One-time Georgia Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output ($)	30,426,636	20,512,654	50,939,290
Labor Income ($)	12,727,835	6,777,592	19,505,427
Employment	313	176	489
State Taxes ($)			999,260
Local Taxes ($)			767,275
Sum of Taxes ($)			1,766,535

Economic Impacts of Ethanol Production

Operation of the ethanol plant in Treutlen County creates annual economic impacts within the local economy. Direct output impact of $93.1 million in Table 2 is equal to the value of annual sales. Direct labor income of $3.0 million for 69 employees is ethanol plant expense for wages and benefits. Average wages and benefits for ethanol plant employees are $43,348 per year. Indirect economic activity in Treutlen County of $12.6 million leads to a total output impact of $105.7 million. Indirect output leads to indirect labor income of $2.8 million for 125 jobs. Total labor income in Treutlen County is $5.8 million for 194 jobs which averages $30,016 per job. State taxes of $514,424 in Table 2 are for economic activity occurring in Treutlen County. Local taxes of $498,781 in the county result in total tax revenue of over $1.0 million. Treutlen County officials state the proposed ethanol plant has a property tax abatement, and there are no property taxes in this analysis. Appendix 2 shows economic impacts among major industrial sectors of the Treutlen County economy.

Table 2. Ethanol Production: Annual County Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output ($)	93,100,000	12,565,335	105,665,335
Labor Income ($)	2,991,000	2,832,029	5,823,029
Employment	69	125	194
State Taxes[1] ($)			514,424
Local Taxes[1] ($)			498,781
Sum of Taxes[1] ($)			1,013,206

[1]Does not include sales or fuel taxes on ethanol sales.

Production in Treutlen County creates economic impacts in surrounding counties. One county has limited capacity to provide inputs for an enterprise, and this leads to indirect impacts in other local economies as inputs are purchased in other counties. The state of Georgia has designated 12 state service delivery regions (SDR) in order to foster regional collaboration in economic development. Treutlen County is in SDR 9 which also includes the counties: Appling, Bleckley, Candler, Dodge, Emanuel, Evans, Jeff Davis, Johnson, Laurens, Montgomery, Pulaski, Tattnall, Telfair, Toombs, Wayne, Wheeler, and Wilcox. Table 3 shows the regional economic impact for SDR 9. Direct impacts are identical to Table 2. Indirect impacts increase as the larger regional economy has greater supporting capacity for production inputs than a single county. The total output impact to the region is $138.1 million. Total labor income of $13.6 million is created for 432 jobs which is a $31,432 average in wages and benefits. State and local taxes generated due to impacts in the region are $2.4 million. Appendix 3 shows economic impacts among major industrial sectors in SDR 9.

Table 3. Ethanol Production: Annual Regional Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output ($)	93,100,000	44,975,815	138,075,815
Labor Income ($)	2,991,000	10,587,535	13,578,535
Employment	69	363	432
State Taxes[1] ($)			1,315,029
Local Taxes[1] ($)			1,083,619
Sum of Taxes[1] ($)			2,398,648

[1]Does not include sales or fuel taxes on ethanol sales.

Expanding the impact area to include all of Georgia indicates the economic impacts from the Treutlen County plant to the state economy. Indirect impacts are greater in Table 4 than impacts for county and regional economies. Total output is $150.3 million for the state economy. A total of $17.6 million in labor income is created for 444 jobs. Indirect wages and benefits average $38,904 per job, and the average for all jobs is $39,594. The state treasury realizes a total of $1.6 million per year from production, while local governments in Georgia receive $1.3 million. Appendix 4 shows economic impacts among major industrial sectors in the Georgia economy.

Table 4. Ethanol Production: Annual Georgia Economic Impacts

	Direct Impact	Indirect Impact	Total Impact
Output ($)	93,100,000	57,179,512	150,279,512
Labor Income ($)	2,991,000	14,588,910	17,579,910
Employment	69	375	444
State Taxes[1] ($)			1,646,332
Local Taxes[1] ($)			1,312,718
Sum of Taxes[1] ($)			2,959,050

[1]Does not include sales or fuel taxes on ethanol sales.

Summary

Construction of a plant for wood cellulosic ethanol production in Treutlen County would create a one-time economic impact leading to $19.5 million in labor income for 489 jobs in Georgia. Operation of the plant would create an annual $105.7 million output impact in Treutlen County. Total labor income of $5.8 million would be created annually for 194 jobs in the county. Local governments in the county would receive $498,781 annually in tax revenues due to ethanol production, not including taxes on ethanol sales. Regional impacts for an area of 18 counties including Treutlen County lead to a labor income impact of $13.6 million for 432 jobs in the

region. Production at the plant would generate a total output impact of $150.3 million for the state economy. Employees in Georgia would earn $17.6 million in wages and benefits for 444 jobs. The state treasury would receive $1.6 million annually, and local treasuries throughout the state would receive $1.3 million from operations related to ethanol production.

Appendix 1. Plant Construction: One-time Economic Impacts to Major Sectors, Georgia

Sector	Output ($)	Labor Income ($)	Employment
Agriculture	163,914	48,528	2
Mining & Construction	17,472,849	9,397,328	227
Utilities	564,394	113,562	1
Manufacturing	11,908,074	2,474,719	57
Transportation, Warehousing	1,077,576	442,117	10
Trade	4,045,917	1,557,273	42
Finance, Insurance, & Real Estate	2,991,551	818,892	17
Services	10,794,011	4,573,527	132
Government and non-NAICS	1,921,005	79,482	2
Total	50,939,290	19,505,427	489

Appendix 2. Ethanol Production: Annual Economic Impacts to Major Sectors, County

Sector	Output ($)	Labor Income ($)	Employment
Agriculture	2,111,033	373,907	13
Mining & Construction	62,995	21,822	1
Utilities	1,651,804	337,497	7
Manufacturing	93,119,150	2,994,473	69
Transportation, Warehousing	399,342	148,617	6
Trade	2,159,982	757,522	39
Finance, Insurance, & Real Estate	1,036,282	251,151	7
Services	1,863,003	862,179	50
Government and non-NAICS	3,261,745	75,861	2
Total	105,665,335	5,823,029	194

Appendix 3. Ethanol Production: Annual Economic Impacts to Major Sectors, Region

Sector	Output ($)	Labor Income ($)	Employment
Agriculture	19,786,366	3,631,775	119
Mining & Construction	112,121	48,929	2
Utilities	6,319,239	1,281,525	10
Manufacturing	93,960,154	3,146,315	74
Transportation, Warehousing	672,908	270,619	7
Trade	4,607,800	1,701,478	65
Finance, Insurance, & Real Estate	1,505,534	396,017	11
Services	8,619,794	3,029,172	143
Government and non-NAICS	2,491,899	72,707	2
Total	138,075,815	13,578,535	432

Appendix 4. Ethanol Production: Annual Economic Impacts to Major Sectors, Georgia

Sector	Output ($)	Labor Income ($)	Employment
Agriculture	20,632,720	3,849,895	111
Mining & Construction	277,472	113,163	2
Utilities	6,363,750	1,291,256	9
Manufacturing	96,803,340	3,426,461	77
Transportation, Warehousing	1,047,598	424,252	9
Trade	6,011,415	2,259,269	61
Finance, Insurance, & Real Estate	4,439,924	1,226,146	24
Services	12,162,831	4,897,695	149
Government and non-NAICS	2,540,463	91,773	2
Total	150,279,512	17,579,910	444

The Center for Agribusiness & Economic Development

The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

> To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.
>
> To provide agricultural, natural resource, and demographic data for private and public decision makers.

To find out more, visit our Web site at: http://www.caed.uga.edu

Or contact:

John McKissick, Director
Center for Agribusiness and Economic Development
Lumpkin House
The University of Georgia
Athens, Georgia 30602-7509
Phone (706)542-0760
caed@agecon.uga.edu

Report Number: CR-07-07 **April 2007**

Issued in furtherance of Cooperation Extension Acts of May 8 and June 30, 1914, the University of Georgia College of Agricultural and Environmental Sciences, and the U.S. Department of Agriculture cooperating.

J. Scott Angle, Dean and Director

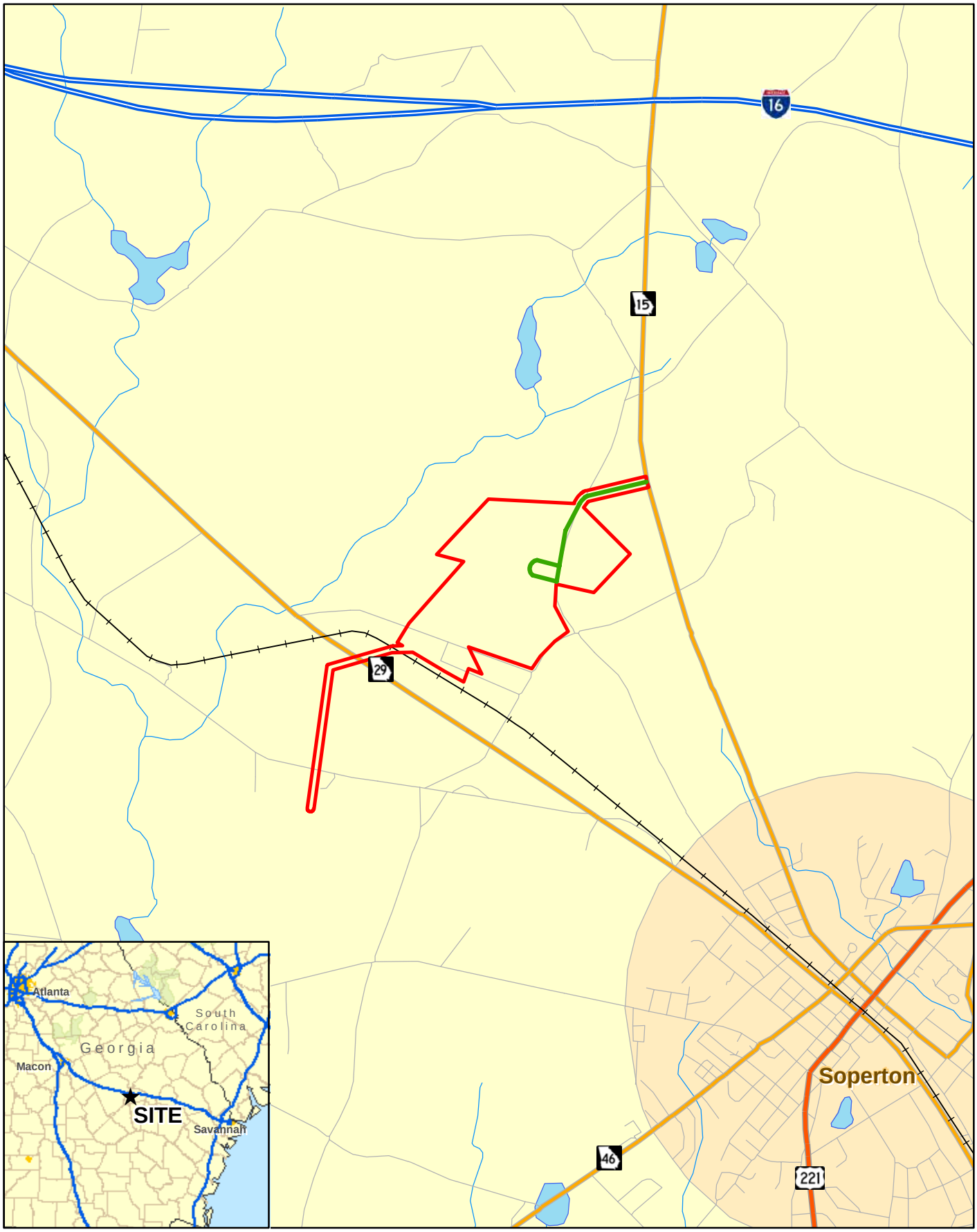

FIGURE 1-1
Project Location
Range Fuels Environmental Assessment

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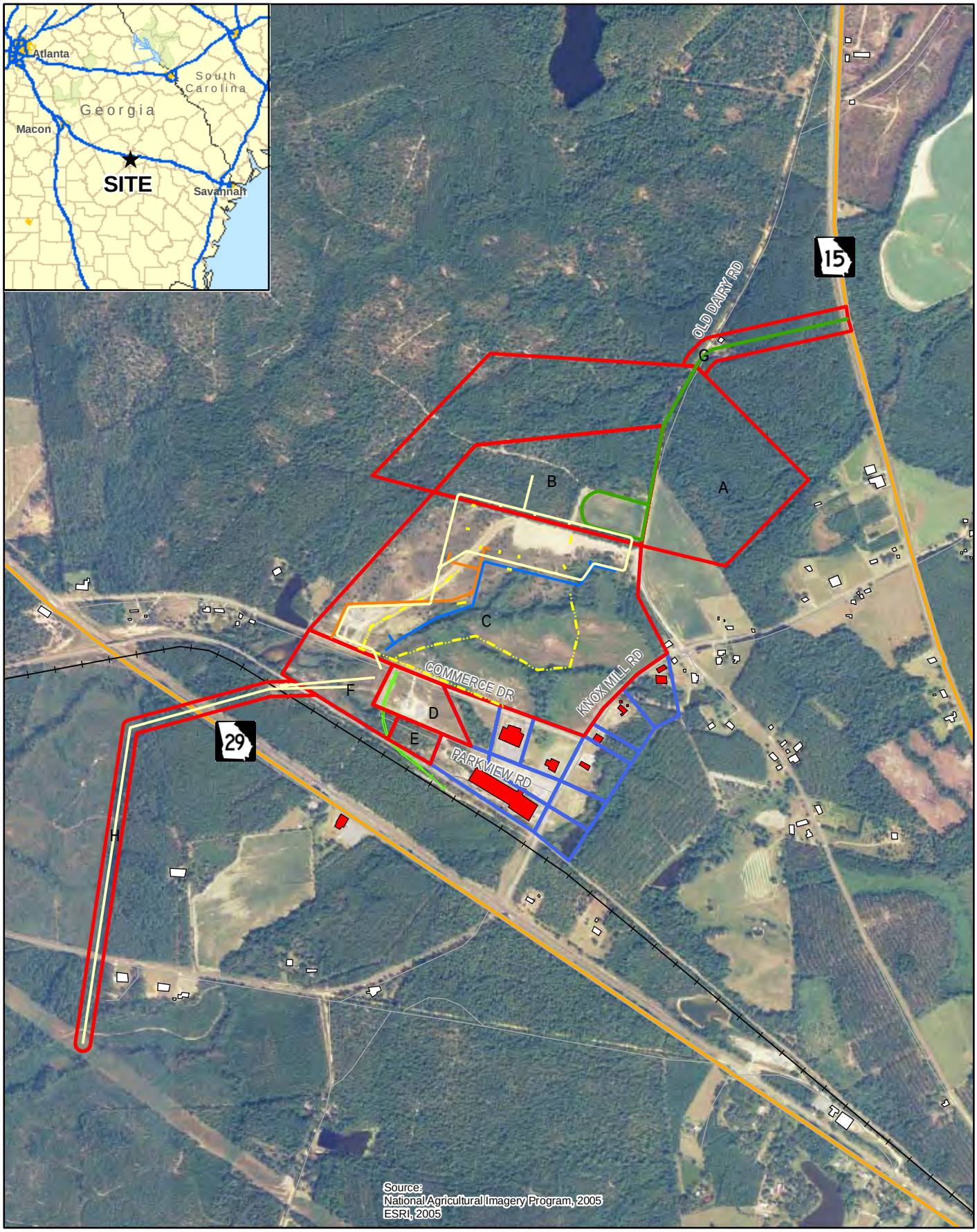


FIGURE 2-1
Site Map with Parcel Delineation
Range Fuels Environmental Assessment

\\BOOMER\G\PROJECTS2\RANGEFUELS\MXD\FIG_2_1_SITEMAP_WITHPARCELDELINEATION.MXD FIG_2_1_SITEMAP_WITHPARCELDELINEATION.PDF 9/11/2007 KALLEN4

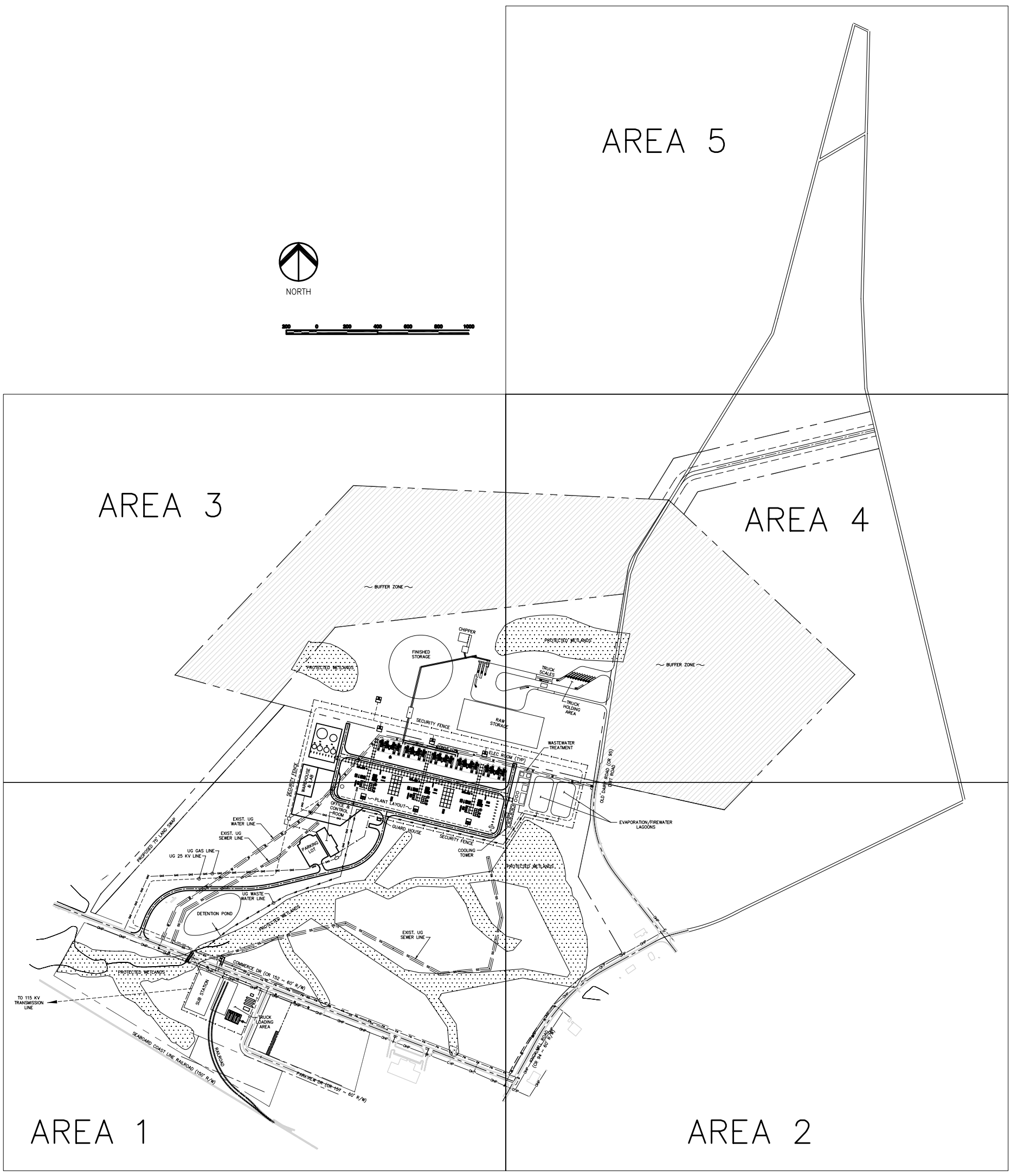


FIGURE 2-2A
Site Layout Key Plan
Range Fuels Environmental Assessment

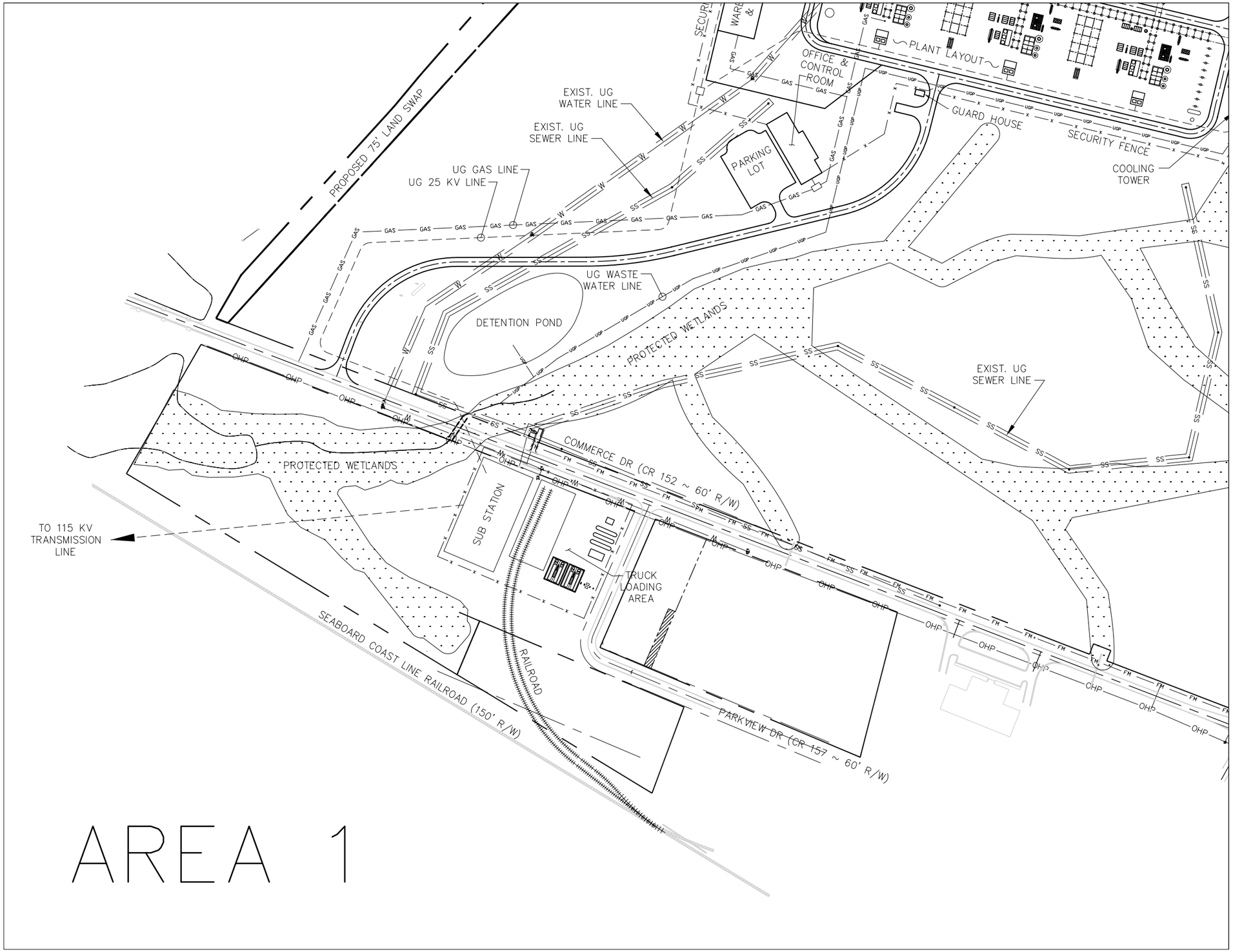


FIGURE 2-2B
Area 1
Range Fuels Environmental Assessment

AREA 2

FIGURE 2-2C
Area 2
Range Fuels Environmental Assessment

FIGURE 2-2D
Area 3
Range Fuels Environmental Assessment

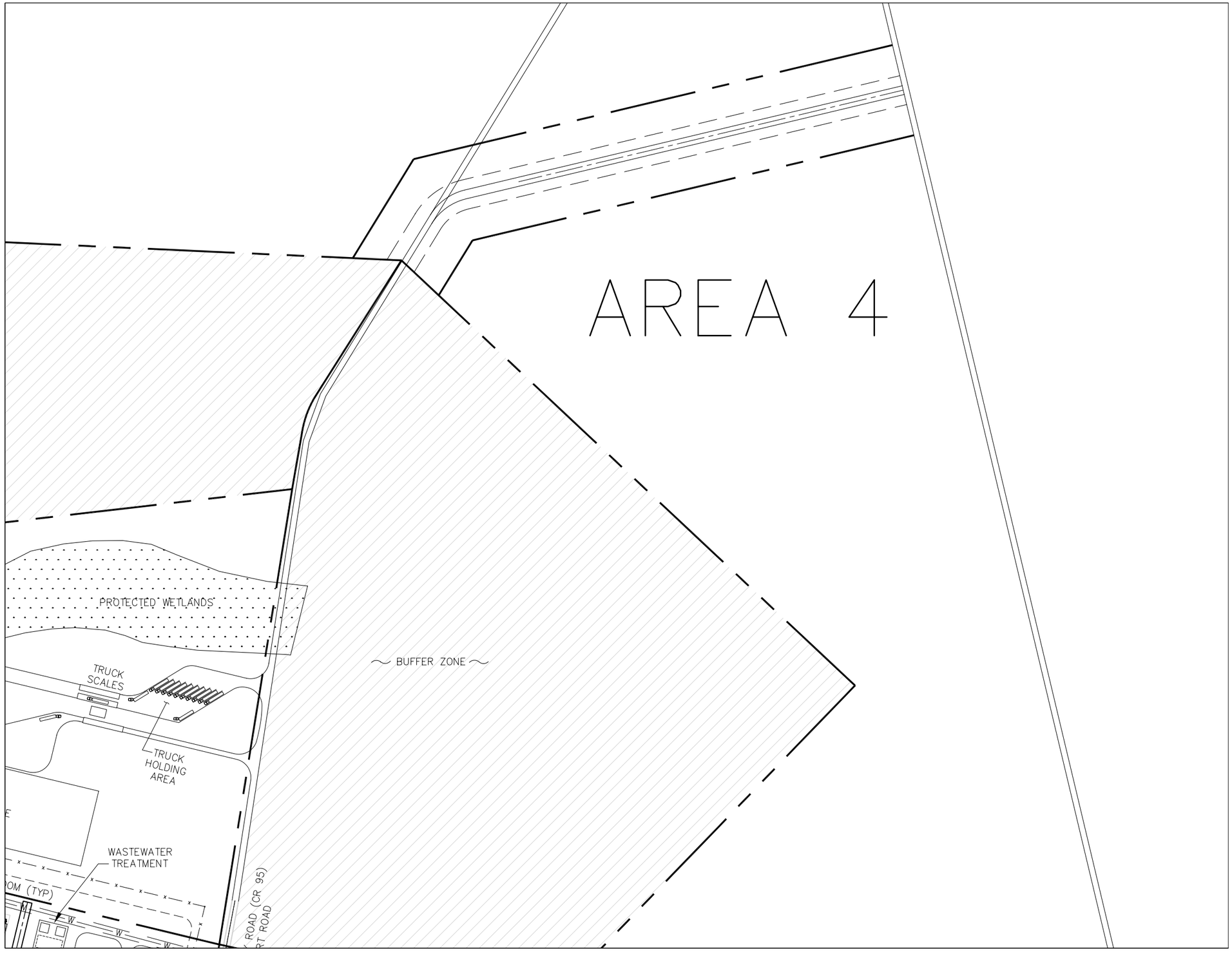


FIGURE 2-2E
Area 4
Range Fuels Environmental Assessment

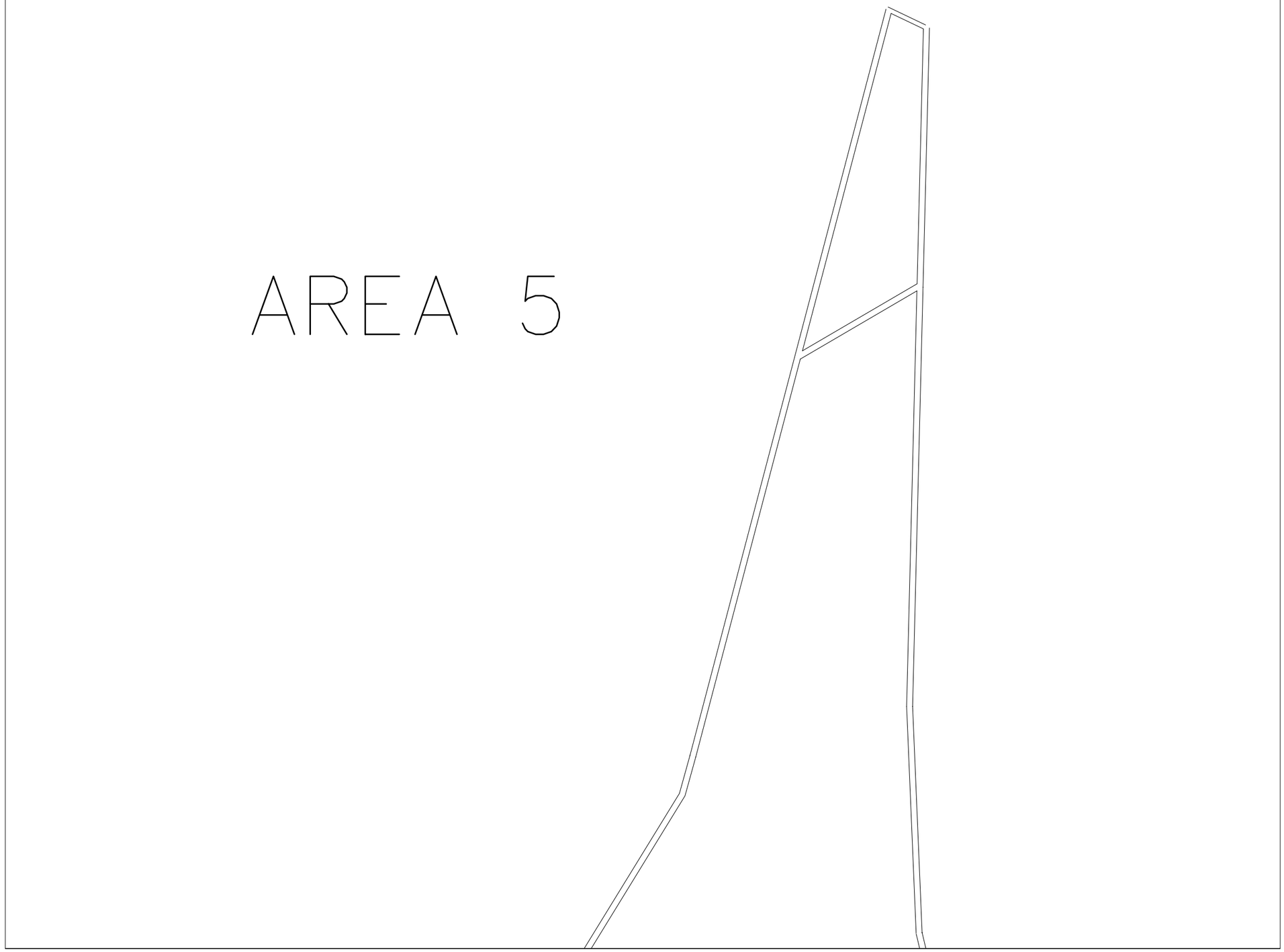
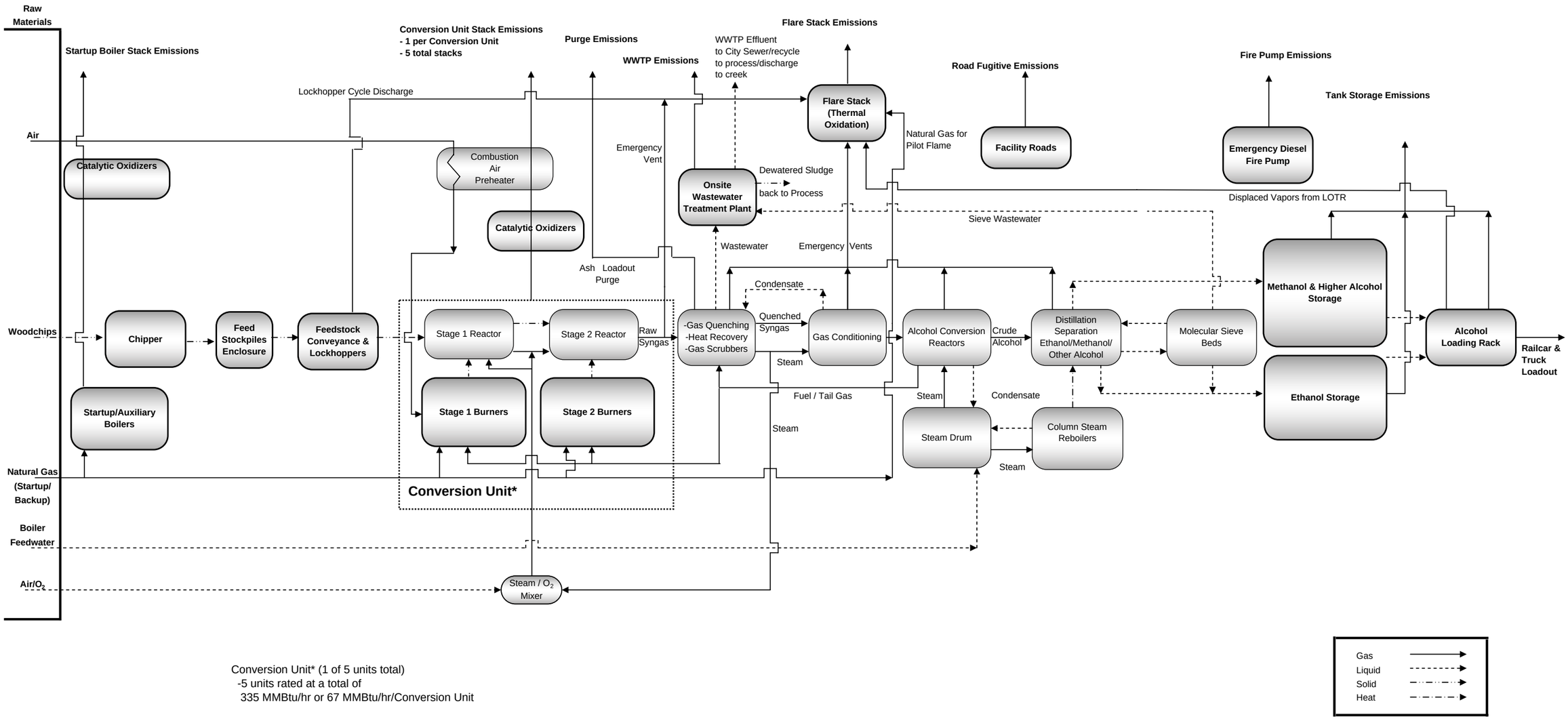


FIGURE 2-2F
Area 5
Range Fuels Environmental Assessment



Conversion Unit* (1 of 5 units total)
-5 units rated at a total of
335 MMBtu/hr or 67 MMBtu/hr/Conversion Unit

FIGURE 2-3
Process Flow Diagram
Range Fuels Environmental Assessment

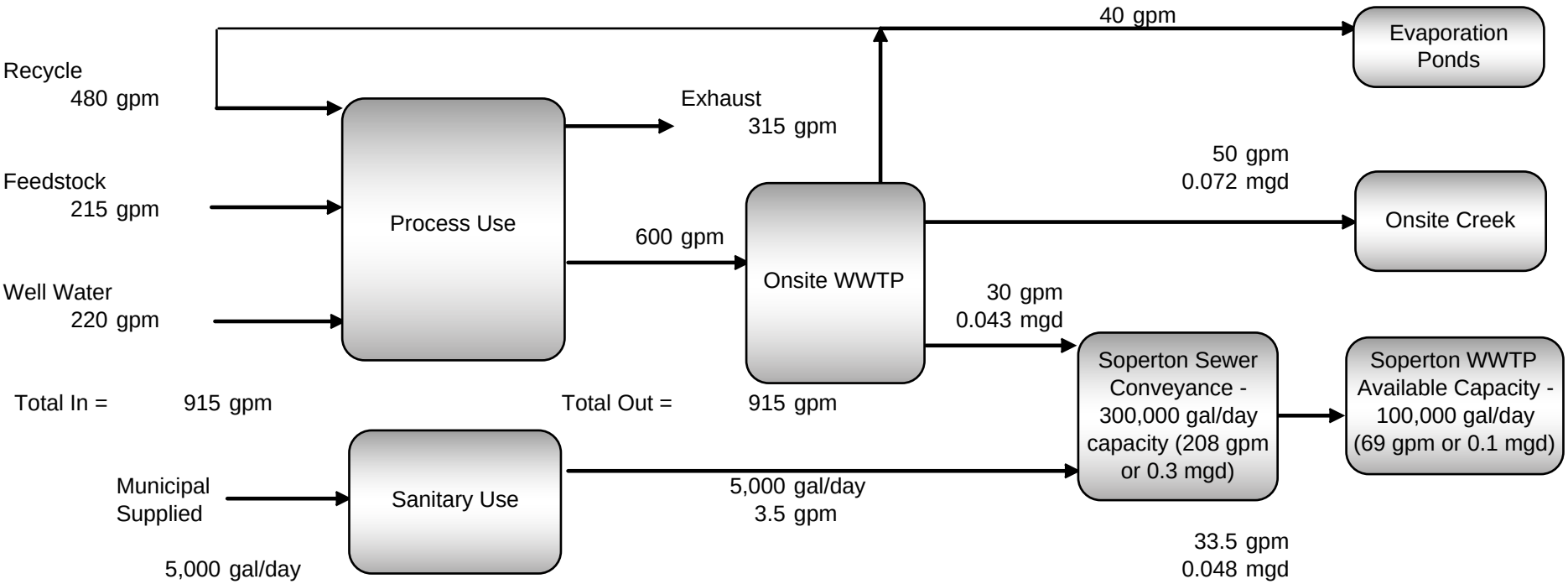
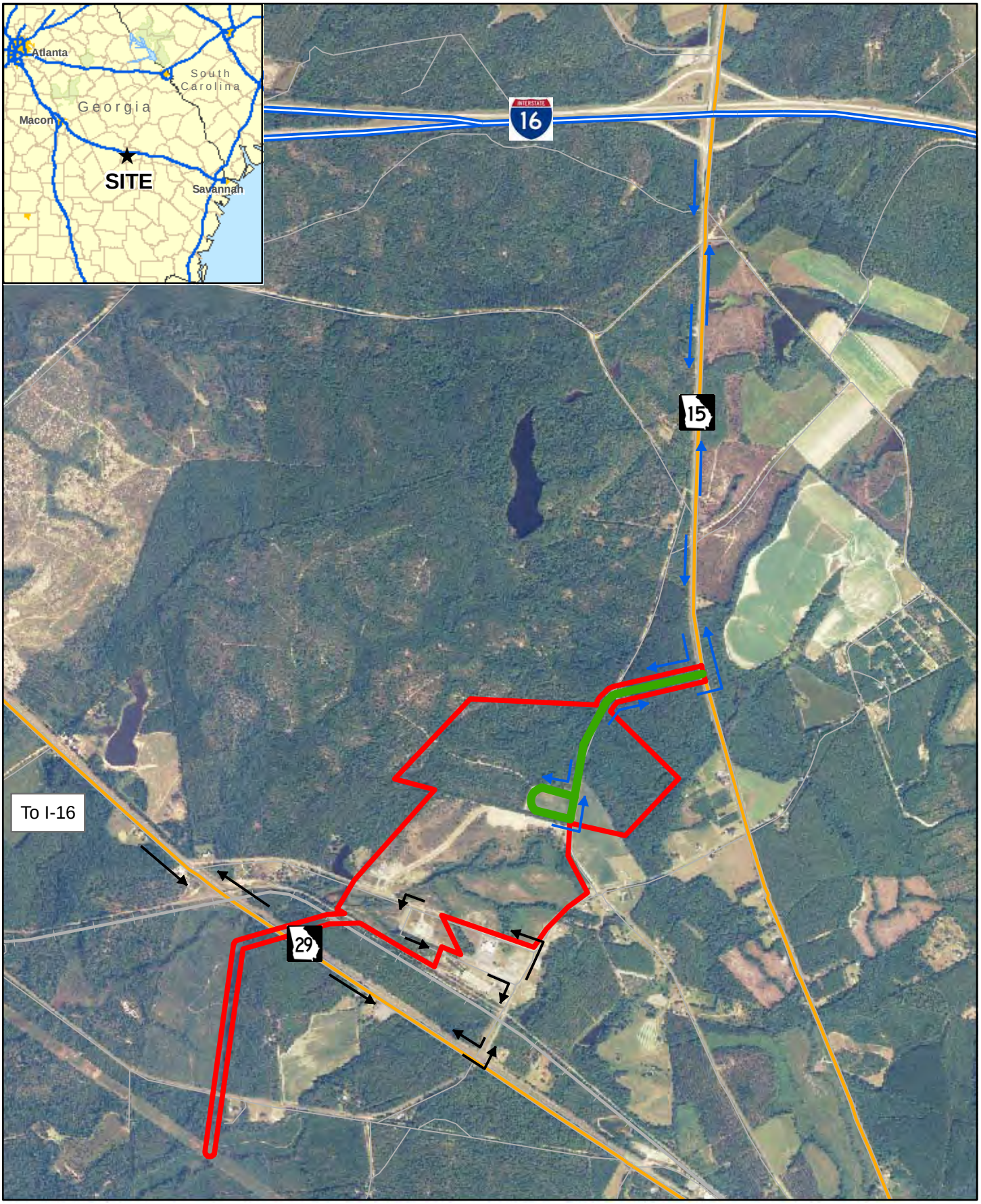


FIGURE 2-4
Water and Wastewater Balance
Range Fuels Environmental Assessment



Feedstock Delivery Route
Product Shipment Route
Proposed Road
Facility Boundary

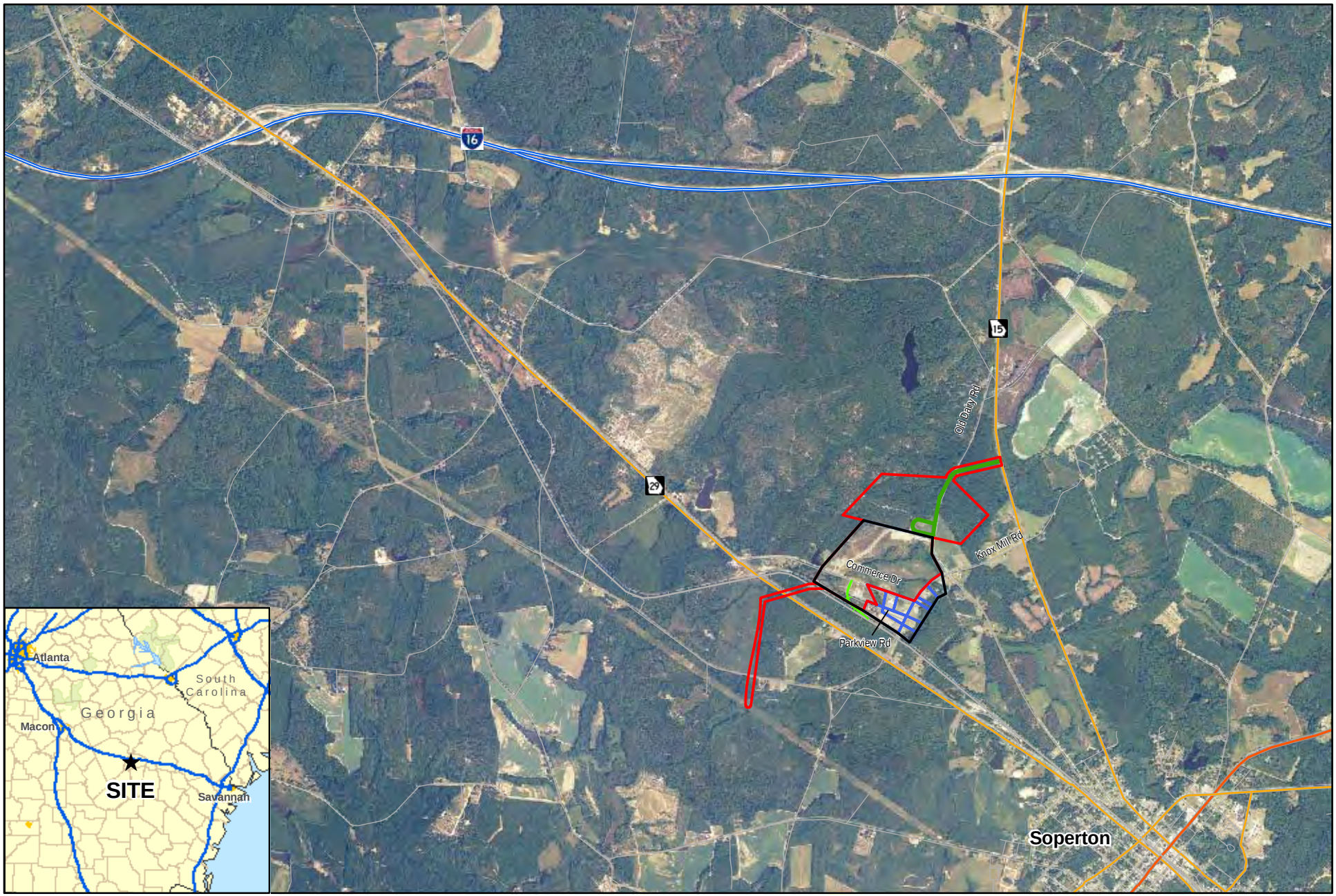
Source: National Agricultural Imagery Program, 2005

0 0.125 0.25 0.5 Mile

N

FIGURE 2-5
Feedstock Delivery and Product Shipment Routes
Range Fuels Environmental Assessment

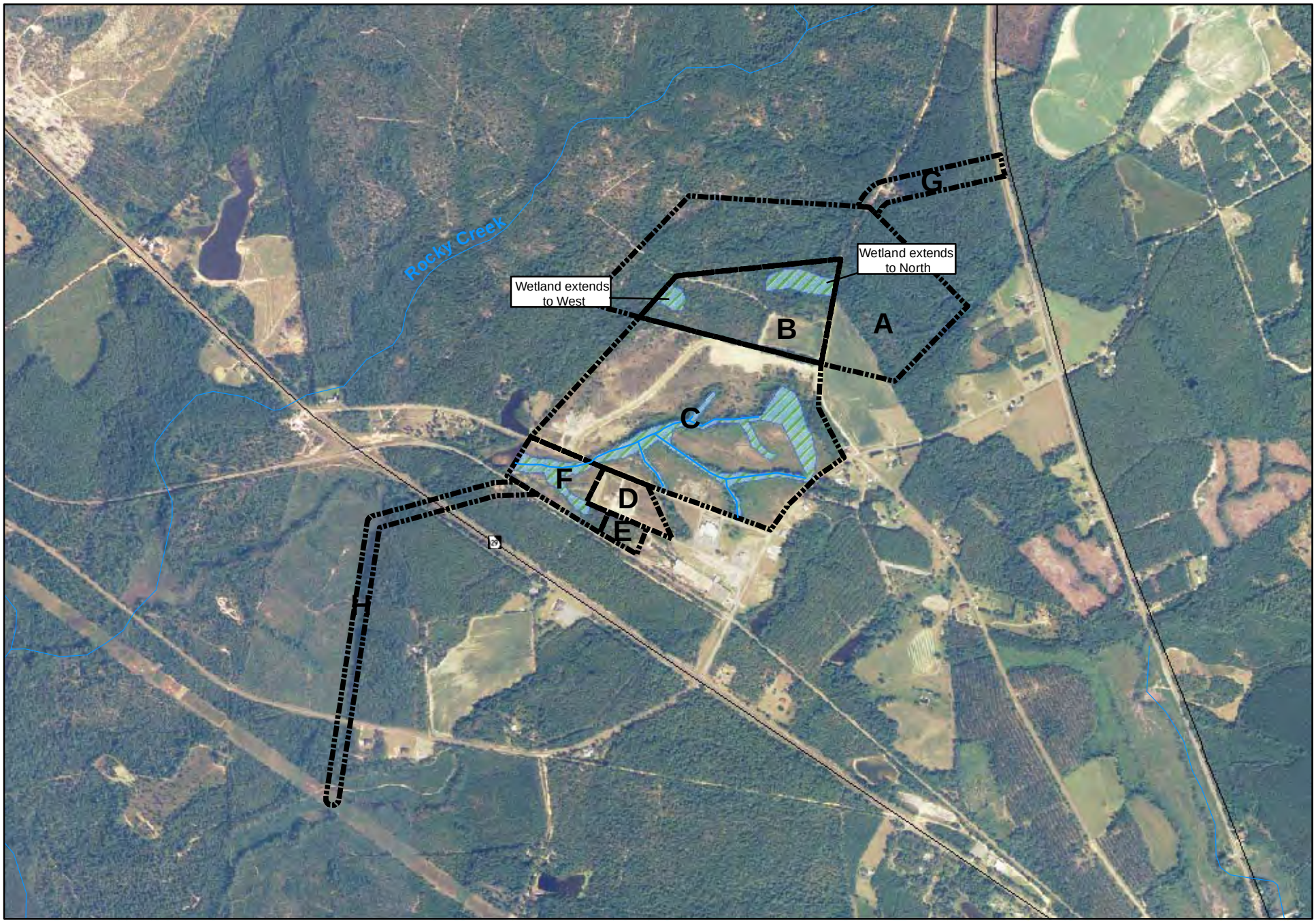
\\Boomer\G\Proj2\RangeFuels\MXD\FIG_2_5_DeliveryAndShipmentRoutes.mxd; Date: 9/11/2007 User: SSmith21



Source: National Agricultural Imagery Program, 2005

FIGURE 3-1
Aerial Vicinity
Range Fuels Environmental Assessment

\\Boomer\G\Proj2\RangeFuels\MXD\FIG_3_1_AerialVicinityMap.mxd; Date: 9/11/2007; User: SSmith21



Stream
Parcel Boundary
Wetland

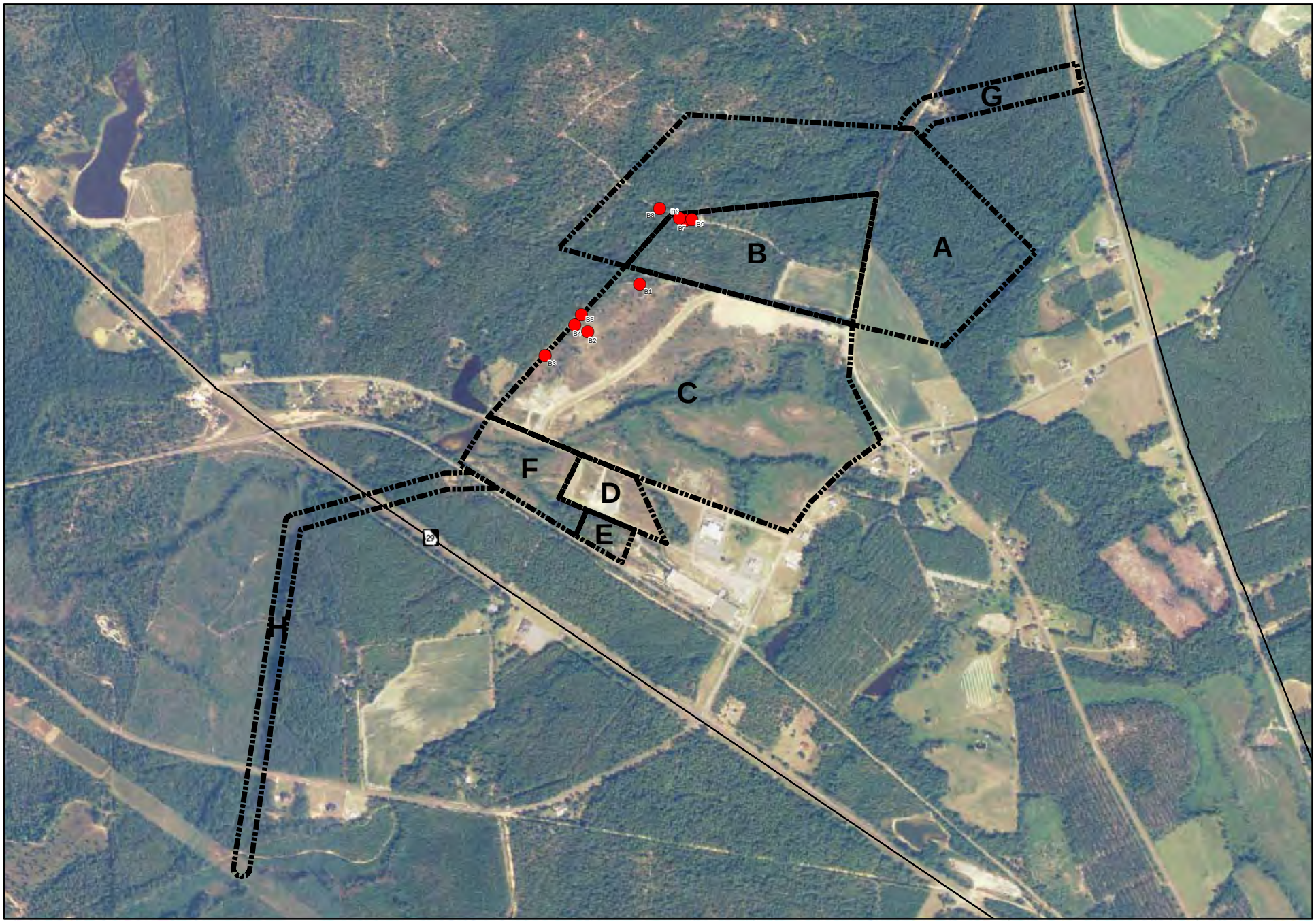
SOURCE:
Orthophotography - National Agricultural Imagery Program 2005

0 0.25 0.5 Miles

N

FIGURE 3-2
Stream and Wetland Locations
Range Fuels Environmental Assessment

\\boomer\G\Projects2\RangeFuels\mxd\Figure_3-2_StreamsAndWetlands.mxd; Date: 9/11/2007; User: SSmith21



Gopher Burrow

Parcel Boundary

SOURCE:
Orthophotography - National Agricultural Imagery Program 2005

0 0.25 0.5 Miles

N

FIGURE 3-3
Gopher Tortoise Locations
Range Fuels Environmental Assessment

\\Boomer\G\Projects2\RangeFuels\mxd\Figure_3-3_GopherTortoiseBurrow.mxd; Date: 9/11/2007; User: SSmith21