Construction and Operation of a Heterogeneous Feed Biorefinery

Enerkem Corporation
Pontotoc, Mississippi

Environmental Assessment

DOE/EA-1790

Prepared for:
U.S. Department of Energy
Energy Efficiency and Renewable Energy

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CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
ASU	air separation unit
ATF	U.S. Bureau of Alcohol, Tobacco, and Firearms
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CO	carbon monoxide
CO_2	carbon dioxide
dB	decibel
DOE	U.S. Department of Energy
EA	environmental assessment
EERE	Office of Energy Efficiency and Renewable Energy
EISA	Energy Independence and Security Act
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
ERP	Emergency Response Plan
ESCP	Erosion and Sedimentation Control Plan
GHG	greenhouse gas
GSR	gasifier solid residues
HAP	hazardous air pollutant
HAZID	Hazard Identification
HAZOP	Hazard and Operability
HDD	Horizontal Directional Drilling
MDAC	Mississippi Department of Agriculture & Commerce
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
MMNS	Mississippi Museum of Natural Science
MRF	Materials Recovery Facility
MSW	municipal solid waste
N_2O	nitrous oxide
NO_x	nitrogen oxides
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O_2	oxygen

O_3	ozone
Pb	lead
PEPA	Pontotoc Electric Power Association
PM	particulate matter
PM_{10}	particulate matter of ≤10 microns
Pre-HAZOP	Pre-Basic-Engineering Hazard and Operability
PVC	polyvinyl chloride
RFS	Renewable Fuel Standard
SO_2	sulfur dioxide
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
Syngas	Synthetic Gas
TRSWMA	Three Rivers Solid Waste Management Authority
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish & Wildlife Service
VOC	volatile organic compound
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION AND PURPOSE AND NEED

The U.S. Department of Energy (DOE or the Department) is proposing to provide cost share funding to Enerkem, Inc (Enerkem) for the final design, construction, and operation of a proposed Heterogeneous Feed Biorefinery Project to be located in Pontotoc, Mississippi (hereafter referred to as the biorefinery or the proposed project).

The biorefinery would use the dried and post-sorted biomass fraction of municipal solid waste (MSW) and wood biomass as feedstock. Enerkem's biorefinery would produce approximately 10 million gallons (38 million liters) of ethanol per year for commercial sale.

If the Department decides to provide federal funding, it would provide a financial assistance award to Enerkem in the amount of $50 million for the final design, construction, and start-up of the biorefinery, whose total anticipated cost is approximately $140 million. The federal cost share of the project funds would be funded by the *American Recovery and Reinvestment Act of 2009* (Recovery Act) and Enerkem would be responsible for the remaining project costs.

The funding of projects under the Recovery Act requires compliance with the *National Environmental Policy Act of 1969*, as amended (NEPA; 42 U.S.C. 4321 et seq.); Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500 to 1508); and DOE NEPA implementing procedures (10 CFR Part 1021). Thus, DOE prepared this environmental assessment (EA) to evaluate the potential environmental consequences of providing federal funding for the proposed project to Enerkem. In compliance with NEPA and its implementing procedures, this EA examines the potential environmental consequences of DOE's Proposed Action (that is, providing federal funding), the project, and the No Action Alternative (under which it is assumed that, as a consequence of DOE's denial of financial assistance, Enerkem would not proceed with the project). The EA's purpose is to inform DOE decision-making of the potential environmental consequences of the proposed project and alternatives and to allow the public to provide comments.

1.1 Purpose and Need

The *Energy Policy Act of 2005* (EPAct 2005), Section 932, directed the Secretary of Energy (the Secretary) to conduct a program of research, development, demonstration, and commercial application for bioenergy, including integrated biorefineries that could produce biopower, biofuels, and bioproducts. In carrying out a program to demonstrate the commercial application of integrated biorefineries, EPAct 2005 authorized the Secretary to carry out a program to demonstrate the commercial application of integrated biorefinery demonstration projects that demonstrate (1) the efficacy of producing biofuels from a wide variety of lignocellulosic feedstock; (2) the commercial application of biomass technologies for a variety of uses, including the development of biofuels, bio-based chemicals, substitutes for petroleum-based feedstock and products, and electricity or useful heat; and (3) the collection and treatment of a variety of biomass feedstock.

The *Energy Independence and Security Act of 2007* (EISA) amended the EPAct 2005 to increase the authorized funding levels for renewable energy research and development, including a Renewable Fuel Standard that requires the production of 36 billion gallons (136 billion liters) per year of biofuels by 2022, and including specific provisions for advanced biofuels, such as cellulosic ethanol and biomass-based diesel fuels.

As part of the Recovery Act, DOE's Office of Energy Efficiency and Renewable Energy (EERE) is providing up to $564 million in funds to accelerate the construction and operation of pilot,

demonstration, and commercial-scale integrated biorefinery facilities. The projects would be designed to validate refining technologies and help lay the foundation for full commercial-scale development of the biomass industry in the United States. The projects would produce advanced biofuels, biopower, and bioproducts using biomass feedstock.

Accordingly, DOE is implementing Section 932 of EPAct 2005 and Section 231 of the EISA and is supporting biofuel production pursuant to the Renewable Fuel Standard established by EISA. In December 2009, the Secretary announced the selection of 19 integrated biorefinery projects to receive competitively awarded federal funds. The projects selected were part of an ongoing effort to reduce U.S. dependence on foreign oil, spur the creation of the domestic bio-industry, and provide new jobs in many rural areas of the country. The biofuels and bioproducts produced through these projects would displace petroleum products and accelerate the industry's ability to achieve production targets mandated by the federal Renewable Fuel Standard. The Enerkem proposed project was one of the 19 competitively selected projects.

The purpose of the DOE Proposed Action is to support the objectives of EPAct 2005, EISA, and the Recovery Act. Specifically, the proposed project would help to support the Recovery Act's goals by creating new jobs. Further, providing federal funding to Enerkem would:

- Accelerate the construction and operation of biorefinery facilities.
- Validate refining technologies and help lay the foundation for full commercial-scale development of the biomass industry in the U.S.
- Reduce U.S. dependence on foreign oil.

1.2 The National Environmental Policy Act

NEPA requires federal agencies to take into account the potential consequences of their actions on both the natural and human environments as part of their planning and decision-making processes. For this project DOE is the federal agency for evaluating potential impacts under NEPA and must determine whether to provide funding. DOE is the only federal agency with responsibility to approve or deny the federal funding for the proposed project, and therefore, is the lead agency responsible for the preparation of this EA. DOE prepared this EA to provide the public and responsible agencies with information about the proposed project and its potential effects on the local and regional environment. This EA fulfills DOE's obligations under NEPA and provides DOE with the information needed to make an informed decision whether to provide a financial assistance award that would fund the final design, construction, and start-up of the proposed project.

This EA analyzes the potential environmental and socioeconomic impacts that would result from implementation of the Proposed Action (with DOE funding) and the No Action Alternative (without DOE funding), and evaluates the potential individual and cumulative effects of the Proposed Action. While it is possible that the project could be implemented 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 this assessment, the EA therefore evaluates, as the No Action Alternative, the potential impacts that would occur if the project were not built and operated. No other action alternatives are analyzed.

1.3 Public Involvement

In accordance with the applicable regulations and policies, DOE sent scoping letters to potentially interested local, state, and federal agencies, including the U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (USFWS), Mississippi Department of Environmental Quality (MDEQ), Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP), Mississippi Department of Agriculture & Commerce (MDAC), Mississippi Museum of Natural Science (MMNS), Mississippi Department of Transportation (MDOT), and Mississippi Department of Archives and History (MDAH). DOE also sent scoping letters to other potentially interested individuals and organizations to solicit public comment. DOE also initiated consultation with MDAH and the Mississippi Band of Choctaw Indians. DOE published a scoping letter on-line at the DOE Golden Reading Room. The scoping letter described the Proposed Action and requested assistance in identifying potential issues that could be evaluated in the EA. Upon completion of the Draft EA, DOE sent Notices of Availability (NOA) to identified stakeholders and published the NOA and the Draft EA online at the DOE Golden Reading Room. The scoping letter, consultation letters, responses to scoping received, the NOA and the NOA distribution list are attached as Appendix A. No comments on the Draft EA were received during the comment period.

1.4 Report Content

This report presents the EA prepared for the DOE NEPA process and provides information on Enerkem's proposed biorefinery including:

- Section 2.0 – DOE Proposed Action and Alternatives
- Section 3.0 - Affected Environment and Environmental Consequences of the Alternatives
- Section 4.0 - Cumulative Impacts
- Section 5.0 - References

2.0 DOE PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action (Section 2.1), the Enerkem proposed project (Section 2.2), and the No-Action Alternative (Section 2.3).

2.1 Proposed Action

DOE's Proposed Action is to provide cost-share funding to Enerkem for the final design, construction, and operation of a demonstration-scale ethanol biorefinery in Pontotoc, Mississippi, to convert post-recycling MSW (feedstock) to ethanol (primary bioproduct) via gasification and synthetic gas (syngas) conversion. The funding from DOE would cover up to 50 percent of project costs but would not exceed $50 million.

2.2 Enerkem's Proposed Project

Enerkem's Heterogeneous Feed Biorefinery Project (proposed project) would include final design, construction, and operation of a 330-ton- (300-metric-ton-) per-day biorefinery in Pontotoc, Mississippi, that uses the dried and post-sorted biomass fraction of MSW and wood biomass as feedstock. Enerkem's biorefinery would produce approximately 10 million gallons (38 million liters) of ethanol per year for commercial sale. The project would be sited within the Three Rivers Solid Waste Management Authority (TRSWMA) landfill site (Three Rivers Landfill). The Three Rivers Landfill is one of six regional solid waste authorities in the state. The proposed project would require approximately 51 employees (50 plant staff, 1 manager) during operation. The post-sorted MSW would be supplied by a proposed Materials Recovery Facility (MRF), which is not part of the DOE-funded proposed activity, but it is a necessary support facility, and its potential impacts have been assessed along with those of the proposed biorefinery. Approximately 10 additional personnel would find new employment in the recycling industry associated with the MRF. During construction, 145 personnel (engineering, procurement, and construction workers) would likely be required.

The project is based on technology that Enerkem has deployed at its demonstration plant in Westbury, Province of Quebec, Canada. The biorefinery would use a three-step thermochemical process for converting the carbon in waste into transportation fuel. Enerkem's proprietary gasifier and gas cleaning/conditioning system breaks down feedstock and turns it into syngas, essentially composed of hydrogen and carbon monoxide. The clean syngas is converted into methanol and then into ethanol, although the process used in the biorefinery also allows for the production of other biochemicals. Enerkem's modular design can be used for various plant configurations from one module (330 tons [300 metric tons] per day) through five modules (1,650 tons [1,500 metric tons] per day). This allows flexibility in scaling plants to match feedstock availability without significant re-engineering. The process modules are shop fabricated, minimizing local installation work, and provide a cost-effective, standardized, packaged-system approach.

Enerkem has pursued the reduction of operating risks by developing a technology platform that allows flexibility in the choice of feedstock and the choice of products being manufactured. The advantages of Enerkem's design include:

- Feedstock flexibility allowing the pursuit and use of non-homogenous biomass including problematic low-cost and negative-cost feedstock materials;

- A modular design which minimizes the construction costs and schedule and allows for incremental capacity increases through the addition of modules;

- A more cost-effective system designed around a "low severity" (i.e., relatively low temperature and low pressure) process; and

- A platform able to produce an array of biofuels and bioproducts through process adjustments, thus reducing risks associated with market movements.

Enerkem has sized its module to adapt to feedstock availability in both rural and urban areas, including feedstock flows as small as 100,000 metric tons per year. This is important because matching the plant capacity to the locally available volume of feedstock minimizes unnecessary costs, logistics, and environmental impact of importing feedstock (or conversely, of unused plant capacity). Enerkem's use of MSW-derived biomass effectively increases the amount of biomass available for conversion to biofuels.

The purpose of the project is to resolve the remaining commercialization hurdles so that Enerkem would be able to deploy its integrated biorefinery platform throughout the U.S. This would be done by the creation of a demonstration facility at the one-module scale. The specific objectives of the proposed project include:

- Overcome scale-up technical hurdles;

- Demonstrate the Enerkem biorefinery module achieving 8,000 hours of essentially continuous operation; and

- Produce and sell approximately 10 million gallons (38 million liters) of ethanol per year from the commercial operation of the project (achieve alcohol production rates of 95 gallons (360 liters) per ton of feedstock processed).

2.2.1 Project Location and Site Plan

The proposed biorefinery would be constructed within the permitted area of an existing, Subtitle D landfill, the Three Rivers Landfill in Pontotoc County, Mississippi (Figure 2.1-1). The Three Rivers Landfill is located in Section 22, Township 9S, Range 2E, approximately 4.5 miles (7.2 kilometers) north of the City of Pontotoc and 17 miles (27.4 kilometers) west of Tupelo, Mississippi, on State Highway 76. The landfill is owned and operated by the TRSWMA. The landfill has been operated since 1994 and has a design capacity of 13.8 million tons (12.5 million metric tons). The active landfill area currently occupies approximately 56 acres (23 hectares) of the over 700 acres (280 hectares) owned by TRSWMA.

Most of the process equipment would be located outdoors, although some of the supporting equipment would be housed within buildings. The biorefinery would contain six main areas: feedstock storage, gasification island, methanol production island, ethanol production island, wastewater pretreatment, and final product storage. Major facility structures are detailed below and shown on the site plan in Figure 2.1-2.

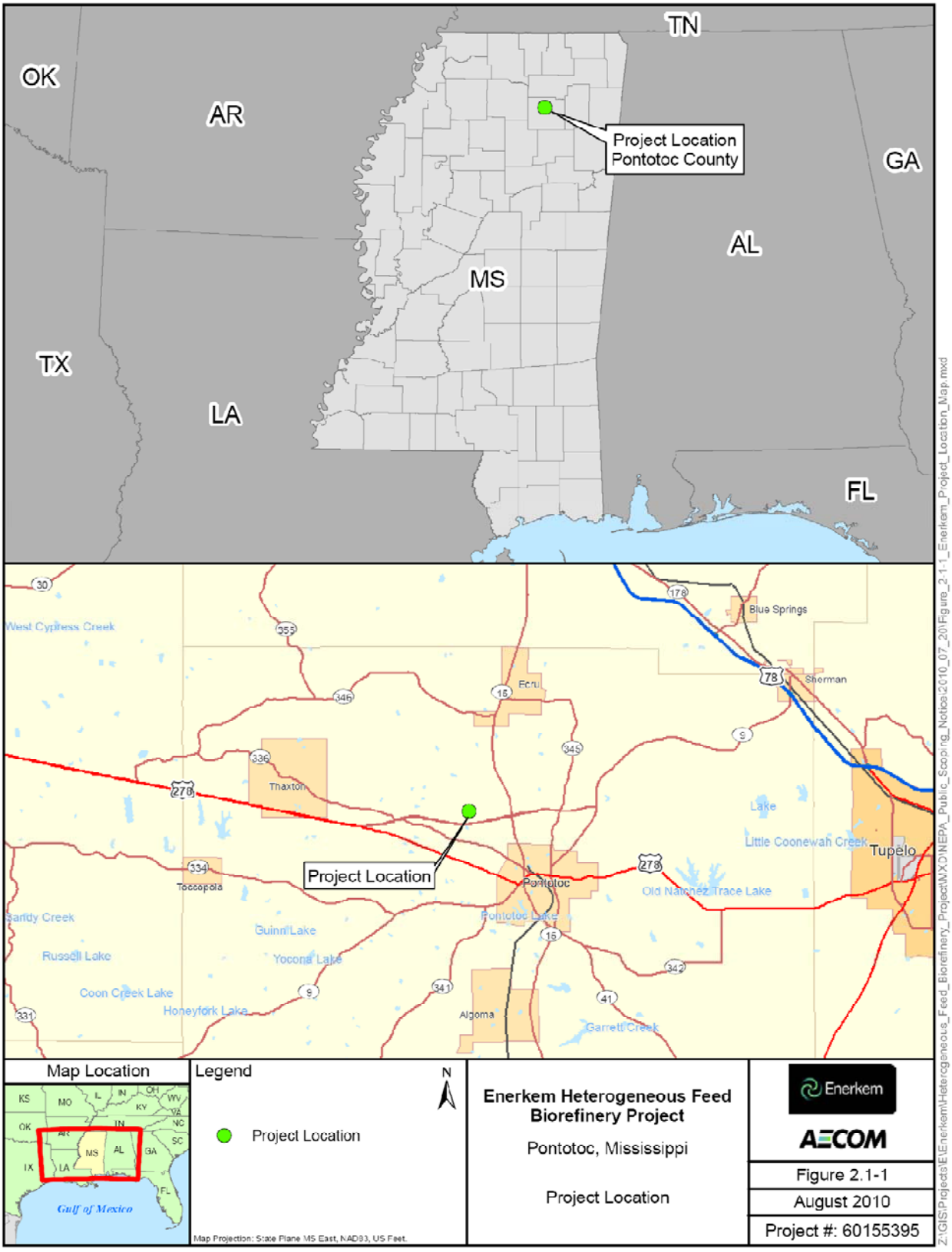

Figure 2.1-1. Location Map

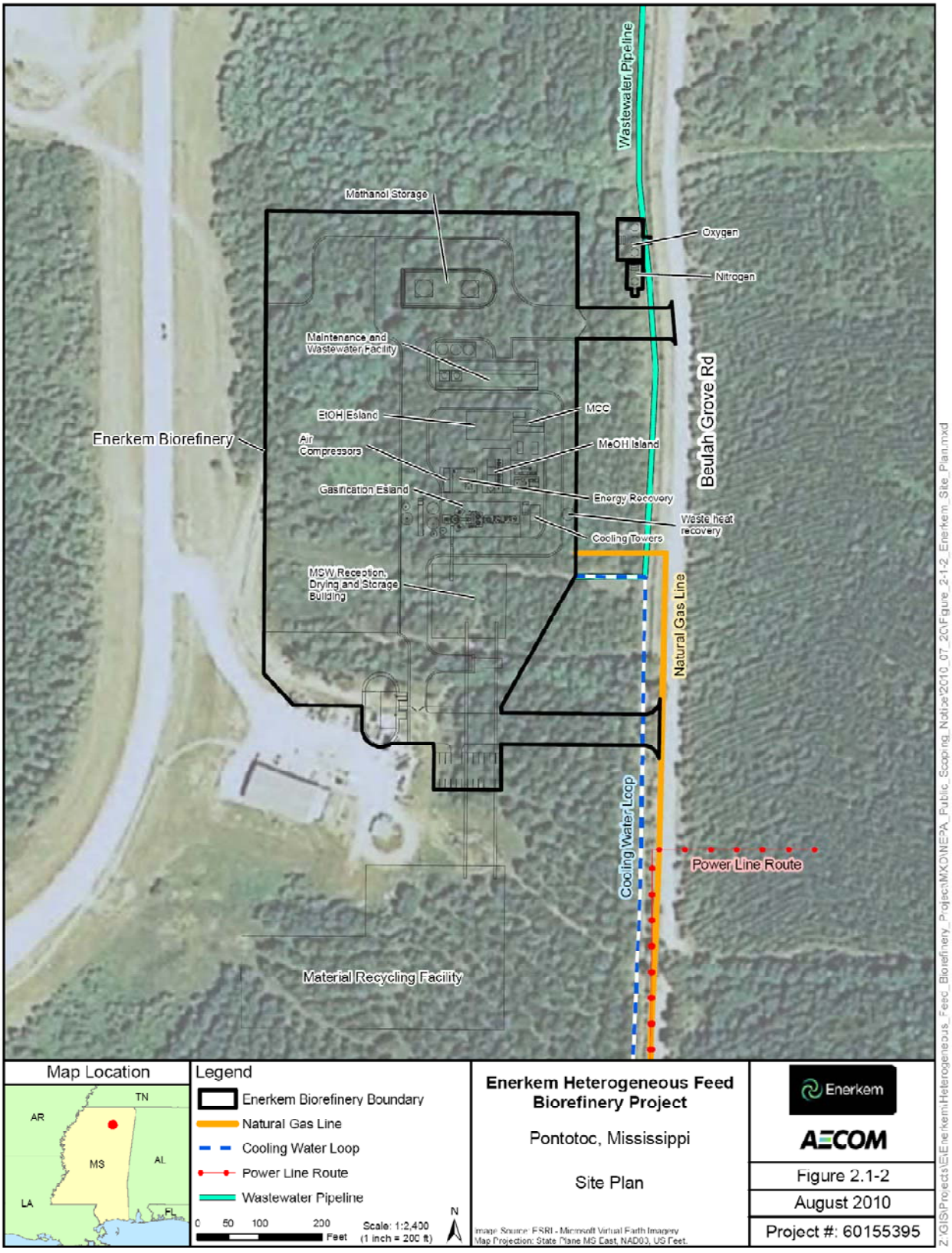

Figure 2.1-2. Site Plan

2.2.2 Facility Description

2.2.2.1 Major Buildings/Structures

Construction and operation of the proposed Enerkem biorefinery would not require either the demolition or translocation of any existing facilities, including the existing Three Rivers Landfill Office and Maintenance Shop. The major buildings and structures associated with the proposed project are listed, along with approximate size and a brief description of their purpose, in Table 2.1-1.

Table 2.1-1

Major Buildings/Structures Associated with the Proposed Project

Structure (Buildings, External Tanks, Major Equipment, etc.)	**Description/Purpose**	**Structure Size Length x Width x Height (feet)**
Gasification island	Conversion of feedstock into syngas	130 x 60 x 115
Methanol production island	Removal of carbon dioxide from syngas and conversion of syngas into methanol	72 x 45 x 68
Ethanol production island	Conversion of methanol into ethanol	72 x 45 x 68
Methanol compressor shed	Methanol compression	40 x 20 x 12
Chiller shed	Intermediate and product temperature control	20 x 10 x 10
Waste water building	Houses waste water decanter, caustic soda, and sulfuric acid storage and maintenance shop	120 x 50 x 40
Feedstock storage building	Indoor storage of post-sorted, dried municipal solid waste	120 x 120 x 60
Cooling tower	Cooling tower	40 x 16 x 40
Motor Control Center (MCC)	Monitoring and control	50 x 20 x 14
Heat exchanger shed	Intermediate cooling	20 x 10 x 12
Product storage tanks	Ethanol storage tanks	30 (diameter) x 30 (height)
Office building	Office space, process control room, change rooms, washrooms and laboratory	~6000 square feet
Oxygen storage area	Process reactant	120 x 140
Nitrogen storage	Injected in several places in the process in case of emergency shutdown	20 (diameter) x 70 (height)

2.2.2.2 Utilities

The new infrastructure, described below, would connect to nearby suppliers via pipelines and overhead lines. These structures and utilities are shown in Figure 2.1-3.

- Enerkem would receive potable water from the existing municipal line that supplies the existing Three Rivers Landfill's Office and Maintenance Shop. This line is currently in place and would continue to be maintained by the Algoma Water Association.

- Enerkem would obtain process/make-up water from a new on-site water well. Enerkem would withdraw a maximum of 5,000 gallons (19,000 liters) per day.

- Enerkem would receive cooling water from a pipeline loop with the City of Pontotoc Wastewater Treatment Plant (WWTP). Enerkem would use the effluent water for cooling purposes at the biorefinery and return the unevaporated remainder to the discharge point of the WWTP. The loop would be approximately 2.5 miles (4 kilometers) long. The City of Pontotoc would construct the cooling water loop.

- Enerkem would discharge process treated purged water and sanitary water from a proposed on-site wastewater treatment plant through a proposed 1-mile (1.6-kilometer), 6-inch (15-centimeter) diameter, wastewater pipeline to the existing Pontotoc County Industrial Park Waste Water Treatment Plant (Industrial WWTP). Enerkem would also send non-process water from cooling and boiler systems to the Industrial WWTP.

- Enerkem would obtain natural gas through a high-pressure natural gas pipeline. The pipeline would be approximately 1.75 miles (2.8 kilometers) in length. The City of Pontotoc would construct and manage the pipeline.

- Enerkem would receive electric power through a new electrical substation constructed on 4 acres (1.6 hectares) in the southwest corner of the Three Rivers Industrial Site and a new approximately 2-mile (3.2-kilometer) powerline crossing road right-of-way, agriculture land, or planted pine to connect to an existing transmission line. The Pontotoc Electric Power Association (PEPA) would construct and maintain the electrical substation while the Tennessee Valley Authority (TVA) would construct and maintain the transmission line.

2.2.2.3 Support Facilities

Supporting facilities would be constructed to assist in sustaining the facilities' operations.

Materials Recovery Facility – In addition to the biorefinery itself, Enerkem would construct a MRF that would receive MSW and remove recyclable materials (such as glass, metals, plastics, etc.) and inert materials (such as rocks, cement, or ceramics) from the waste stream. The recyclable materials would be resold, and the inert materials would continue to be disposed of in the Three Rivers Landfill. The rest of the waste stream would be shredded and sized for Enerkem's gasifier and delivered by covered conveyor belt to Enerkem's Feedstock Storage Building, where it would be dried. The MRF would be located to the south of the Enerkem biorefinery fence. The MRF is not part of the DOE-funded proposed activity, but it is a necessary support facility, and its potential impacts have been assessed along with those of the biorefinery.

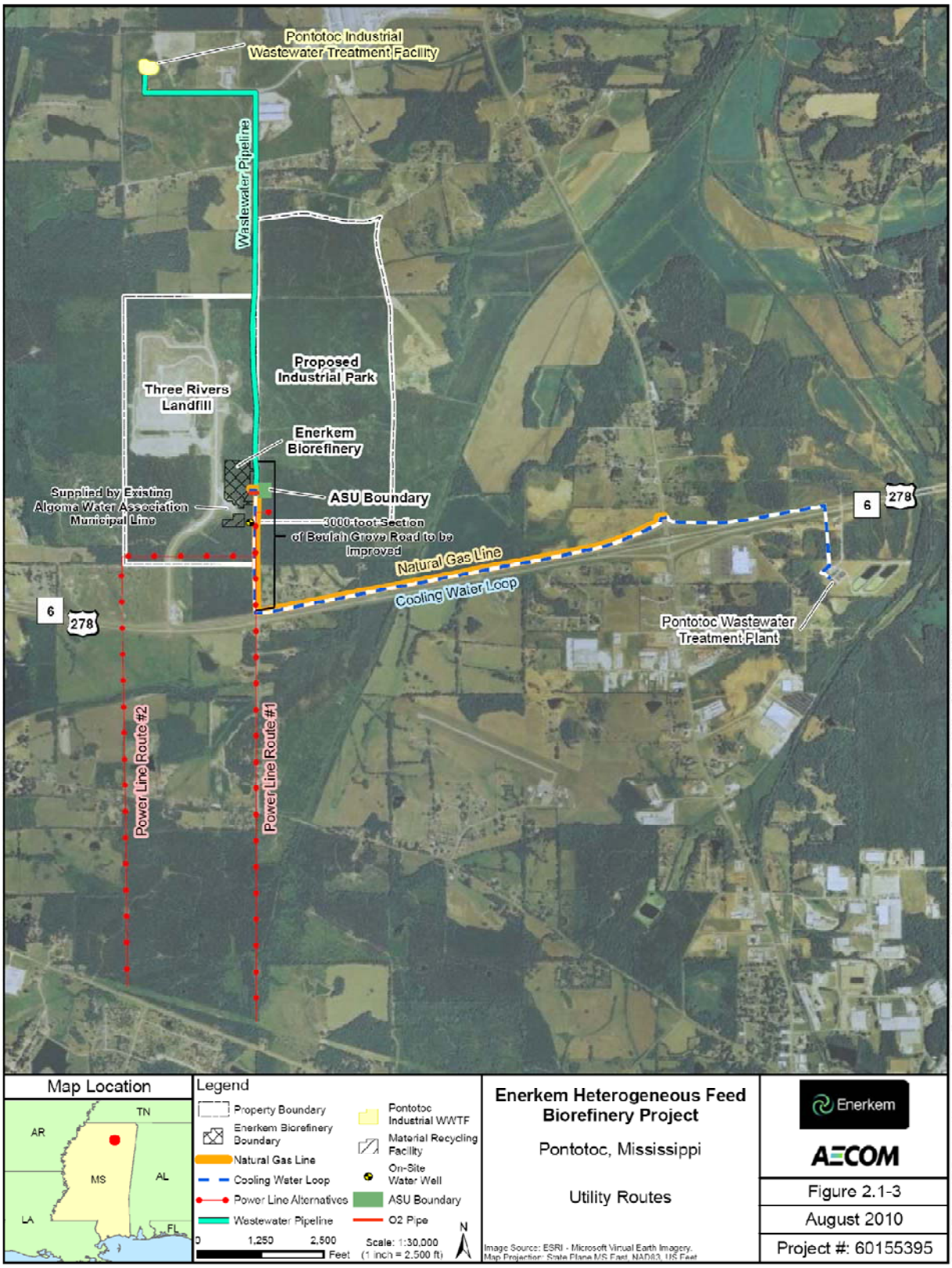

Figure 2.1-3. Utility Routes

Air Separation Unit – To supply oxygen for the gasification process, an air separation unit (ASU) would be constructed on the adjacent Three Rivers Industrial Site. Ownership of the ASU is still under development. The ASU would occupy approximately 4 acres (1.6 hectares) of land in the southwest portion of the Three Rivers Industrial Site, near the proposed substation. The ASU is not part of the DOE-funded proposed activity, but it is a necessary support facility, and its potential impacts have been assessed along with those of the biorefinery.

Oxygen for the gasification process would be delivered by pipeline from a new ASU located on the adjacent Three Rivers Industrial Site (see Figure 2.1-3). Additional oxygen, if needed, would be delivered by truck. Enerkem would store contingency oxygen on site.

Truck Loading Area – The truck-loading facilities would be scalable to meet the needs of the single-module biorefinery as well as future expansions of the biorefinery. Because the ethanol export fleet contains trucks not dedicated to ethanol service, the truck-loading facilities include piping to route vapors back to the storage tank(s) to reduce volatile organic compound (VOC) emissions during truck load-out.

Cooling tower – An evaporative cooling tower would dissipate heat generated by the process equipment. Water circulating through the cooling tower would be non-contact process water.

Firewater system – Enerkem would construct and maintain an emergency firewater pump engine. The engine would be a 150-horsepower, 6-cylinder, four stroke, lean burn, turbocharged pump. The firewater pump engine would be used for emergency use only.

2.2.2.4 Roads and Access

Vehicles would access to the biorefinery via Beulah Grove Road, an existing gravel road running north-south through the Three Rivers Landfill site. In conjunction with construction of the biorefinery, Pontotoc County would improve approximately 3,000 feet (900 meters) of Beulah Grove Road from State Highway 76 past the project site. These road improvements include paving the driving surface and adding shoulders and drainage ditches on either side.

To the south, Beulah Grove Road connects to State Highway 76, a four-lane divided highway also known as Pontotoc Parkway. State Highway 76 connects to State Highway 15, a major access point to the city of Pontotoc. Highway 15 is located approximately 2 miles (3.2 kilometers) from the entry point to Beulah Grove Road.

Trucks delivering waste to the Three Rivers Landfill site would continue to use existing landfill access roads. In addition, the landfill access road would be the primary road used for project vehicles and supplies during the construction phase.

2.2.3 Process Description

Enerkem uses an advanced gasification process that has the flexibility to convert low-value heterogeneous forms of biomass, urban biomass (e.g., sorted MSW, industrial waste, treated wood), agricultural residues (e.g., bagasse, corn stover, wheat straw, rice hulls), and forest residues (e.g., wood chips, sawdust, bark, thinning, limbs, needles) into fuels like ethanol, as well as various green chemicals. The Enerkem technology platform is based on a state-of-the-art gasification system coupled with a proprietary gas cleaning and conditioning process. The product of Enerkem's thermo-chemical process is a chemically clean synthetic gas, which is converted through catalytic reactions to produce ethanol and other green chemicals.

The three primary "islands" of the process include gasification, methanol by catalysis, and ethanol production. The primary steps in the process include:

- Feedstock pre-treatment,
- Gasification,
- Synthetic gas conditioning, and
- Conversion into liquid fuel.

These steps are summarized in Figure 2.1-4 and are described in detail below.

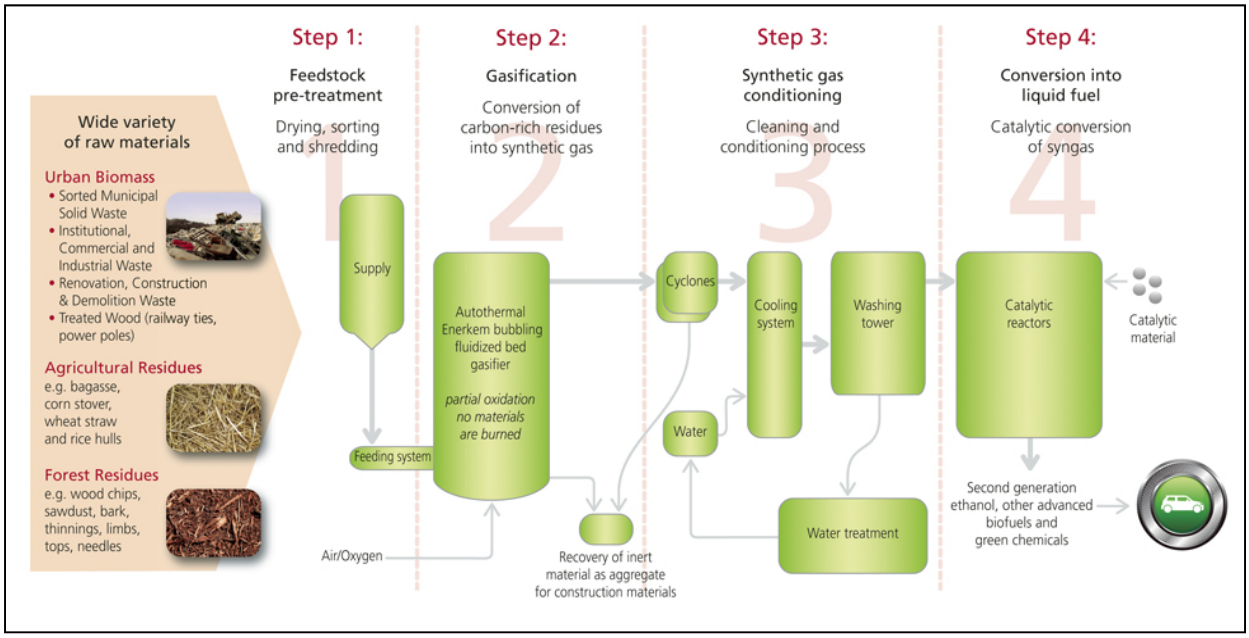

Figure 2.1-4. The Primary Steps in Enerkem's Advanced Gasification Process.

2.2.3.1 Feedstock Pre-Treatment

The project would use two distinct feedstock streams. These feedstock "fuels" would be delivered directly to the feedstock storage building.

The first fuel, the sorted and shredded biomass fraction of MSW, would be processed in the MRF, within the active landfill site and next to the Enerkem biorefinery. It would then be delivered to the biorefinery by conveyor belt, where it would be dried and stored for use. By siting the biorefinery within the Three Rivers Landfill, it would have immediate access to this feedstock. Enerkem anticipates using 330 tons (300 metric tons) per day of post-sorted, dried MSW.

The second feedstock fuel stream would be wood residues derived from furniture manufacturing, pallet grinding, municipal land-clearing operations, and similar activities. This fuel would be used on a make-up basis, if and when post-sorted MSW feedstock is insufficient to meet the needs of the biorefinery. This feedstock would be delivered in coarsely shredded form to the plant from nearby operations and unloaded and dried to an optimum moisture content – approximately 15 percent. After drying, the biomass would be screened, finely shredded, and transported via conveyor belt to an indoor storage area where it would be held until needed.

2.2.3.2 Gasification

Feedstock pressurization and feeding

Enerkem would inject feedstock at a continuous rate of 15 tons (14 metric tons) per hour into a fluid bed reactor by screw feeders. The gasifier would be a bubbling fluidized bed type using sand (alumina) as fluid bed media. In this type of gasifier, water and steam are added to the gasifier, enhancing the chemical reactions that take place. The carbon, oxygen, and hydrogen that make up the vast majority of the feedstock are reduced to their elemental states and then partially recombined, producing raw syngas made up of hydrogen, carbon monoxide, carbon dioxide, methane, minor amounts of other light hydrocarbons, and small amounts of contaminants (tar and fine particulates). The general gasification reaction is described below:

$$\text{Feedstock} + O_2 + H_2O \rightarrow \text{Heat} + CO + H_2 + CO_2 + \text{Hydrocarbons} + H_2O + \text{Solids}$$

The portion of the feedstock that is not made up of carbon, hydrogen, or oxygen, does not react, and is larger than the sand used in the reactor but is inert (such as mineral ash and glass or ceramics in the MSW stream) accumulates in the fluidized bed, and is withdrawn continuously from the base of the gasifier. This inert material is called gasifier solid residues (GSR). In addition, small diameter particulate material (char and inerts) are entrained with the syngas stream and exit the gasifier reactor to be separated in the downstream gas cleaning processes.

Char removal

Small diameter particulate material (char) consisting primarily of ash and unconverted carbon is entrained with the syngas stream and exits the gasifier reactor to be separated in cyclones located immediately downstream from the gasifier. The char removed by the cyclones is comprised of inorganics coated with carbon. The amount of carbon associated with the particles depends upon the gasification conditions and is related to the quality of the syngas produced. The char would be withdrawn from the bottom of the cyclones, then cooled and finally depressurized through a lock hopper system. The char can be used as aggregate in the cement industry or disposed of at the Three Rivers Landfill.

2.2.3.3 Synthetic Gas Conditioning

A heat exchanger cools the hot syngas to about 700 degrees Fahrenheit (°F) (370 degrees Centigrade [°C]). The heat recovered is used in the downstream process. The gas is then further cooled in the first stage of the gas scrubbing process where water, ultra-fine particles, and tars, etc., are removed from the syngas. The impurities removed from the syngas are recycled to the gasifier where they are converted due to longer residence time. Syngas from the first stage scrubber then flows into the second stage scrubber, which cools the gas and removes ammonia. Ammonia is removed from the scrubber water as a vapor product and re-injected to the gasifier for conversion to nitrogen and hydrogen.

2.2.3.4 Conversion into Liquid Fuel

In this step of the process, the cleaned syngas is preheated and further treated to remove traces of chlorine and sulfur-containing contaminants. The syngas is then compressed and goes through a chilled methanol absorber to remove the excess carbon dioxide. At this point, the syngas contains almost exclusively hydrogen and carbon monoxide, with the adjusted carbon dioxide level and methane to less than 1 percent volume.

Methanol production

The liquid fuel production process starts with the conversion of the syngas into methanol. In this step, the clean and buffered syngas enters catalytic synthesis reactors where a portion of the carbon monoxide and hydrogen are converted into methanol. The methanol is then condensed and separated from the residual gas. The general reaction in the production of methanol is described below:

$$CO + 2\ H_2 \leftrightarrow CH_3OH$$

The unconverted syngas is then split, via a standard gas separation process, into a carbon monoxide-rich fraction and high purity hydrogen stream.

Ethanol production

In the production of ethanol, the gases remaining from the methanol production step are used to convert the methanol into ethanol. This process involves a 3-step reaction process: carbonylation, esterification, and hydrogenolysis. The general reactions are described as:

$$CH_3OH + CO + 2\ H_2 \leftrightarrow CH_3CH_2OH + H_2O$$

Carbonylation reaction

$$CH_3OH + CO \overset{CH3I}{\leftrightarrow}{}^{Cat.} CH_3COOH$$

(CH_3I = Methyl Iodide)

Esterification reaction

$$CH_3COOH + CH_3CH_2OH \leftrightarrow^{H+} CH_3COOCH_2CH_3 + H_2O$$

Hydrogenolysis reaction

$$CH_3COOCH_2CH_3 + 2H_2 \leftrightarrow 2CH_3CH_2OH$$

In this process, the carbon monoxide-rich stream is mixed with the methanol (which is pumped and vaporized) and with a chemical mediator. This is carbonylation. Under specific operating conditions and with the appropriate catalyst, acetic acid is formed. This acetic acid then undergoes an esterification step that converts the acetic acid into ethyl acetate. The ethyl acetate is then reacted with the hydrogen gas (this is the hydrogenolysis step) to produce ethanol.

2.2.4 Construction

2.2.4.1 Preconstruction Surveying and Geotechnical Analysis

Preconstruction surveys and geotechnical sampling are in progress. The results of these investigations are not expected to alter the environmental impacts of the proposed project.

2.2.4.2 Grading and Earthworks

The proposed project would clear, grade, or otherwise disturb approximately 12.5 acres (5.0 hectares) of land. This includes construction laydown areas and process areas. The proposed construction laydown area is within the fenced area of the biorefinery and corresponds to the location where the second unit would be placed during the next phase of the project. Following completion of construction, Enerkem would seed

the disturbed areas that would not be used for biorefinery operations with native grasses, unless the area in question was part of a drainage ditch, or a cleared area beside a road, etc.

Prior to construction, Enerkem would obtain from the MDEQ a Large Construction Storm Water General National Pollutant Discharge Elimination System (NPDES) Permit for storm water discharge. This permit requires an Erosion and Sedimentation Control Plan (ESCP) and a Storm Water Pollution Prevention Plan (SWPPP) be developed and made available at the site. Enerkem would use appropriate best management practices (BMPs) to manage erosion and sedimentation caused by construction at the site. These BMPs include:

- Temporary and permanent vegetative stabilization;
- Sedimentation basin(s);
- Silt fence, hay bales, check dams, and other erosion control devices; and
- Limiting traffic outside the active construction area.

Following MDEQ storm water regulations, and in accordance with the project SWPPP, the BMPs would regularly be inspected to ensure proper function. Enerkem would implement additional controls as necessary to prevent impacts to resources.

2.2.4.3 Construction Schedule

Construction of the biorefinery is scheduled for January 2011. Commissioning and the start-up process would start in October 2011, while continuous operations are planned for December 2012.

2.2.4.4 Construction Staffing

Construction of the biorefinery would require approximately 145 personnel. Enerkem would require a portion of these personnel throughout the duration of the construction process, but many specialists and craft personnel would be needed for shorter durations. Enerkem would source this workforce from existing local and regional resources, except where the need for specialized skills makes local hiring impractical.

2.2.5 Operations

2.2.5.1 Material Balance and Logistics

The project would use the dried and sorted biomass fraction of MSW. The MSW feedstock would be presorted in a separate MRF, and then transferred by covered conveyor to the biorefinery to be processed as described below. Throughput of the proposed biorefinery is 330 dry tons (300 dry metric tons) of feedstock per day. The MRF would only convey the material that can be processed during a one-day cycle. Enerkem would return excess material from the MRF to the landfill for normal processing. The material balance for biorefinery operations is provided in Table 2.1-3.

Table 2.1-3

Material Balance Associated with Operation of the Enerkem Biorefinery

Input/Output	Quantity
Inputs	
Feedstock MSW	330 dry tons (300 dry metric tons) per day
Water make-up from Pontotoc WWTP (cooling tower)	450,000 gallons (1.7 million liters) per day*
Process water from water well	5,000 gallons (19,000 liters) per day*
Auxiliary fuels (Natural Gas / Diesel)	2.2 tons (2 metric tons) per day

Table 2.1-3

Material Balance Associated with Operation of the Enerkem Biorefinery

Input/Output	Quantity
Electricity	6,500 kW
Chemicals, Catalysts, Guard Bed Materials	15 tons (13.5 metric tons) per day
Oxygen (O_2)	203 tons (184 metric tons) per day
Denaturing agent (gasoline)	Blended with Ethanol (Quantity TBD)
Outputs	
Ethanol	93 tons (84 metric tons) per day
Cooling tower blowdown	145,000 gallons (550,000 liters) per day*
Cooling tower evaporative loss	305,000 gallons (1.2 million liters) per day*
Process Water to Industrial WWTP	67,000 gallons (254,000 liters) per day*
Residual Gas	66 tons (60 metric tons) per day
Solids	
Gasifier Solid Residues (GSR)	16.8 tons (15.2 metric tons) per day
Char	41.7 tons (37.8 metric tons) per day
Spent catalysts and guard beds	950 pounds (430 kilograms) per day
Liquids	
Treated purged water	137 tons (124 metric tons) per day
Inorganic sludge	6.3 tons (5.7 metric tons) per day
Gases	
Waste heat recovery unit emissions	Totals included in Potential Air Emissions below
Steam boiler and superheater emissions	Totals included in Potential Air Emissions below
Cooling water evaporative losses	300,000 gallons (1.1 million liters) per day
CO_2	Totals included in Potential GHG Air Emissions below
Non-hazardous solid waste	<2 tons (1.8 metric tons) per day
Potential Air Emissions	
PM	21.27 tons (19.30 metric tons) per year‡
PM_{10}	21.27 tons (19.30 metric tons) per year‡
NO_x	67.06 tons (60.84 metric tons) per year‡
CO	87.89 tons (79.73 metric tons) per year‡
VOCs	55.42 tons (50.28 metric tons) per year‡
SO_2	11.23 tons (10.19 metric tons) per year‡
Hazardous Air Pollutants (HAPs)	
Highest Single HAP (Acetaldehyde)	3.39 tons (3.08 metric tons) per year‡
Total HAPs	7.14 tons (6.48 metric tons) per year‡
Greenhouse Gases (GHGs)	
CO_2	71,393 tons (64,767 metric tons) per year‡
Methane	114 tons (103 metric tons) per year‡
N_2O	23.81 tons (21.60 metric tons) per year‡
O_3	Not directly emitted

*Water volumes are maximum, worst-case values and are very conservative.
‡Air emissions are calculated based on year-round (8,760 hours) processing. Thus, these emissions are considered very conservative.

Acronyms
CO – carbon monoxide

Table 2.1-3

Material Balance Associated with Operation of the Enerkem Biorefinery

Input/Output	Quantity
CO_2 – carbon dioxide GHGs – greenhouse gases GSR – gasifier solid residues HAPs – hazardous air pollutants kW – kilowatt N_2O – nitrous oxide NO_x – nitrogen oxides O_2 – oxygen O_3 – ozone PM – particulate matter PM_{10} – particulate matter of ≤10 microns SO_2 – sulfur dioxide VOCs – volatile organic compounds	

2.2.5.2 Biomass Availability

The feedstock for the biorefinery would be post-sorted MSW. By siting the biorefinery within the Three Rivers Landfill, the biorefinery would have immediate access to this feedstock. The proposed project would consume approximately 116,000 dry tons (105,000 dry metric tons) of post-sorted MSW per year. TRSWMA has estimated that approximately 190,000 tons (172,000 metric tons) of unsorted MSW is available on an annual basis. This volume of feedstock is ensured by the flow-control ordinances in effect in the region. After removal of the recyclables and after the removal of water, the volume of feedstock needed is almost exactly the same as what can be produced from unsorted MSW currently received. If there is any decline in the amount of feedstock received, Enerkem would use local wood waste and forest residues (spindly branches, treetops and other wood waste are routinely burned at logging sites) to make up any shortfall.

The landfill's rated capacity is 13.8 million tons (12.5 million metric tons), which is projected to be sufficient until the year 2079 on the landfill's current property. The MRF would receive all of the MSW the landfill receives up to the process limits of the biorefinery, converting it to a post-recycling feedstock, selling the recyclable fraction and returning the non-recyclable, inert portion to the landfill. When there is excess daily inflow of MSW, Enerkem would return the portion that cannot be processed to the landfill for burial. The biorefinery would convert the feedstock into ethanol and ash. The ash would be landfilled. The net reduction in landfilled volume would be on the order of 90 percent, depending on the ash content in the feedstock. The proposed project would reduce the volume of the material to be landfilled, and the capacity of the landfill would be extended by a factor of 10 for the period that the proposed project would operate, thus significantly prolonging the service lifetime of the landfill before closure or expansion of the landfill footprint would be necessary.

2.2.5.3 Operational Workforce

Operation of the biorefinery would require approximately 50 staff and one plant manager. Enerkem would fill these positions through local hiring where availability and skillsets make it practical.

In addition to the jobs at the Enerkem biorefinery, an additional 25 jobs would be created in the sorting and recycling sector. This workforce includes operation of the MRF and handling and marketing of the valuable ferrous, nonferrous, and plastic materials sorted from MSW as part of the feedstock pre-treatment process.

2.2.5.4 Project Design Features to Minimize Threat from Intentional Destructive Activities

The biorefinery would not be subject to U.S. Department of Homeland Security or Chemical Facility Anti-Terrorism Standards regulations. Enerkem's design and operation would include conventional security measures, including security fences, security lighting, and communication procedures with the local 911 emergency response system. In addition, the biorefinery would be manned 24 hours per day and equipped with automation that allows remote emergency shutdown and cutoff of process units and loading racks.

2.2.6 Startup, Shutdown, Maintenance, and Emergency Conditions

Enerkem estimates that the biorefinery would operate 24 hours per day, seven days per week, with an annual total of about 350 operating days per year. Enerkem would conduct minor maintenance activities throughout the year with a planned shutdown of approximately one week for major maintenance activities in both the spring and the fall.

During upset conditions, the biorefinery could be quickly and safely shut down. Enerkem's emergency shutdown procedures are based on Enerkem's experience with its demonstration facilities in Westbury, Quebec, and Sherbrooke, Quebec.

There are no unique emissions associated with normal shutdowns or startups of the biorefinery.

2.2.7 Decommissioning

The biorefinery would have a planned life of approximately 30 years, and operations may be extended through equipment upgrades, refurbishments, etc. Prior to shutdown, Enerkem would prepare a definitive shutdown plan and put it into effect six months before the plant is closed. Enerkem would retain some key personnel, especially long-time plant operators, to work on the decommissioning team. Enerkem would offer incentives to key personnel to increase retention during the decommissioning process, as long-term employees can be especially helpful to supplement the available documentation.

During the early planning stages, Enerkem would gather as much documentation as possible, including:

- Material safety data sheets (MSDSs) for all chemicals;
- Plant equipment documentation;
- Drawings, especially piping and instrumentation diagrams;
- Any corporate engineering standards or procedures that review specific company-mandated decommissioning methodology; and
- Operating and environmental permits.

Enerkem would contact the appropriate government agencies early in the decommissioning process to determine whether any special procedures are required or whether specific paperwork must be filed. Enerkem would redeploy equipment that is idled in the decommissioning process within the company or would sell it to a broker. Enerkem would contact a broker to handle sales for any equipment that has significant value or complexity. Brokers would handle the details of any sale, such as advertising and auctions, as part of their fee.

The decommissioning team would include the following personnel:

- Project manager;
- Operations supervisor;
- Contract administrator;
- Manager of equipment sales;

- Construction personnel; and
- Hourly operations personnel.

Enerkem would purchase any materials needed during the decommissioning process prior to shut down. Enerkem would give primary consideration to pipe blanks and blinds, tags, marking paint, hoses, fittings to blow out lines, fire and acid-resistant clothing, permit books, rags, buckets and drums.

2.2.8 Permits, Approvals and Applicant-Committed Actions

The project would require a number of environmental permits, approvals, and plans for construction and operation. The permits and approvals are included in Table 2.1-2.

Table 2.1-2

Potential Environmental Regulatory and Commenting Agencies

Agency	Authorization	Applicant Committed Measures
U.S. Army Corps of Engineers (USACE)	Potential Nationwide Permit No. 12 for Utility Corridors	If impacts to wetlands or waterbodies are required along utility corridor, Enerkem would obtain authorization and mitigation from USACE.
Mississippi Department of Environmental Quality, Office of Pollution Control (MDEQ-OPC)	Air Construction Permit (Application submitted 01/26/2010, additional information submitted 03/02/2010)	Facility construction would meet requirements of Air Construction Permit.
	Air Operating Permit (submittal required within 12 months of the completion of construction)	Facility operations would meet requirements of Air Operating Permit.
	National Pollutant Discharge Elimination System (NPDES) Large-Construction Storm Water Discharge General Permit	Facility construction would meet NPDES Construction Storm Water Permit requirements.
	NPDES Baseline Storm water General Permit for Industrial Activities (and Stormwater Pollution Prevention Plan [SWPPP])	Facility operations would meet requirements of NPDES Industrial Discharge Permit including preparation of a SWPPP.
	NPDES Hydrostatic Test and Vessel Testing Wastewater General Permit	Discharge of hydrostatic test water would meet requirements of NPDES permit.
	Water Well Notification	Water well installation and withdrawal would comply with MDEQ Water Well Notification requirements.

Table 2.1-2

Potential Environmental Regulatory and Commenting Agencies

Agency	Authorization	Applicant Committed Measures
	Solid Waste Processing Permit	Enerkem would perform solid waste processing in accordance with permit stipulations.
	Operating Wastewater Pretreatment Permit Application (for discharge to Industrial Wastewater Treatment Plant [WWTP])	Discharge of wastewater would meet requirements of Wastewater Pretreatment Permit.
Mississippi Department of Transportation (MDOT)	Clearance	Enerkem would obtain clearance for utilities easements from MDOT prior to construction.
U.S. Bureau of Alcohol, Tobacco, and Firearms (ATF)	Ethanol production permit	Facility operations would meet requirements of ATF permit.

Enerkem would site and develop the biorefinery in such a manner as to avoid and minimize environmental impacts. Enerkem would obtain all applicable environmental permits. The following applicant-committed mitigation measures, identified in the EA, are proposed to minimize environmental impacts:

1. Enerkem would implement an Unexpected Discoveries and Emergency Procedures Plan that would address the possibility of accidental discovery of cultural resources during construction;

2. Enerkem would implement dust control measures as needed during certain construction activities, such as transporting soil or rock, trenching, and use of access roads;

3. Construction noise would only occur during daylight working hours;

4. Enerkem would conduct a noise study and develop and implement a noise mitigation strategy, if it is found that construction or operation noise would exceed 60 dB at the nearest residence.

5. Enerkem intends to hire the necessary people from existing local and/or regional resources whenever possible for construction and operations staff.

6. Enerkem would meet with the local fire and emergency response providers to discuss potential emergencies, determine capabilities, and establish communication protocols and responsibilities.

7. Enerkem would work with contractors to control both the routes and timing of delivery of materials to the facility to mitigate traffic concerns, if they arise.

8. Enerkem would provide training to its personnel on the site-specific spill prevention and response measures contained in the contingency plans. In addition, Enerkem would meet with the local fire and emergency response providers to discuss potential emergencies, determine capabilities, and establish communication protocols and responsibilities.

9. Enerkem would prepare a definitive shutdown plan and put it into effect six months before the plant is closed.

2.3 No Action Alternative

Under the No-Action Alternative, DOE would not authorize Enerkem to expend Recovery Act funding for the proposed biorefinery project. As a result, the biorefinery and supporting infrastructure would be delayed while Enerkem looked for other funding sources, or abandoned if other funding sources could not be obtained. If the biorefinery was abandoned entirely, the site would remain vegetated in planted pine until such time as it was converted to use as active landfill. Furthermore, reductions in fossil fuel use would not occur and DOE's ability to achieve its objectives under the ARRA would be impaired.

Although Enerkem's proposed project might proceed if DOE decided not to provide any form of financial assistance, DOE assumes for purposes of this EA that the project would not proceed without this financial assistance. If the project did proceed without DOE's financial assistance, the potential impacts would be essentially identical to those under DOE's Proposed Action (that is, providing assistance that allows the project to proceed). In order to allow a comparison between the potential impacts of a project as implemented and the impacts of not proceeding with a project, DOE assumes that if it decided to withhold assistance from this project, final design and construction of Enerkem's biorefinery would not proceed.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The following sections describe the affected environment and the potential environmental consequences of the proposed project, including the discussion of impacts associated with the supporting infrastructure. Impacts from both construction and operations are included in this analysis. Impacts of the No Action Alternative are also described.

3.1 Land Use

This section provides a discussion of the existing land uses at and surrounding the locations for the proposed project and the potential land use impacts of the proposed project and the No Action Alternative.

3.1.1 Affected Environment

Enerkem would locate the proposed biorefinery within the Three Rivers Landfill site. The Three Rivers Landfill site comprises approximately 208 acres (84 hectares) that are permitted as a Subtitle D landfill. This site is owned by the TRSWMA and is located at 1904 Pontotoc Pkwy in west Pontotoc, Mississippi. The current landfill occupies about 56 acres (23 hectares) of this site. The landfill was permitted to begin receiving waste in 1994 and has an ultimate design capacity of 13.8 million tons (12.5 million metric tons). Based on acceptance rate projections, this landfill is estimated to have a site life that will extend until 2079.

Currently the proposed project site contains planted pines that are 12 to 13 years old. It is within the footprint of the landfill's planned expansion. The landfill site is used for commercial/industrial purposes but there are no zoning restrictions. The adjacent areas are mostly forested land, pasture, and industrial property.

Beyond the adjacent land use, the surrounding area is made up of forest and farmland mixed with occasional low-density residential development. The nearest residential area is located approximately 500 feet (150 meters) south of the Three Rivers Landfill property. The proposed project site is set back from the southern boundary of the Three Rivers Landfill property and the MRF (nearest project facility) is approximately 1,200 feet (360 meters) from a residential area containing three homes.

The adjacent property to the east of the project is in early development as the Three Rivers Industrial Site. The Three Rivers Industrial Site is a separate project being conducted by and on land owned by TRSWMA, east of Beulah Grove Road. It will continue to be owned by TRSWMA and will be governed by their board of directors. The site is marketed by Three Rivers Planning and Development District in conjunction with the County of Pontotoc and the board has agreed to sell sections of the land for industrial development purposes. At present, there is one industrial client with an active interest in the Three Rivers Industrial Site. They are in preliminary negotiations, and their identity is confidential. Marketing efforts are ongoing, and additional clients are expected. Land use is shown in Figure 3.1-1.

3.1.2 Environmental Consequences of the Proposed Action

The Proposed Action would support the Enerkem project, which would result in both short-term and long-term impacts to land use. Land use impacts are described below and are summarized in Table 3.1-2.

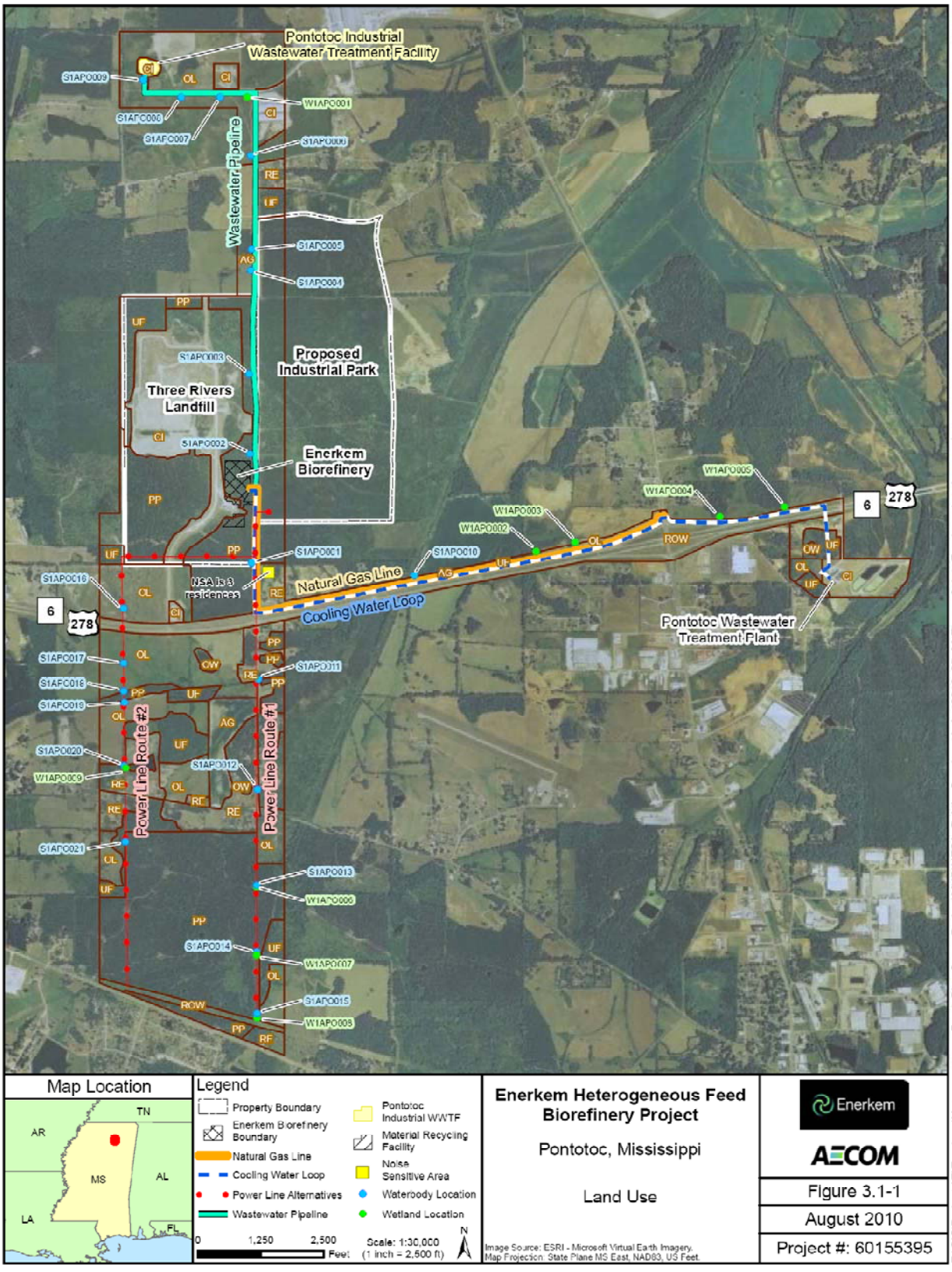

Figure 3.1-1. Land Use.

Enerkem Biorefinery – During operations, the proposed biorefinery would occupy approximately 12.5 acres (5.0 hectares) of undeveloped land, currently vegetated in planted pine. This area includes sufficient space for construction procurement, laydown, construction offices, etc., which would remain as open, industrial space within the facility fenceline for expansion to a two-module facility, planned for 2015. The biorefinery would occupy this area for 30 years.

Materials Recovery Facility (MRF) – The MRF would occupy approximately 2.0 acres (0.8 hectare) of land, similar to that discussed above for the Enerkem biorefinery.

Air Separation Unit (ASU) and Oxygen Piping – The ASU and oxygen piping would require approximately 4.0 acres (1.6 hectare) of undeveloped upland. The ASU would be located near the southwest corner of the Three Rivers Industrial Site. The oxygen piping would begin at the ASU, cross Beulah Grove Road by underground road bore or overhead pipe bridge, and join the cooling water loop and natural gas pipeline rights-of-way to the biorefinery. This land is currently vegetated with planted pine.

Electrical Substation – The electrical substation would occupy approximately 2.5 acres (1.0 hectare) of undeveloped upland within the Three Rivers Industrial Site. This land is currently vegetated with planted pine.

Potable Water Piping – Enerkem would obtain potable water from the existing municipal line that supplies the existing Three Rivers Landfill's Office and Maintenance Shop. This line is immediately adjacent to the proposed biorefinery site, and all piping would be within the fenceline of the biorefinery. No land-use impacts would be associated specifically with this piping.

Process Water Piping – Enerkem would obtain process water from a proposed well within the fenceline. No land-use impacts would be associated specifically with the piping from the well to the process area.

Cooling Water Pipeline – Enerkem would obtain cooling water from a pipeline loop located along the west side of Beulah Grove Road, south to State Highway 76 and then across approximately 0.25 mile (0.4 kilometer) of open space to the City of Pontotoc WWTP. Construction would require a 45-foot (14-meter) corridor immediately adjacent to the existing roads and generally within the roadside right-of-way. Following construction, the land within the pipeline right-of-way (also within the road right-of-way) would not contain aboveground structures and would remain available for roadside maintenance. Although there is prime farmland (Urbo silty clay loam) outside the road right-of-way in the Lappatubby Creek floodplain, the required construction corridor would not affect this farmland.

Natural Gas Pipeline – Enerkem would collocate the natural gas pipeline within the same 45-foot (14-meter) right-of-way as the cooling water pipeline loop. It would end at the intersection of State Highway 76 and SR-15. Because its footprint would be within that of the cooling water pipeline loop, minimal land-use impacts would be associated specifically with this piping. It would not include aboveground structures in the road right-of-way.

Wastewater Discharge Pipeline – Enerkem would locate the wastewater discharge pipeline along the west side of Beulah Grove Road, north to the end of the road, then through disturbed land to the Pontotoc County Industrial Parkway. The pipeline route would then turn west paralleling the parkway until terminating at the Industrial WWTP. Construction would require a 30-foot (9-meter) corridor immediately adjacent to the existing roads. Construction would be generally within the roadside right-of-way, but the right-of-way width varies, and the proposed construction corridor may affect agricultural land adjacent to the right-of-way. This agricultural land is designated prime farmland (Mayhew silty clay loam and Adaton silt loam). Final design of this pipeline right-of-way would likely involve a narrower construction corridor and minimize impacts to agricultural areas, but for purposes of this EA, half of the impact has been assigned to

roadside right-of-way and half to agricultural land. If impacts to agricultural lands are required, Enerkem would coordinate with landowners to schedule construction around agricultural activities and/or compensate landowners for lost productivity. Following construction, the land within the pipeline right-of-way would not contain aboveground structures and would remain available for current uses (e.g., roadside maintenance and agricultural use). No prime farmland would be converted to other uses by this project.

Powerlines – TVA would be responsible for construction and operation of the required powerline to the new substation. TVA would conduct its normal practices under NEPA during the siting of the final route. TVA would comply with all necessary permitting and applicable regulatory requirements for construction of the proposed powerline.

TVA is considering two routes for the proposed powerline from the existing TVA transmission line to the new substation. Route 1 would be approximately 2.0 miles (3.2 kilometers) long, primarily through planted pine. Route 2 would be approximately 2.3 miles (3.7 kilometers) long through primarily planted pine and open land. Construction of the powerline through planted pine and other forested areas would require clearing of an approximately 30-foot (9-meter) corridor. TVA would install poles at intervals to minimize environmental impacts. Following construction, TVA would maintain an approximately 30-foot (9-meter) right-of-way clear of tall vegetation for safety and monitoring. Because TVA would construct only one powerline route, only Route 2 (the longer route) is included in Table 3.1-2. Route 1 would cross approximately 300 feet (100 meters) of agricultural lands, designated as prime farmland (Urbo silty clay loam). TVA would install poles at intervals to minimize impacts to this area. Following construction, the land within the powerline right-of-way would not contain aboveground structures and would remain available for current uses (e.g., agricultural use).

Beulah Grove Road – Pontotoc County would improve approximately 3,000 feet (900 meters) of Beulah Grove Road. The existing road is graveled. The road improvements include paving the driving surface and adding shoulders and drainage ditches on either side.

Table 3.1-2

Acres of Land Permanently Impacted by Operation of the Proposed Project

Existing Land Use Classification	Proposed Land Use (Acres)								
	Biorefinery‡	MRF	ASU and Oxygen Piping	Substation	Cooling Water Pipeline Loop and Natural Gas Pipeline (collocated)*	Wastewater Discharge Pipeline*	Powerline†	Road Improvement (Beulah Grove Road) †	Project Total
Planted Pine	11.8	2.0	4.0	2.5	1.3	1.4	4.5	3.2	**30.7**
Commercial / Industrial	0.7	-	-	-	-	-	-	-	**0.7**
Right-of-way	-	-	-	-	-*	-*	-	-	**-***
Upland Forest	-	-	-	-	0.3	-	0.5	-	**0.8**
Total	**12.5**	**2.0**	**4.0**	**2.5**	**1.6**	**1.4**	**5.0**	**3.2**	**32.2**

‡ Includes Potable Water Piping and Process Water Piping.

† Powerline Alternative Route #2 (the longer route); Assumes overlap between Powerline and Beulah Grove Road improvement.

*An additional 24.3 acres of right-of-way would be temporarily impacted by construction but allowed to return to pre-existing conditions following construction

Siting the biorefinery within an existing industrial area minimizes land-use impacts. The proposed infrastructure related to the Enerkem biorefinery would primarily traverse disturbed areas collocated with existing roadways and utility corridors.

3.1.2.1 Beneficial Effects

By sorting MSW, recycling materials, and converting a significant portion of the organic MSW into ethanol, the lifespan of the Three Rivers Landfill could be extended significantly. Enerkem calculates the percentage of volume reduction in landfilled material at or exceeding 90 percent. The Enerkem biorefinery has a projected life of 30 years. Thus, during the 30-year life of the project, landfill longevity is projected to be increased by 27 years before additional land would need to be converted to landfill usage (that is, instead of reaching capacity in 2079, the landfill would reach capacity in 2106).

Improvement of Beulah Grove Road would be beneficial for the future development of the adjacent Three Rivers Industrial Site.

3.1.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the biorefinery would not be built and operated, and no supporting infrastructure would be constructed. The site would continue to be vegetated with planted pine until such time as it was converted to use as active landfill. There would be no project-related impacts to land use. However, the net benefit of having the biorefinery on site in terms of increased landfill longevity would not be realized.

3.2 Air Quality

This section provides a discussion of the existing air quality within the vicinity of the proposed project. Information concerning the potential for odor emission is included, as well as a discussion of the potential for pollutant emissions from the proposed project and the No Action Alternative.

3.2.1 Affected Environment

3.2.1.1 Meteorology

The following describes the current and expected meteorological conditions at the proposed project site. Meteorology for the Pontotoc area features typical southern-continent weather patterns with relatively warm temperatures during the winter and relatively hot temperatures during the summer. Severe weather events, such as thunderstorms, are common in the summer. Pontotoc-area historical tornado activity is slightly above the Mississippi state average; it is 154 percent greater than the overall U.S. average (City-data.com 2010).

Climate data for the City of Pontotoc shows that average monthly mean temperature ranges from 40°F (4°C) to 81°F (27°C) (IDcide 2010). Winter months (December through February) are the coldest with average monthly low temperatures ranging from 31°F (-1°C) to 34°F (1°C) and high temperatures ranging from 50°F (10°C) to 55°F (13°C). The warmest months are the summer months of June through August. During those months, the average monthly low temperature ranges from 67°F (19°C) to 71°F (22°C) and high temperatures range from 87°F (31°C) to 91°F (33°C). Average annual precipitation is approximately 60 inches (150 centimeters). July through October have the lowest precipitation rates, with an average range from 3.37 to 3.95 inches (8.6 to 10.0 centimeters), most of which is in the form of rainfall (Climate-charts.com 2010). Wind speed is moderate and generally oriented either north or south (Figure 3.2-1).

3.2.1.2 Air Emissions

The federal Clean Air Act (CAA) required the U.S. Environmental Protection Agency (EPA) 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 the public, 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 (EPA 2010). EPA has established NAAQS for six principal pollutants, which are called "criteria pollutants." They include nitrogen oxides (NO_x, including nitrogen dioxide [NO_2]), carbon monoxide (CO), particulate matter (PM), sulfur dioxide (SO_2), ozone (O_3), and lead (Pb).

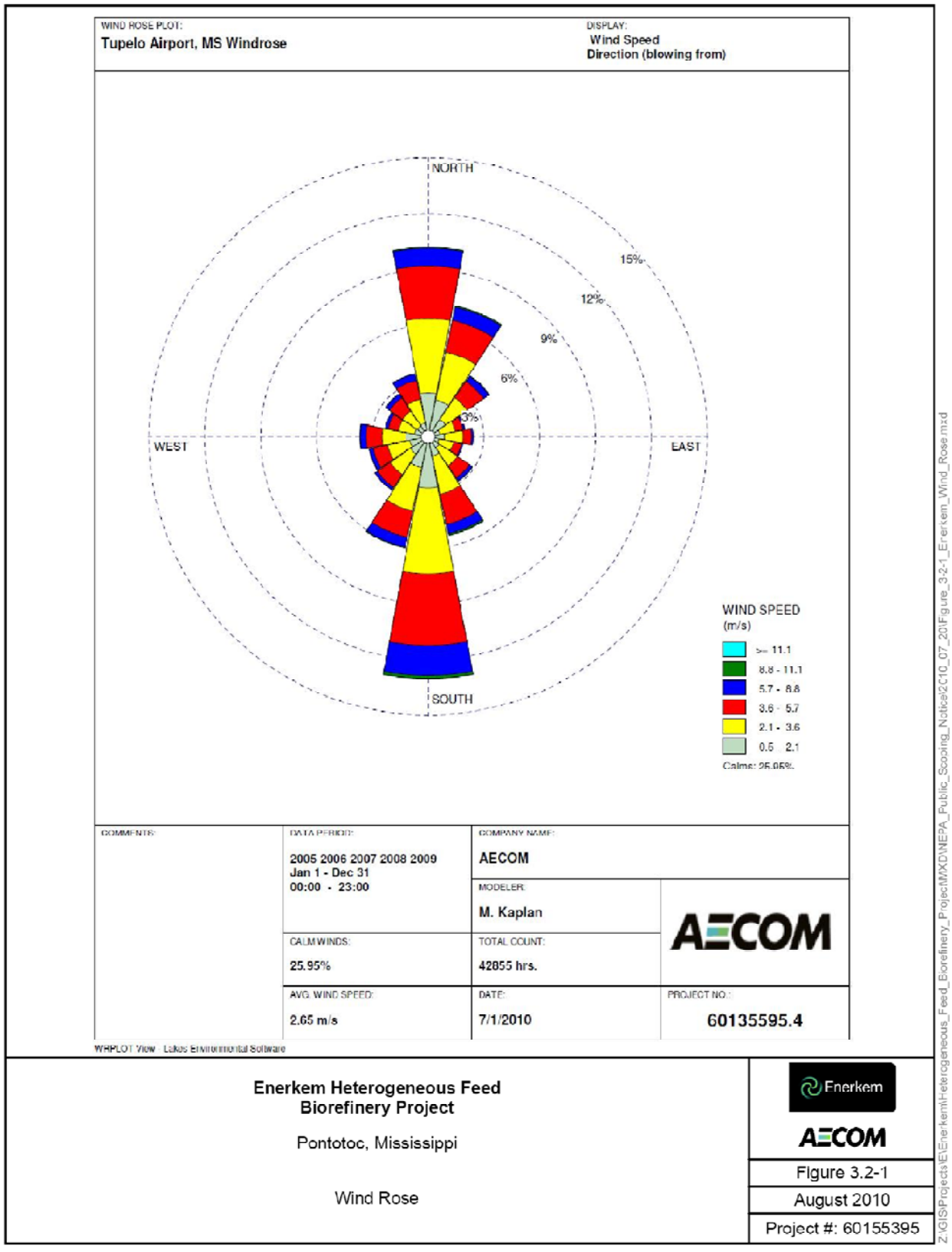

Figure 3.2-1. Wind Rose.

Areas that meet the air quality standards 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. Pontotoc County is in attainment for all criteria air pollutants as pollution levels consistently stay below the EPA standards.

Other regulations established by the EPA that may affect the proposed project are New Source Performance Standards (NSPS). NSPS require new, modified, or reconstructed sources to control emissions to the level achievable by the best-demonstrated technology as specified in the provisions.

3.2.1.3 Air Quality Conformity

Section 176(c)(1) of the CAA requires federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of the NAAQS for criteria pollutants. To achieve conformity, a federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern (for example, a state or a smaller air quality region). Federal agencies prepare written conformity determinations for federal actions that are in or that affect NAAQS nonattainment or maintenance areas when the total direct or indirect emissions of nonattainment pollutants (or their precursors in the case of ozone) exceed specified thresholds.

3.2.1.4 Greenhouse Gas Emissions

Global warming is the observed increase in average temperature of the earth's surface and atmosphere. The primary cause of global warming is an increase of greenhouse gas emissions in the atmosphere. The six major greenhouse gases are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, haloalkanes, and perfluorocarbons. Greenhouse gases absorb longwave radiant energy emitted by the earth, which warms the atmosphere. Greenhouse gases also emit longwave radiation both upward to space and back down toward the surface of the earth. The downward part of this longwave radiation emitted by the atmosphere is known as the "greenhouse effect."

3.2.1.5 Odor

In the U.S., odor is not regulated by the EPA as a pollutant. However, the Mississippi Commission on Environmental Quality has adopted an ambient air quality standard for odor. This is the only air quality standard in Mississippi that differs from or is in addition to air quality standards adopted by the EPA under the CAA and then adopted by the Commission by reference (*See* Mississippi Commission on Environmental Quality, *Ambient Air Quality Standards*, APC-S-4; 40 CFR pt. 50).

The Mississippi air quality standard for odor states: *There shall be no odorous substances in the ambient air in concentrations sufficient to adversely and unreasonably:*

(1) affect human health and well-being;
(2) interfere with the use or enjoyment of property; or
(3) affect plant or animal life.

In determining that concentrations of such substances in the ambient air are adversely and unreasonably affecting human well-being or the use or enjoyment of property of plant or animal life, the factors to be considered by the Commission will include, without limiting the generality of the foregoing, the number of complaints or petitioners alleging that such a condition exists, the frequency of the occurrence of such substances in the ambient air as confirmed by the Department of Environmental Quality staff, and the land use of the affected area.

3.2.2 Environmental Consequences of the Proposed Action

3.2.2.1 Meteorology

Severe weather, such as thunderstorms or tornados, may temporarily impact operations by limiting delivery of materials, impeding the sorting of feedstock, impeding shipments of products, or causing disruption of electrical or water service. These types of impacts would be expected to last for less than 24 hours but could extend for up to several days. Although these impacts may occur in any given year, operational planning would address severe weather effects and allow for normal operations to resume with minimal impacts.

3.2.2.2 Air Emissions

The estimated air emissions of construction and operation of the proposed project are below the thresholds for applicability under a minor source permit (3.2-3). Enerkem would obtain a minor source permit prior to construction. Construction of the biorefinery, support facilities, and utilities would result in intermittent and short-term emissions including fugitive dust from soil disruption and emissions from combustion-type 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. Emissions from construction are not expected to result in a violation of an applicable ambient air quality standard because Enerkem would operate construction equipment on an as-needed basis. Enerkem would implement dust control measures as needed during certain construction activities such as transporting soil or rock, trenching, and use of access roads. Therefore, impacts to air quality during the construction phase of the project would be minor and short-term.

Potential emissions during operations would come from several sources. Vehicle traffic hauling raw materials and finished products to and from the site would generate fugitive dust. This traffic would use Beulah Grove Road, which is currently a gravel road. Prior to construction, the County of Pontotoc would pave the road for a length of approximately 3,000 feet (900 meters) from its intersection at State Highway 76 to the edge of the project site. The paving of Beulah Grove Road would help to minimize fugitive dust emissions during both construction and operations. Enerkem would reduce fugitive dust generated from the storage, reclamation, and handling operations by implementing BMPs, such as applying water to exposed soils during dry, windy weather conditions.

Enerkem's proposed project site is within the property fenceline of the Three Rivers Landfill. The proposed operations would utilize feedstock derived from MSW that would otherwise be destined for disposal within the Three Rivers Landfill. As landfilled waste, the degradable waste would decompose and release certain emissions to the air, including the greenhouse gases methane and carbon dioxide. Operations would result in a reduction of emissions from the landfill. As a result, the reduction in air emissions from the landfill should be considered to be a benefit of the proposed biorefinery.

Several fuel-fired units of the proposed biorefinery would generate emissions of VOCs and hazardous air pollutants (HAPs), including acetaldehyde, formaldehyde, and methanol. Enerkem would control these pollutants by venting the exhaust gases from these processes through a wet scrubber that would remove approximately 95 percent of the VOCs and 75 percent of the HAPs. Process chemical and product storage tanks would also generate emissions of VOCs and HAPs. Table 3.2-2 summarizes the potential to emit from the project.

Table 3.2-2

Summary of Estimated Annual Air Emissions for the Biorefinery

Source	NO_x (tpy)	CO (tpy)	PM (tpy)	SO_x (tpy)	VOC (tpy)	Single Highest HAP (tpy)	Total HAPs (tpy)
Total Emission	67.06‡	87.89‡	21.27‡	11.23‡	55.42‡	3.39 (Acetaldehyde)‡	7.14‡
Threshold for Minor Source Permit	100	100	100	100	100	10	25

‡Air emissions are calculated based on year-round (8,760 hours) processing. Thus, these emissions are very conservative.

Acronyms
CO – carbon monoxide
HAP – hazardous air pollutant
NO_x – nitrogen oxides
tpy – tons per year
PM – particulate matter
SO_x – sulfur oxides
VOC – volatile organic compound

Because the proposed project is in an area that is in attainment for all criteria pollutants, it would meet the conformity requirements of the CAA.

3.2.2.3 Greenhouse Gas Emissions

Enerkem commissioned a study of greenhouse gas (GHG) reductions through Enviro-Accès Inc. (Canadian Environmental Technology Advancement Center) related to operation of its existing ethanol production plant in Quebec. This study compared the conversion of waste into ethanol versus degradation of waste in a landfill, and the emissions created by the production and use of ethanol through its production process versus production and use of diesel or gasoline fuels. The Enviro-Accès study examined multiple mixture percentages of typical solid waste feedstock streams and it determined that the Enerkem process resulted in reductions of GHG emissions ranging between 83 percent and 92 percent, compared to the production of diesel and gasoline and landfilling (Enviro-Accès 2009a). Further, the life-cycle analysis of Enerkem's "primary product" – ethanol -- demonstrates that there is an 80.2 percent reduction in lifecycle GHG emissions when compared to gasoline vehicles fuelled with conventional gasoline (well-to-wheel results, Enviro-Accès 2009b).

The ethanol produced by the biorefinery would displace approximately 7.1 million gallons (26.8 million liters) per year of gasoline, based on a simple energy balance of ethanol and gasoline. Based on an emission factor of 19.4 pounds of CO_2 per gallon of gasoline (EPA Emission Factor, EPA420-F-05-001), the combustion of 7.1 million gallons of gasoline would result in the emission of 69,000 tons per year of CO_2. Because the Enerkem process is unique, a standard life-cycle analysis has not been established. Using the standard life-cycle analysis for dry-mill ethanol production (Center for Transportation Research 2007) as an appropriate surrogate, an estimated 28 percent reduction in GHG compared to gasoline use is obtained.

Using this reduction to calculate the net reduction in global CO_2 emissions as a result of the production of ethanol from the proposed project yields 19,000 tons per year compared to gasoline use.

Although the Enerkem biorefinery would result in a substantial reduction of GHG by converting waste into a clean energy product, proposed processes at the biorefinery would emit some GHGs. The Enerkem project would generate GHG primarily from five sources, the natural degradation of feedstock (biogenic sources), operation of fuel combustion equipment, the methanol island syngas preparation, the ethanol island production process, and the wastewater process. Enerkem would fuel combustion equipment by natural gas, with the exception of one 150-horsepower fuel oil-fired emergency generator. Other than the natural degradation of feedstock received by the biorefinery and biological degradation within the wastewater stream, there would be no biogenic sources of GHGs. Biogenic sources are natural sources of CO2 where emissions are produced by living organisms or biological processes and are typically considered part of the natural carbon cycle and, therefore, not an increase in global GHG emissions. Table 3.2-3 summarizes the potential emissions of GHGs from the Enerkem project.

Table 3.2-3

Summary of Potential to Emit Greenhouse Gases

Source	Total
Carbon dioxide (CO_2)	71,393 tons (64,767 metric tons) per year‡
Methane	114 tons (103 metric tons) per year‡
Nitrous oxide (N_2O)	23.81 tons (21.60 metric tons) per year‡
‡Air emissions are calculated based on year-round (8,760 hours) processing. Thus, these emissions are very conservative.	

Emissions of combustion GHGs are a function of the amount of fuel combusted. The emissions of process-related GHGs are a function of the amount of methanol and ethanol produced. Therefore, emissions of GHGs would not be higher during start up or shutdown conditions than during normal operations.

Air emissions modeling (FC&E 2010) demonstrates that the proposed project would emit HAPs and GHGs below state regulatory thresholds. Enerkem would obtain an air permit from the MDEQ to construct prior to beginning construction. As part of the permitting process, the MDEQ would not require that an ambient air quality modeling analysis be completed. Compliance with all applicable air quality regulations would protect public health.

3.2.2.4 Odor

Operations of the proposed project would result in emissions of odor. Primary odor emissions during operations would come from receiving, pretreatment (drying), and of handling MSW and forest biomass residues until it is fed into the gasifier process. The nuisance effect of odors to the surrounding area would be dependent upon weather conditions (temperature, wind direction and velocity, humidity, and air pressure). In general, odors related to degrading MSW would be consistent with the current operations of the TRSWMA. The intensity of noticeable odors might differ from the current TRSWMA operational

conditions due to the sorting and drying steps necessary to prepare the feedstock material. The forest biomass residue processing would produce an odor of fresh cut wood.

The proposed Enerkem biorefinery would use material that would otherwise already be present at the Three Rivers Landfill. MSW would be sorted outside of the Enerkem biorefinery at the MRF. The MRF would process all material it received each day and return any amount received in excess of its ability to process to the landfill for routine disposal. This would keep the odor resulting from the facilities' operations to a minimum. In addition, Enerkem would install odor controls on the MSW Reception, Drying, and Storage Building, which is the biorefinery building that receives the feedstock via conveyor.

As the proposed project would use material that would otherwise already be present at the Three Rivers Landfill, operations of the biorefinery would not add to odor within the landfill vicinity. The combination of odor controls, operating procedures, and the distance to the nearest residence (1,200 feet [360 meters] from the MRF) would effectively manage odors from the biorefinery.

3.2.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be built and operated, and no supporting infrastructure would be constructed. Under the No Action Alternative, no new emission sources would occur at this location. The site would continue to be vegetated with planted pine land until such time as it was converted to use as active landfill.

3.3 Noise

This section describes the existing noise levels at the proposed project site and the noise levels from the proposed project and the No Action Alternative.

3.3.1 Affected Environment

Enerkem would locate the proposed biorefinery within the existing Three Rivers Landfill site, an active Subtitle D landfill. Daily truck traffic at the landfill averages over 80 heavy vehicles (ESI 1997), and earthmoving equipment operates on a routine basis to manage the contents of the landfill. The landfill's design includes a broad, vegetated buffer, which provides mitigation for the noise generated on site. Although there is a residential area within 500 feet (150 meters) of the landfill's boundary, representatives of the Three Rivers Landfill confirm that there have been no complaints of noise from nearby residents as a result of the landfill's operations from its inception until now. The noise sensitive area (NSA) closest to the proposed project would be a residence, located in an area containing 3 residences total, approximately 1,200 feet (360 meters) from the MRF, based upon interpretation of aerial photography. The day-night average sound level, designated Ldn, is defined as the average noise level over a 24-hour period with the noise between the hours of 10 p.m. and 7 a.m. artificially increased by 10 decibels (dB) to account for the decrease in community background noise during this period. Rural populations enjoy average outdoor sound levels generally lower than Ldn = 50 dB (Schultz 1978), and a level of 55 dB outdoors is identified as preventing activity interference and annoyance (EPA 1974).

3.3.2 Environmental Consequences of the Proposed Action

Enerkem estimates that the highest noise levels would occur during construction of the plant and associated facilities. Enerkem would generate a maximum noise level during construction in the range of 82 to 105 dBA (dB, A-weighted scale) at the source from pile-driving equipment (Eaton 2000), if pile driving is required. (Because sound pressure varies across the audible spectrum, decibels on an A-weighted scale is used to approximate the human ear's sensitivity to various frequencies.) Geotechnical data will be collected during July and August 2010, to determine whether pile driving is necessary.

The equation below (Beranek et al. 1992) can be used for evaluating the noise loss before reaching the NSA:

SPL 2 = SPL 1 - 20 Log 10 (d2/d1).

Where:

SPL 2 is the sound pressure level at the NSA,
SPL 1 is the sound pressure level contribution from the noise source,
d1 is the distance at which SPL1 is measured, and
d2 is the distance to the NSA.

Using the above equation, and assuming pile-driving noise at 98 dBA (average, per Eaton 2000), Enerkem would generate a noise level at the closest NSA (residence 1,200 feet [360 meters] away) of approximately 51 dBA, which is similar to the normal background level for rural agricultural areas and below the EPA outdoor limit of 55 dB (EPA 1974). Pile driving, if it is required, would be a short-term activity.

At the proposed biorefinery site and along the utility routes, other noise sources during construction would most likely include routine construction equipment including bulldozers, front-end loaders, cranes, dump trucks, tractor-trailers, track hoes, backhoes, rollers, pavers, and pickup trucks. These other construction noises are well below that of pile driving and would have lesser noise impact at the NSAs. Therefore, construction of the proposed biorefinery would not generate noise levels above the EPA limit at the closest NSA. Enerkem would limit construction to daylight working hours.

Beulah Grove Road approaches the residential area where the Road meets State Highway 76. As described above, the area contains three residences. Pontotoc County would generate short-term noise associated with road repair and improvement. Pontotoc County would conduct this work in such a way as to avoid disturbing the nearby residents (e.g., limiting construction to daylight hours).

Noise during operations would be limited to the biorefinery and associated facilities, as the proposed utilities (e.g., underground pipelines) are nearly silent. Noise related to feedstock delivery would not be altered, as the site is already an active landfill and the feedstock source would be delivered to the landfill site even if the biorefinery were not built (No Action Alternative).

The chemical processes of the biorefinery would not generate elevated noise levels, but mechanical equipment may. Noise sources from the proposed project during operations would be related to:

- Feedstock handling and processing equipment, including conveyors;
- Compressors;
- Cooling towers; and
- Materials handling equipment (e.g., front-end loaders, forklifts, etc.).

Based on typical noise profiles, this type of equipment can generate from 70 to 86 dBA. From the above equation, the noise level at the closest NSA associated with operations would be approximately 45 dBA. The noise level associated with the equipment typically used for existing landfill operations (which would continue even under the No Action Alternative) is in this same range (e.g., 86 dBA average for a backhoe, Eaton 2000), and the combined noise level could approach 50 dBA. The maximum calculated noise level of 50 dBA would be within the normal background level for a residence with a typical movement of people and possibly an air conditioner (40-60 dBA: Jones & Stokes Associates 1999). Therefore, operation of the biorefinery would not generate noise levels above the decibel range routinely encountered in the area.

Enerkem would conduct a noise study and develop and implement a noise mitigation strategy if it is found that construction or operations noise would exceed 60 dB at the nearest residence.

3.3.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the Enerkem biorefinery would not be built and operated, and no supporting infrastructure would be constructed. The normal noise of landfill operations would continue, and the proposed project site would continue to be vegetated with planted pine until converted to active landfill at some time in the future.

3.4 Visual and Aesthetic Resources

This section provides a discussion of the aesthetic resources located within the vicinity of the proposed project and the potential impacts to these resources from the proposed project and the No Action Alternative.

3.4.1 Affected Environment

The proposed project site is located within the Three Rivers Landfill site, in a rural area of Pontotoc County, Mississippi. The proposed site is currently vegetated in planted pine. The landfill site is used for commercial/industrial purposes but there are no zoning restrictions. The area to the northeast is the active landfill, with planned cells for future expansion located north of the site (and currently covered in planted pine). The landfill's office building is immediately adjacent to the proposed Enerkem site. The surrounding area is mostly forested land, pasture, and industrial property. The nearest residences are approximately 1,200 feet (360 meters) from the proposed project site, screened from the site by dense stands of planted pine (Figure 3.1-1, Land Use).

The adjacent property to the east is in early development as the Three Rivers Industrial Site. Sections of the land are to be sold for industrial development purposes. At present, there is one industrial client with an active interest in the Three Rivers Industrial Site. Marketing efforts are ongoing, and additional clients are expected.

3.4.2 Environmental Consequences of Proposed Action

The proposed project would cause short-term visual impacts resulting from ground disturbance; the presence of workers, vehicles, and equipment; and the generation of dust and vehicle exhaust associated with construction of the proposed biorefinery and related infrastructure. Equipment would be visible, especially along transportation corridors during pipeline and powerline construction. However, construction activities would last weeks to months, and have only short-term effects on visual resources.

During operations, most of the proposed structures and activities would occur at ground level. The surrounding planted pine would screen ground-level structures and activities of the biorefinery and support facilities from view. Enerkem's tallest proposed structure, the Gasification Island, is 115 feet (35 meters) tall. The next tallest proposed structures are the Ethanol and Methanol Islands, which would both be 68 feet (21 meters) tall. The tops of these structures would protrude above the surrounding forest and would likely be visible from nearby residences, as well as motorists on State Highway 76, who would pass within approximately 0.5 mile (0.8 kilometer) of the site, but the structures would not compromise scenic vistas. Because of the relatively low population density, the distance from most observers, and the general use of this area for commercial/industrial purposes, the addition of these industrial structures would not result in unacceptable impacts to aesthetics.

The underground water pipelines and natural gas pipeline would have no effect on visual resources during operations. The aboveground power transmission lines would parallel existing utility corridors where possible and have minimal long-term effects on visual resources. The improvements to Beulah Grove Road would improve the aesthetics of this transportation corridor. These minimal alterations to the viewshed would have neutral or positive aesthetic impacts.

3.4.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the Enerkem biorefinery and supporting infrastructure would not be built and operated. The proposed project site would continue to be vegetated with planted pine until such time as it was converted to use as active landfill.

3.5 Geology and Soils

This section provides a discussion of the geologic setting and existing soil resources of the proposed project site. Information presented includes geologic setting, geologic hazards, and soil types that exist within the proposed project area. This section also describes potential impacts to geology and soils from the proposed project and the No Action Alternative.

3.5.1 Affected Environment

Pontotoc County is located within the East Gulf Coastal Plain of the Atlantic Plain Physiographic Province (USGS 2003). The East Gulf Coastal Plain extends from the Florida Parishes of Louisiana over most of Mississippi, and portions of Tennessee, Kentucky, Alabama, and Florida. This physiographic area is characterized by level to rolling topography which is broken by several streams and river bottoms (BLM 2010).

Geologic units likely to be encountered in the project area were formed during the Paleocene Age and belong to the Midway Group (MDEQ 2010a). These include the Porters Creek and Clayton formations. The Porters Creek formation is characterized by dark-gray clay. The Clayton formation is characterized as a greenish-gray coarsely glauconitic sandy clay and marl in its upper portion, and crystalline sand limestone and loose sand in its lower portion (MDEQ 2010b).

To assess the seismic risk in the project area, Enerkem reviewed the USGS National Seismic Hazard Maps. The Peak Ground Acceleration with a 2 percent-in-50-year probability of exceedance is approximately 0.12 gravity (USGS 2008). In Pontotoc County, there is only a 0.01 probability of a magnitude 4.75 or greater earthquake over a 100-year period (USGS 2002). In addition, the only faulting in the region occurs at a depth of approximately 3,000 feet (900 meters) and is associated with Troy Field located over 20 miles (32 kilometers) southeast of the site (ESI 1997). Based on this information, the project area would not be located in a region with a high probability of a serious earthquake. The project would be located in an area identified as having a low incidence of landslides (USGS 2010). Due to low incidence of landslides and minimal threat of seismic activity, landslides are not expected in the vicinity of the project area.

3.5.1.1 USDA Soil Series

Enerkem consulted the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic database (NRCS 2010) to identify soils within the proposed project site boundaries and pipeline routes (Table 3.5-1, Figure 3.5-1). The following NRCS *Official Soil Series Descriptions* provide a general description of each of the soil series affected.

- Falkner Series – The Falkner series consists of deep somewhat poorly drained soils that formed in a thin silty mantle and the underlying clayey marine deposits. Permeability is slow. These are nearly level and gently sloping soils in uplands and on stream terraces of the Southern Mississippi Valley Silty Uplands, Blackland Prairie, and the Southern Coastal Plain Major Land Resource Areas. Slopes range from 0 to 8 percent.

- Mayhew Series – The Mayhew series consists of deep, poorly drained soils with very slow permeability. They formed in acid, clayey sediments that are underlain by weathered soft clay shale. These nearly level to strongly sloping soils are on uplands of the Southern Coastal Plain. Slopes range from 0 to 12 percent.

- Tippah Series – The Tippah series consists of deep, moderately well drained soils that formed in a thin layer of silty material and the underlying acid clayey sediment. Permeability is moderate in the surface and upper part of the subsoil and slow in lower part of the subsoil. These nearly level to strongly sloping soils are in landscapes with low relief in the Southern Mississippi Valley Silty Uplands. Slopes range from 0 to 12 percent.

- Urbo Series – The Urbo series consists of deep, somewhat poorly drained soils. Permeability is very slow. These nearly level to gently sloping soils formed in clayey alluvium on flood plains of streams that drain uplands of the Southern Coastal Plain and Blackland Prairie Major Land Resource Areas. Slopes range from 0 to 3 percent.

- Wilcox Series – The Wilcox series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey sediments overlying shale. They are on uplands of the Southern Coastal Plain Major Land Resource Area. Slopes range from 1 to 35 percent.

Hydric soils are soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. They can be an indicator of the potential presence of wetlands. Hydric soil components were identified in the Commerce, Mayhew, Urbo, and Wilcox series soils using the Soil Survey Data. Soils with surface textures of sandy clay loam or finer with a poorly drained drainage class are likely to be susceptible to compaction. Such soils can be associated with the Mayhew series.

Prime farmland, as defined by the Farmland Policy and Protection Act of 1981, is land that has the best combination of physical and chemical characteristics for producing agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber but does not include land already in or committed to urban development or water storage.

Table 3.5-1

Soil Associations and Major Soil Limitations of Soils Within the Project Site and Pipeline Routes

Map Unit	Map Unit Name	Prime Farmland[a]	Hydric Soils[a]	Erosion Potential[b]	Compaction Potential[c]	Shallow Bedrock[d]	Slope[a]	Drainage class
Ad	Adaton silt loam	If drained	Partially	Slight	Yes	No	-	Poorly drained
Ar	Arkabutla silt loam	If drained	Partially	Slight	Yes	No	-	Somewhat poorly drained
AtB	Atwood silt	Yes	No	Moderate	No	No	2-5%	Well

Table 3.5-1

Soil Associations and Major Soil Limitations of Soils Within the Project Site and Pipeline Routes

Map Unit	Map Unit Name	Prime Farmland[a]	Hydric Soils[a]	Erosion Potential[b]	Compaction Potential[c]	Shallow Bedrock[d]	Slope[a]	Drainage class
	loam							drained
AtC3	Atwood silt loam	No	Partially	Moderate	No	No	5-8%	Well drained
AtD3	Atwood silt loam	No	Partially	Severe	No	No	8-12%	Well drained
BuA	Bude silt loam	Yes	Partially	Slight	Yes	No	0-2%	Somewhat poorly drained
Co	Commerce silt loam	If drained	Partially	Slight	Yes	No	-	Somewhat poorly drained
FkB	Falkner silt loam	Yes	No	Moderate	Yes	No	2-5%	Somewhat poorly drained
FkC	Falkner silt loam	Yes	No	Moderate	Yes	No	5-8%	Somewhat poorly drained
FkC2	Falkner silt loam	Yes	No	Moderate	Yes	No	5-8%	Somewhat poorly drained
Me	Marietta loam	Yes	Partially	Slight	No	No	-	Moderately well drained
MsA	Mayhew silty clay loam	Yes	Partially	Slight	Yes	No	0-2%	Poorly drained
MsB	Mayhew silty clay loam	Yes	Partially	Moderate	Yes	No	2-5%	Poorly drained
MsD	Mayhew silty clay loam	No	Partially	Severe	Yes	No	5-12%	Poorly drained
MsD2	Mayhew silty clay loam, eroded	No	Partially	Severe	Yes	No	8-12%	Poorly drained
PsB	Providence silt loam, heavy substratum	Yes	No	Moderate	No	No	2-5%	Moderately well drained
RuE	Ruston and Cahaba sandy loams	No	No	Moderate	No	No	17-30%	Well drained
RuE2	Ruston and Cahaba sandy loams, eroded	No	No	Severe	No	No	12-30%	Well drained
Ur	Urbo silty clay loam	If drained	Partially	Slight	Yes	No	-	Somewhat poorly drained

Table 3.5-1

Soil Associations and Major Soil Limitations of Soils Within the Project Site and Pipeline Routes

Map Unit	Map Unit Name	Prime Farmland[a]	Hydric Soils[a]	Erosion Potential[b]	Compaction Potential[c]	Shallow Bedrock[d]	Slope[a]	Drainage class
WcB	Wilcox silty clay loam	Yes	No	Moderate	Yes	No	2-5%	Somewhat poorly drained

[a] As designated by USDA-NRCS National Hydric Soils List by State (2010).
[b] Soil components that have a Land Capability Class of 3 through 8 and a Subclass of "E."
[c] Soil that has a surface texture of sandy clay loam or finer and a poorly drained or very poorly drained drainage class.
[d] Shallow Depth to Bedrock or Coarse Fragments: refers to the potential for shallow depths to bedrock, less than 60 inches (150 centimeters), or coarse fragments.

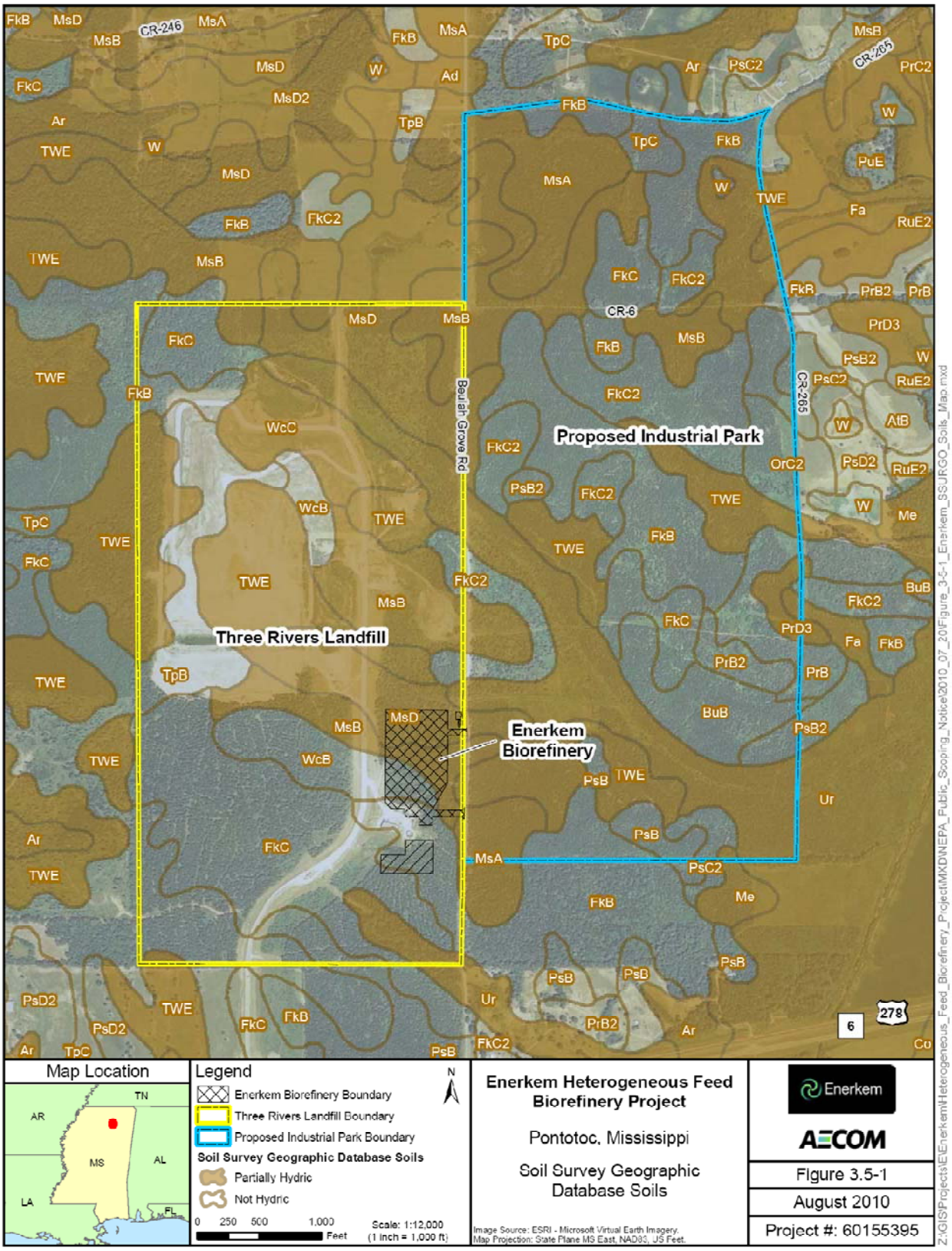

Figure 3.5-1. Soil Survey Geographic Database Soils Map

3.5.2 Environmental Consequences of the Proposed Action

The proposed project would include development of approximately 12.5 acres (5.0 hectares) of land that is currently vegetated with planted pine. The site would require clearing, grading, excavation, and site-development activities associated with construction of the project. The project would disturb approximately 12.5 acres (5.0 hectares).

During siting of the proposed project, Enerkem performed an evaluation of the soils of the Three Rivers Landfill where the proposed project would be located. The evaluation determined that subsurface geologic deposits consisting of soils capable of significant differential settlement, physical instability, or dissolution such as Karst formations were not present at the Three Rivers Landfill site. All of the soils were generally found to have high strength and very low settlement potential. As part of the evaluation, stability analyses were performed to investigate the sliding stability of the excavated cell slopes and the sliding stability of the waste fill at closure. The results of these analyses indicated that the excavated cell and waste fill slopes have an adequate factor of safety against failure. Settlement was also found not to be a consideration in operation of the landfill. Based upon soil investigations, there are naturally occurring low-permeability soils present between the uppermost aquifer and the base of the landfill (ESI 1997). Therefore, soils conditions would be adequate for support of construction and operation of the proposed Enerkem biorefinery.

Land within the Three Rivers Landfill and Three Rivers Industrial Site is already committed to urban development and is not considered prime farmland. The only prime farmland that may experience short-term impacts from the project is found within the wastewater discharge pipeline route, along the west side of Beulah Grove Road, north of the Three Rivers Landfill site. Construction of the pipeline may cause short-term disturbance of the adjacent prime farmland, but following construction, the land within the pipeline right-of-way would not contain aboveground structures and would remain available for agricultural use, therefore no prime farmland would be converted to other uses by this project. Section 3.1 provides further details about agricultural lands.

3.5.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the Biorefinery would not be constructed and there would be no project-related impacts to soils or geology. The site would remain vegetated with planted pine until such time as it was converted to use as active landfill. Conversion to landfill use would disrupt the soils to approximately 110 feet and permanently alter their composition.

3.6 Water Resources

This section provides a discussion of the water resources near the proposed project site and potential impacts to these resources from the proposed project and the No Action Alternative. Information presented includes groundwater and surface water (including floodplains and wetlands) for the proposed project area. Mitigation measures are also discussed to reduce potential impacts on water resources.

3.6.1 Affected Environment

3.6.1.1 Groundwater

The proposed project lies within the Black Warrior River aquifer of the Southeastern Coastal Plain aquifer system. This aquifer system consists of three major aquifers that comprise unconsolidated and poorly consolidated sedimentary strata of Tertiary and Cretaceous age. This aquifer system extends westward into Mississippi where the Chickasawhay and the Pearl River aquifers merge with and are considered to be part of the Coastal Lowlands and the Mississippi embayment aquifer systems, respectively. The Black Warrior River aquifer, which is the lowermost aquifer of the Southeastern Coastal Plain aquifer system, underlies about 32,000 square miles (83,000 square kilometers) in Mississippi (USGS 1998).

The Black Warrior River aquifer consists of an interbedded mix of fluvial sand and gravel, deltaic sand, silt and clay, and marginal marine sand, silt, and clay. In Mississippi, the Black Warrior River aquifer includes unnamed water-yielding rocks of Early Cretaceous age and the Tuscaloosa Group, the McShan and the Eutaw Formations, and the Coffee Sand of Late Cretaceous age. The Black Warrior River aquifer is confined by a thick sequence of clay and marl of the Selma Group, which effectively separates it from overlying rocks of the Mississippi embayment aquifer system. The Black Warrior River aquifer is greater than 4,000 feet (1,200 meters) thick in east-central Mississippi but generally is less than 1,000 feet (300 meters) in thickness near the project area (USGS 1998).

Water enters the Black Warrior River aquifer as precipitation that falls on the aquifer outcrop areas in northeastern Mississippi, as well as Alabama. Most of this water moves to streams as direct runoff, is returned to the atmosphere by evapotranspiration, or follows short flow paths in the aquifer and discharges to local streams as base flow. A small part of the precipitation enters deeper parts of the ground-water flow system, moves down gradient into the confined part of the aquifer, and reemerges as discharge in the valleys of major streams. Ground water that discharges from the deeper, or regional, part of the flow system exits where erosion has deeply incised and exposed the aquifer along the Tombigbee River in western Mississippi and eastern Alabama (USGS 1998).

3.6.1.2 Surface Water

The proposed project is located within the Little Tallahatchie watershed, which is part of the Lower Mississippi-Yazoo River basin. The Federal Emergency Management Agency's National Flood Insurance Program indicates that the project site is located outside the 100-year and 500-year floodplain.

Wildlife Technical Services, Inc (WTI) conducted a wetland and waterbody delineation of the Three Rivers Landfill in 2009. The location of the proposed project site in relation to the jurisdictional wetlands and waterbodies is shown in Figure 3.6-1. There are no wetlands or waterbodies inside the footprint or within 50 feet (15 meters) of the proposed Enerkem biorefinery or the MRF. In addition, there are no public surface water intakes within 2,500 feet (750 meters) of the Three Rivers Landfill (ESI 1997).

Table 3.6-1

Waterbodies Within Utility Rights-of-Way

Feature ID	Feature Type	Approximate width (feet)	Description	Associated Facility
S1APO001	Waterbody	<10	Wetland drain	Natural Gas Pipeline Cooling Water Loop Powerline Route #1 Powerline Route #2
S1APO002	Waterbody	<10	Non-RPW	Wastewater Pipeline
S1APO003	Waterbody	<10	RPW	Wastewater Pipeline
S1APO004	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO005	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO006	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO007	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO008	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO009	Waterbody	<10	Wetland drain	Wastewater Pipeline
S1APO010	Waterbody	40	Lappatubby Creek	Natural Gas Pipeline Cooling Water Loop
S1APO011	Waterbody	<10	Stream	Powerline Route #1
S1APO012	Waterbody	100	Pond, off right-of-way	Powerline Route #1
S1APO013	Waterbody	<10	Stream	Powerline Route #1
S1APO014	Waterbody	<10	Stream	Powerline Route #1
S1APO015	Waterbody	<10	Stream	Powerline Route #1
S1APO016	Waterbody	<10	Drainage	Powerline Route #2
S1APO017	Waterbody	<10	Drainage	Powerline Route #2
S1APO018	Waterbody	<10	Stream	Powerline Route #2
S1APO019	Waterbody	<10	Stream	Powerline Route #2
S1APO020	Waterbody	<10	Braided channel	Powerline Route #2
S1APO021	Waterbody	<10	Pond outfall	Powerline Route #2

Note: No waterbodies are present on the proposed project site.
RPW = Relatively permanent waterbody

Because Enerkem would use Horizontal Directional Drilling (HDD) methods to install pipelines across waterbodies and wetlands, and TVA would install overhead utilities spanning waterbodies and wetlands, installation of utilities would have no direct surface-water impact. Enerkem characterized waterbodies (Table 3.6-1) and wetlands (Table 3.6-2) on utility rights-of-way by photointerpretation of aerial photographs.

Where photointerpretation was insufficient to determine whether the environmental feature exists within the right-of-way (e.g., wetlands on the edge of the right-of-way), Enerkem would perform a confirmatory field survey prior to construction.

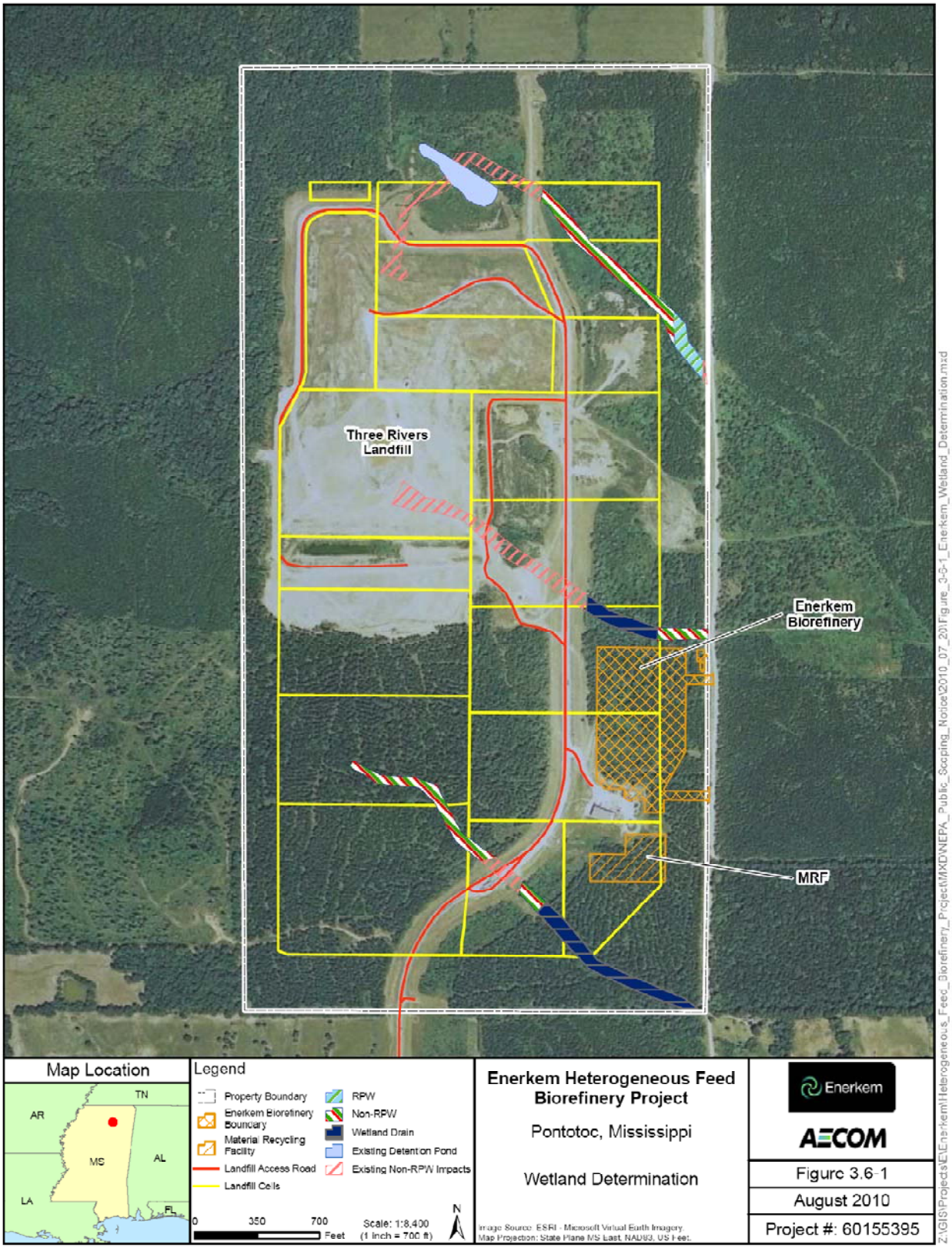

Figure 3.6-1. Wetland Determination.

Lappatubby Creek – At the point where the Enerkem utility right-of-way (for the cooling water pipeline loop and natural gas pipelines) crosses Lappatubby Creek, this waterbody is a broad, constructed channel. The broad floodplain above and below the crossing point (which is collocated with SR-76) is primarily agricultural. At the point of crossing, Lappatubby Creek is listed (feature ID MS232E) on the MDEQ Clean Water Act §303(d) list for biological impairment due to sediment (MDEQ 2010c). A Total Maximum Daily Load was established April 17, 2008. It explains that insufficient data exists for segment-specific modeling and recommendation but makes the general recommendation for, "sediment reduction BMPs, especially for the road crossings, agricultural activities, and construction activities. The implementation of these BMP activities should reduce the sediment load to water bodies within the Yazoo Hills (MDEQ 2008)."

Table 3.6-2

Wetlands Within Utility Rights-of-Way

Feature ID	Feature Type	Approximate width (feet)	Description	Associated Facility
W1APO001	Wetland	50	Emergent wetland	Wastewater Pipeline
W1APO002	Wetland	300	Emergent wetland	Natural Gas Pipeline Cooling Water Loop
W1APO003	Wetland	100	Emergent wetland	Natural Gas Pipeline Cooling Water Loop
W1APO004	Wetland	200	Emergent wetland	Cooling Water Loop
W1APO005	Wetland	75	Emergent wetland	Cooling Water Loop
W1APO006	Wetland	250	Forested wetland	Powerline Route #1
W1APO007	Wetland	300'	Emergent wetland	Powerline Route #1
W1APO008	Wetland	275'	Forested wetland	Powerline Route #1
W1APO009	Wetland	200'	Scrub-shrub wetland	Powerline Route #2
Note: No wetlands are present on the proposed project site.				

3.6.2 Environmental Consequences of the Proposed Action

3.6.2.1 Groundwater

During construction, several of the larger vessels and the pipelines would require hydrostatic testing to ensure integrity. Enerkem would withdraw approximately 10,000 gallons (38,000 liters) of water from the proposed on-site well and cascade this water to the various vessels for most efficient use of the water. After the hydrostatic testing is complete, Enerkem would discharge the water to the Industrial WWTP. This modest withdrawal would not draw down the local water level. There are no public water supply wells within 1,000 feet (300 meters) of the Three Rivers Landfill (ESI 1997).

During operations, a new on-site groundwater withdrawal well would supply the process (non-potable) water for the proposed biorefinery. The proposed on-site well would draw less than 5,000 gallons (19,000 liters) per day. Enerkem would use a cooling-water loop with the City of Pontotoc WWTP to minimize its required groundwater withdrawals.

Potential impacts to the surficial aquifer include releases of hazardous materials from construction or operations. The biorefinery and all support facilities would have operational policies and procedures to manage and store such materials, such as secondary containment around all storage tanks, so that releases should not occur. If an accidental release should occur, the biorefinery would have a Spill Prevention, Control, and Countermeasure (SPCC) plan to contain, manage, and clean up the release. These procedures would minimize, to the extent possible, any potential impacts to the surficial aquifer. Additional mitigation

measures for preventing soil and ground water contamination include the development of both a construction SWPPP and an operational SWPPP.

3.6.2.2 Surface Water

The proposed Enerkem biorefinery and supporting activities would result in the conversion of approximately 2.5 acres (1.0 hectare) of pervious land surface to gravel or pavement surfaces. Paving of Beulah Grove Road would also convert a semi-pervious graveled road to an impervious surface; however a paved road would have less potential for sedimentation impact. In addition, construction activities associated with the Enerkem biorefinery and related infrastructure would result in short-term soil disturbance and loss of vegetative cover. These activities would result in modified surface water runoff patterns from the site. Specifically, impacts on hydrology could result from land clearing, loss of vegetation, and associated accelerated runoff from impervious surfaces following precipitation events. However, the use of construction and post-construction BMPs would prevent a significant increase in runoff following implementation of the proposed project. Enerkem would obtain NPDES Construction and Operations Storm water Permits and develop an ESCP and a SWPPP to prevent excess erosion and degradation of the proposed project site and rights-of-way during construction. Similarly, Pontotoc County would obtain the necessary permits for Beulah Gove Road improvement. Enerkem would seed the areas disturbed during construction that are not part of the active biorefinery with appropriate grasses and vegetation as part of the ESCP and SWPPP for the biorefinery. As a result, impacts to surface water hydrology from construction and operation of the biorefinery project would be minor.

Enerkem would cross waterbodies and wetlands traversed by the natural gas and cooling water lines by HDD methods. TVA would span waterbodies and wetlands traversed by the overhead powerline; TVA would locate poles outside the limits of the wetlands where practicable. These installation methods would avoid impacts to waterbodies and wetlands, with no disturbance of these resources. Enerkem and TVA would obtain USACE Nationwide Permit No. 12 (NWP-12) and perform appropriate mitigation based upon consultation with the USACE, if these activities required disturbance of wetlands or waterbodies. The construction technique, HDD, proposed for Lappatubby Creek is consistent with the recommendations of the Total Maximum Daily Load for this waterbody.

3.6.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be built and operated, no supporting infrastructure would be constructed, and there would be no short- or long-term impacts to water resources.

3.7 Biological Resources

This section provides a discussion of the biological resources located within the vicinity of the proposed project and potential impacts to these resources from the proposed project and the No Action Alternative. Information is presented concerning vegetation, wildlife, threatened and endangered species, and wetlands. Mitigation measures are also discussed to reduce the proposed project's impact on biological resources.

3.7.1 Affected Environment

3.7.1.1 Vegetation & Wildlife

Enerkem would locate the proposed biorefinery, all support facilities, and portions of the associated gas and wastewater pipelines within the fenceline of the previously developed Three Rivers Landfill tract, which consists of cleared or recently planted pine forest land. As a result, the existing vegetation at the plant site provides suitable habitat for wildlife associated with recently disturbed areas and planted pine habitat. Enerkem would construct the associated gas, water, and wastewater pipelines along the edge of existing

road rights-of-way, which are predominantly vegetated by turfgrasses or roadside weed species, which generally produce low-quality habitat for wildlife.

The supporting electric utility line construction alternative routes would predominately occur along existing road rights-of-way or agricultural fields, but some additional forest clearing would occur at discrete locations, especially in the southern part of the alternative routes. In these areas, TVA would clear the trees within the right-of-way and convert the vegetation from forest to maintained field or shrub habitat. Parts of the required utility rights-of-way would cross floodplain or wetland habitat. Bottomland hardwood areas in the region are characteristically dominated by mixtures of broadleaf deciduous (e.g., willow oak (*Quercus phellos*), green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), sweetgum (*Liquidambar styraciflua,)* swamp gum (*Nyssa aquatica*), needleleaf deciduous (e.g., baldcypress (*Taxodium distichum*), and evergreen trees and shrubs (e.g., southern magnolia (*Magnolia grandiflora*), dwarf palmetto (*Sabal minor*). This habitat supports a variety of adaptable wildlife species including whitetail deer (*Odocoileus virginianus*), wild turkeys (*Meleagris gallopavo*), gray squirrels (*Sciurus carolinensis*), and other species common to the region such as barred owls (*Strix varia*), various woodpeckers, various treefrogs (*Hyla spp.*), beavers (*Castor canadensis*), opossums (*Didelphis virginiana*), and rat snakes (*Elaphe spp.*)

The utility lines would cross several streams and/or wetlands. Wetland areas within the utility rights of way would remain as wetlands but any forested wetlands would be converted to emergent wetlands within the rights-of-way due to safety and regulatory requirements regarding the presence of trees within utility rights-of-way.

3.7.1.2 Fishery Resources

Based upon review of USGS 7.5-minute topographic quadrangles (USGS 1980), there is only one perennial stream that would be crossed by the proposed project or its associated utility lines (that is, Lappatubby Creek). Lappatubby Creek is a low-quality channelized drainage through an agricultural production (that is, cultivated fields) area throughout the project utility line crossing area. The biotic diversity of this type of waterbody is very low. The project also crosses several intermittent streams that could have some perennial pools capable of supporting fish. These areas would likely contain low-diversity communities comprised of species capable of surviving harsh conditions with elevated temperatures and depressed oxygen caused by natural circumstances. Streams like those present in the project area typically are heavily impacted by siltation and high nutrient loads caused by the abundant farms in the area. Therefore, the species present that could be affected by the construction of the proposed project are likely to consist of pollution-tolerant bullhead catfish (*Ictalurus* and *Ameiurus spp.*) and common sunfish species, such as bluegill (*Lepomis macrochirus*) and green sunfish (*Lepomis cyanellus*). The streams and agricultural drainage ditches that would be affected by the proposed project are not likely to support fishery resources.

3.7.1.3 Threatened and Endangered Species

Endangered and threatened species are protected by the federal Endangered Species Act of 1973 (16 USCA §§ 1531-1543, P.L. 93-205). Section 7 of the Endangered Species Act requires each federal agency to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of federally listed endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for any federally listed species.

Enerkem initiated informal consultation with the USFWS and the MDWFP regarding the potential presence of federal or state listed threatened or endangered species and/or designated critical habitat for listed species within the proposed project vicinity. A copy of the agency correspondence and clearance letters provided can be found in Appendix A.

Based on the USFWS record of threatened and endangered species by county in the state of Mississippi, only one species was identified as potentially present within Pontotoc County: the stirrupshell (*Quadrula stapes*) (USFWS 2010). This species is federally listed as Endangered in the state of Mississippi. Where proposed utilities cross waterbodies, HDD techniques would be used to avoid disturbance of the waterbody and the species, including stirrupshell, within them.

The Mississippi Natural Heritage Program of the MDWFP listed Price's potato bean (*Apios priceana*) as occurring within 2 miles (3.2 kilometers) of the project site. This species is federally listed as threatened in the state of Mississippi. The proposed project site is vegetated with planted pine and does not represent suitable habitat.

The MDWFP also identified that black bears (*Ursus americanus*) recently had been observed within approximately 2 miles (3.2 kilometers) of the proposed project site. The black bear is a rare species in Mississippi and due to similarity of appearance to the federally threatened Louisiana black bear subspecies, it is protected throughout Mississippi. It is believed that the black bear(s) observed in Pontotoc County were transient individuals that had wandered from areas of habitat elsewhere. The habitat areas affected by the proposed project are generally not preferred black bear habitat types. It is not believed that the proposed project would adversely affect black bears using the area. A description of suitable/critical black bear habitat and a comparison with the habitat present at the proposed project site is provided in Table 3.7-1.

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer listed as a threatened or endangered species, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Table 3.7-1 lists these species and their preferred habitat.

Table 3.7-1

State and Federally Protected Species Potentially Present in Pontotoc County

Common Name (*Scientific Name*)	**Miss. Status**	**Federal Status**	**Suitable Habitat**	**Likelihood to Affect**
Bald Eagle (*Haliaeetus leucocephalus*)	None*	None*	Nests in tall trees near coastal and inland waterbodies.	No. Immature planted pine does not provide suitable habitat.
Black Bear (*Ursus americanus*)	T	T (by similarity of appearance to Louisiana black bears)	Bottomland hardwood forests with minimal human disturbance	Not Likely. Planted pine does not provide suitable habitat. One powerline route alternative crosses 300 feet (100 meters) of bottomland hardwood that may provide suitable habitat. Black bears would be expected to avoid the site during construction activity and return to the area as it recovered to pre-construction conditions.
Price's potato-bean (*Apios priceana)*	NL	T	Open, rocky, wooded slopes and floodplain edges. Sites are usually under mixed hardwoods	No. Planted pine does not represent suitable habitat.

Table 3.7-1

State and Federally Protected Species Potentially Present in Pontotoc County

Common Name (*Scientific Name*)	Miss. Status	Federal Status	Suitable Habitat	Likelihood to Affect
			or in associated forest clearings, often where bluffs or ravine slopes meet creek or river bottoms. Soils are well-drained and loamy, formed on alluvium or over calcareous boulders. Several populations extend onto road or powerline rights-of-way.	
Stirrupshell (*Quadrula stapes*)	E	E	The Stirrupshell inhabits moderate to large rivers with moderate to swift current.	No. Waterbodies would be crossed by HDD techniques to avoid disturbance.

Key: E=Endangered; T=Threatened

*Bald Eagle is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.
Source: USFWS 2010, NatureServe 2010.

3.7.2 Environmental Consequences of the Proposed Action

3.7.2.1 Vegetation and Wildlife

Enerkem would alter vegetation within the footprint of the proposed biorefinery and support facilities; however the proposed site is industrial space, currently planted in pine. Enerkem would remove the existing planted pine (12 to 13 years old) and convert the land to industrial use. However, the site is within the permitted landfill area and does not represent high-quality habitat.

Habitat crossed by the wastewater and natural gas pipelines would include open land associated with existing industrial property and road rights-of-way. Section 3.1 provides additional detail. A new approximately 2-mile (3.2-kilometer) powerline would cross primarily road right-of-way, agriculture land, or planted pine before connecting to an existing transmission line.

Construction and operation of the proposed pipelines would result in short- and long-term impacts on vegetative cover types. Construction of the wastewater and natural gas pipelines would include approximately 30 to 45 feet (9 to 14 meters) of construction rights-of-way for the length of the pipeline. The wastewater and natural gas pipelines would generally be installed by open-trench methods. That is, excavating a trench approximately 3 feet (0.9 meter) wide, lowering-in the pipeline, and backfilling the trench to pre-construction grade. After pipeline installation, Enerkem would allow the construction rights-of-way to revegetate naturally, except for a 15-foot (4.6-meter) permanent right-of-way directly over the

pipeline, which would remain free of woody vegetation for ongoing monitoring and maintenance. Long-term vegetative impacts would only be within the forested areas along the permanent pipeline rights-of-way, with the long-term removal of forest vegetation and conversion to open land with herbaceous vegetation. Once the rights-of-way leave the permitted Three Rivers Landfill site, they would primarily be collocated with existing linear corridors, which are already cleared, to minimize any potential adverse impacts. Following right-of-way restoration and during operation of the pipelines, displaced species would likely utilize the rights-of-way as they have prior to pipeline construction. Construction or maintenance of the proposed infrastructure related to the Enerkem biorefinery would have only minimal impact upon biological resources.

Construction of overhead utility easements would require long-term clearing of a 30-foot (9-meter) wide corridor. Although clearing the rights-of-way would significantly change those portions that are currently forested, more than 90 percent of the proposed utility easement routes are currently cleared roadsides or agricultural fields. The clearing of the relatively small amount of bottomland and upland forest would likely not affect the much-larger surrounding habitat.

The disturbance of wildlife within the proposed utility rights-of-way would be associated with clearing and construction. Heavy equipment and construction traffic on the rights-of-way could displace animals by creating noise and physical barriers. Construction could result in direct mortality of less-mobile species, such as small mammals and reptiles, or result in some animals becoming trapped in a trench or excavation. Construction activities would be of short duration through each of the identified habitats and would result in only short-term impacts. Following right-of-way restoration and during operation of the utilities, noise and disturbance would be minimal, and species would likely utilize the rights-of-way as they have prior to construction. Although individuals of some wildlife species could be affected, the effects would have a small impact on local populations or habitats of any species.

In summary, disturbance associated with the proposed project construction activities would cause the short-term displacement of most wildlife from the immediate vicinity of the construction zone and adjacent areas. In addition, structures at the biorefinery would provide minimal habitat for wildlife after construction, but utility rights-of-way would be usable as habitat for some species. Although individuals of some wildlife species could be affected, the effects have a small impact on local populations or habitats of any species.

Long-term impacts would be related to conversion of portions of the proposed project site from planted young pine to industrial use and conversion of some areas of forest within utility rights-of-way to non-forested vegetation. No filling of wetlands would take place. Construction of utility lines would result in short-term disturbance within rights-of-way, but Enerkem would perform revegetation immediately after construction is completed.

3.7.2.2 Fishery Resources

It is unlikely that fishery resources would experience long-term impacts as a result of the construction activities for the proposed project. Enerkem would protect streams from sediment runoff with the installation of erosion control devices around the Enerkem biorefinery site and along the utility construction rights-of-way. Following construction, Enerkem would restore the utility line rights-of-way and allow them to return to pre-construction conditions.

Enerkem would treat wastewater from the biorefinery through permitted WWTPs; thus, minimal impacts to fishery resources are expected as a result of treated wastewater discharge.

3.7.2.3 Threatened and Endangered Species

A summary of the potential impacts to threatened and endangered species with the potential to be present within the vicinity of the proposed project is provided in Table 3.7-1. The habitat at the proposed project site was compared against the habitat needs of the listed species (black bear) which are potentially present to determine whether protected species or their habitat might be affected by the project. Based upon the lack of quality habitat within the proposed project footprint, construction and operation of the proposed project would not adversely affect federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures. Enerkem would perform site-specific surveys, if necessary, prior to construction to ascertain that no protected species are present. In addition, operational noise would be limited and associated with aboveground facilities within the industrial area as the proposed pipelines would be buried. Therefore, unlikely that noise would impact any protected species.

3.7.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be built and operated, and no supporting infrastructure would be constructed. There would be no project-related impacts to biological resources. The site would continue to be vegetated with planted pine until such time as it was converted to use as active landfill. Planted pine and landfills are not typically considered quality habitat for protected species, although they may support a variety of wildlife.

3.8 Cultural Resources

This section provides a discussion of the cultural resources located within the vicinity of the proposed project and potential impacts to these resources from the proposed project and the No Action Alternative. Cultural resources are defined as historic properties as defined by the *National Historic Preservation Act*, cultural items as defined by the *Native American Graves and Repatriation Act*, archeological resources as defined by *Archaeological Resources Protection Act*, sacred sites as defined in Executive Order 13007 to which access is afforded under the *American Indian Religious Freedom Act*, and collections and associated records as defined in 36 CFR 79.

3.8.1 Affected Environment

Cultural resources include sites, buildings, structures, or areas that are of historic, cultural, archeological, and/or architectural significance. Because the DOE is providing funding for a portion of the proposed project, the proposed project is subject to the provisions of Section 106 of the National Historic Preservation Act. The purpose of the "Section 106 Process" is to assure that no unnecessary harm comes to historic properties as a result of federal actions. Under Section 106 of the National Historic Preservation Act of 1966 (as amended), federal agencies are required to take into account the effect of their proposed undertakings on properties listed in or eligible for inclusion in the National Register of Historic Places (NRHP).

The MDAH was consulted in 1997 regarding expansion of the landfill and determined that no properties listed in or eligible for listing in the NRHP were present on the property. Enerkem initiated informal consultation with the MDAH's Historic Preservation Division concerning the proposed project on June 25, 2010. On July 12, 2010, MDAH issued a clearance letter with its determination that no cultural resources would likely be affected. A copy of this correspondence is provided in Appendix A.

The NRHP has been reviewed for Pontotoc County, Mississippi. There are three resources currently listed on the Register, as shown in Table 3.8-1. The closest site on the NRHP is over 5 miles (8 kilometers) away.

Table 3.8-1

Cultural Resources Located in Pontotoc County, Mississippi

Name	Type of Resource	Location	Proximity to Proposed Project
Lochinvar Plantation	Architectural	Lochinvar Dr. Pontotoc, MS 38863	Approximately 8.0 miles (12.9 kilometers)
Pontotoc Historic District	Architectural	Main St. and Liberty St. between Reynolds St. and 8th St. Pontotoc, MS 38863	Approximately 5.4 miles (8.7 kilometers)
Treaty of Pontotoc Site	Architectural	Chickasaw National Council House Pontotoc, MS	Approximately 11.5 miles (18.5 kilometers)

Source: National Park Service, NRHP, National Register Information System <http://www.nr.nps.gov/>

3.8.2 Environmental Consequences of the Proposed Action

There are no properties listed in the NRHP, or places likely to be eligible, present at the Three Rivers Landfill (ESI 1997). Enerkem would require some infrastructure associated with the proposed biorefinery outside the boundary of the Three Rivers Landfill. Enerkem would install this infrastructure immediately adjacent to existing roads and generally within the roadside right-of-way or planted pine areas. An "Unexpected Discoveries and Emergency Procedures Plan" has been developed that would address the possibility of accidental discoveries during construction. A copy of this plan is provided in Appendix B.

The closest NRHP-listed property is over 5 miles (8 kilometers) away from the proposed project site. This property would not be affected by construction or operation of the proposed Enerkem biorefinery.

3.8.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be built and operated, no supporting infrastructure would be constructed, and no further ground disturbance would occur at the proposed project site.

3.9 Socioeconomics

This section describes the existing socioeconomic conditions for Pontotoc County and the potential socioeconomic impacts of the proposed project and the No Action Alternative.

3.9.1 Affected Environment

Pontotoc County is a rural county and does not have any defined metropolitan statistical area. The estimated population of Pontotoc County in 2009 was 29,248 individuals, which is an increase of 9.4 percent since the 2000 census. By comparison, the State of Mississippi has experienced a population increase of 3.8 percent since 2000 (U.S. Census Bureau 2010).

Property values in Pontotoc are below the state average, with the 2000 median value of owner-occupied homes being $66,400, in comparison to the state at $71,400 per home (U.S. Census Bureau 2010). The county median household income is slightly higher than the state median. The state median income is $37,818 while the median household income in Pontotoc County is $38,518. Approximately 15.6 percent of persons in Pontotoc County are below the poverty level, compared to 20.8 percent for the State of Mississippi. Unemployment in Pontotoc County exceeds national and statewide rates (Table 3.9-1).

Table 3.9-1

Unemployment Rate, June 2010

Area	Civilian Labor Force	Employed	Unemployed	Unemployment Rate (Unadjusted)
United States	154,767,000	139,882,000	14,885,000	9.6%
Mississippi – Statewide	1,312,800	1,166,900	145,900	11.1%
Pontotoc County	12,610	11,180	1,430	11.3%

Source: MDES 2010

3.9.2 Environmental Consequences of the Proposed Action

As proposed, the project would help revitalize the U.S. manufacturing base, bringing job growth to northern Mississippi. The jobs created by the project, as predicted by the DOE's Jobs and Economic Development Impact model (NREL 2004), are summarized in Table 3.9-2. This model includes direct, indirect, and induced effects of the project.

Table 3.9-2

Local Economic Impacts – Summary Results

During construction period	**Jobs**
Direct Impacts	**145**
Construction Sector Only	131
Other Industry Sectors	14
Indirect Impacts	**38**
Induced Impacts	**57**
Total Construction Impacts (Direct, Indirect, Induced jobs)	**Total: 240**
During operating years	**Annual Jobs**
Direct Impacts	**75**
Plant Workers Only	51
Other Workers	24
Indirect Impacts	**16**
Induced Impacts	**30**
Total Operations Impacts (Direct, Indirect, Induced jobs)	**Total: 121**

Definitions:
Direct Effect: These are the on-site or immediate effects created by an expenditure. It refers to the on-site jobs of the contractors and crews hired to construct the plant. It also refers to the jobs at the manufacturing plants that build the equipment, among others.
Indirect Effect: This refers to the increase in economic activity that occurs when a contractor, vendor, or manufacturer receives payment for goods or services and in-turn is able to pay others who support their business.
Induced Effect: This refers to the change in wealth that occurs or is induced by the spending of those persons directly and indirectly employed by the project.

During construction, Enerkem would create jobs for 145 personnel (131 from the Construction Sector, 14 from other industry sectors, such as Machinery, Electrical Equipment, and Transportation). During operations, Enerkem would require approximately 51 persons (50 plant staff, 1 manager) as permanent employees. An additional 10 personnel would likely find new employment in the recycling industry associated with the MRF. Enerkem would hire the construction personnel and permanent employees for the project locally where practicable, with specialty workers brought in for specific task requirements. The increase in employment of local personnel and the influx of temporary construction personnel would have a positive impact on the local economy by the creation of jobs as well as increasing spending in the area.

In addition to the local economy, indirect jobs related to the Enerkem biorefinery would also be created. These jobs would be associated with manufacturing (e.g., steel, construction materials, components), shipping, etc. and would be dispersed throughout the U.S. It is projected that indirect and induced jobs would equate to approximately 95 employees during construction and 46 employees during operations.

Local resources such as schools, hospitals, parks, and public safety agencies could experience a slight increase in activity due to the population increase related to the construction and operation of the Enerkem biorefinery. However, these resources would be supported by accompanying increases in the local tax digest due to the same growth factors.

When the plant is operating, it would provide for an extended life of the Three Rivers Landfill. This would provide a net benefit to the local community and the landfill's service area by extending the period of time before an alternative site for waste disposal is necessary. Siting of a new landfill accrues costs in permitting and land purchase as well as the potential for additional transportation costs and related emissions if the landfill is located further away.

3.9.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be built or operated, and no supporting infrastructure would be constructed. The proposed project site would continue to be an industrial site with planted pine within an existing landfill. Beneficial impacts to Pontotoc County from an increased tax base and the direct and indirect jobs resulting from construction and operations of the proposed project would not be realized.

3.10 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 DOE's NEPA* (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 populations.

3.10.1 Affected Environment

The racial make-up of Pontotoc County is 84.1 percent white, 14.9 percent black, 0.3 percent American Indian and Alaska Native persons, 0.2 percent Asian, and 0.6 percent persons of more than one race (U.S. Census Bureau 2009). In addition, 3.7 percent of the population also describe themselves as Latino descent. Pontotoc County's median household income of $38,518 is slightly higher than the state median income of $37,818. Approximately 15.6 percent of persons in Pontotoc County are below the poverty level, compared to 20.8 percent for the State of Mississippi.

3.10.2 Environmental Consequences of the Proposed Action

The proposed project would not be located within a county that possesses a relatively high proportion of minorities. In addition, the area does not have a disproportionately high poverty level compared to the rest of the state. The selection of the proposed Enerkem biorefinery site was constrained by the location of the existing landfill. The construction and operation of the proposed project would benefit the local population at many levels through creation of jobs at the biorefinery, creation of secondary jobs to serve the additional growth related to the population, growth of the local tax base, and by demonstrating the potential for "green technology" as a cost effective way to use local MSW.

The proposed project would have only minor environmental impacts, and these do not have a disproportionally higher impact on minority or low-income populations. There are no public schools, parks, municipal services, or businesses that would be adversely impacted by the construction of the proposed project.

3.10.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery and its associated job creation and economic growth would not occur and there would be no effect on the local population.

3.11 Public and Occupational Safety and Health

This section discusses existing public and occupational safety and health services in the vicinity of the proposed project and potential impacts to public and occupational safety and health from the proposed project and the No Action Alternative.

3.11.1 Affected Environment

The proposed project site is approximately 6 miles (9.7 kilometers) northwest of the City of Pontotoc. Emergency services are provided by the Pontotoc Police and Fire Departments. The Pontotoc Fire

Department is housed at the fire station at 18 South Liberty Street, approximately 8 miles (12.9 kilometers) from the proposed project site.

Occupational health services and emergency medical services are provided by the North Mississippi Medical Center located in Pontotoc, approximately 9 miles (14.5 kilometers) from the proposed project site. The hospital offers paramedic-level ambulance service and 24-hour physician coverage in its emergency department. Radiology services are available and include x-ray, computed tomography, and ultrasound (North Mississippi Medical Center 2010).

Pontotoc County has an emergency management agency. The Mississippi Emergency Management Agency is divided into nine districts, and each county has a full or part-time emergency management program. The Mississippi Emergency Management Agency coordinates county disaster services and emergency planning for such events as floods, fire, earthquakes, tornadoes, hurricanes, drought, epidemics, electrical or computer outages, and terrorist attacks. The agency's primary goal is to prevent injuries, save lives, and reduce property damage in the community during emergency situations.

3.11.2 Environmental Consequences of the Proposed Action

Safety and health factors related to the proposed project would include some localized increase in road traffic, noise, and the potential for chemical releases to affect the plant workers or surrounding public. Emission releases could include process chemicals or products produced by the biorefinery or support facilities. Air quality impacts are addressed in Section 3.2, noise impacts are addressed in Section 3.3, potential impacts from use of hazardous materials are addressed in Section 3.13, and traffic impacts are addressed in Section 3.14. Occupational safety and health impacts are addressed below.

The chemicals and chemical processes used to produce ethanol create a potential for health and safety hazards. The hazards related to hazardous material storage and handling are further discussed in Section 3.13. In summary, the hazardous materials generally fall into two categories, flammable or reactive. The ethanol, denaturant, gasoline, and diesel fuel are flammable. Many of the process chemicals are strong acids or bases or are reactive.

The plant manager at the proposed biorefinery would be responsible for health and safety coordination. In addition, a health and safety program manager, located at Enerkem's engineering and procurement office in Sherbrooke, Quebec, would provide technical support to the proposed biorefinery. Enerkem would also develop an integrated contingency plan and an Emergency Response Plan (ERP) for the proposed biorefinery. Items to be detailed in this plan describe planning and procedures to be followed in the event of an emergency including:

- Spills or releases of hazardous materials,
- Fire/explosion,
- Tornadoes,
- Severe weather,
- Medical emergency, and
- Bomb threat.

The integrated contingency plan would contain the appropriate emergency service contact information. Furthermore, Enerkem would develop safety and emergency response procedures for construction activities, excavation and trenching, electrical, hazardous chemicals, hot work permits, fall prevention, proper equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection for employees, contractors, and visitors. Enerkem would complete these items prior to bringing

hazardous materials on site. The existing emergency response capabilities of the City of Pontotoc and Pontotoc County would remain in place and available to the proposed biorefinery, if needed.

Enerkem would design the fire protection systems for the proposed project to limit personal injury, loss of life, property loss, and plant downtime from fire or explosion. The biorefinery would have the following fire protection systems:

- Adequate numbers of fire hydrants and hose stations located throughout the biorefinery to ensure sufficient coverage of the process areas;

- Storage tanks containing flammable materials designed and constructed in accordance with the National Fire Code;

- Operating and maintenance personnel trained to effectively deal with plant emergencies involving fire, explosion, or accidental spills. Ongoing training would be administered to maintain the effectiveness of the on-site fire brigade; and

- The project would also rely upon the local fire department or emergency response teams in the event of a serious fire. These local authorities would be made familiar with the layout of the facilities, the hazards of materials handled on the premises, places where personnel would normally work, and possible evacuation routes. A fire protection plan for the plant would be created and updated to detail the project information necessary to ensure that safe and effective fire fighting measures are used at the plant.

In addition to the fire hydrants and other systems, Enerkem would equip the biorefinery with hand-held fire extinguishers, temperature detectors, smoke detectors, and other fire detection devices as required by fire codes and the Pontotoc County or the Office of the State Fire Marshall.

3.11.2.1 Risk Analysis

As part of the design process for the project, which is based on technology that Enerkem has deployed at its demonstration plant in Westbury, Quebec, Enerkem conducted a HAZID (hazard identification) study to identify hazards during the early stages of engineering. The HAZID procedure includes the following analysis steps:

- Identification of deviations;
- Identification of causes for the deviations;
- Discussion of consequences / hazard; and
- Listing of safeguards.

For the proposed project, the HAZID study was initiated to identify the following primary hazards of concern:

- General;
- Pressure;
- Temperature;
- Composition;
- Level; and
- Flow.

The HAZID study was completed as a Pre-Basic-Engineering Hazard and Operability (Pre-HAZOP) study which Enerkem would expand into a HAZOP at the end of basic engineering for the proposed biorefinery in Pontotoc. Enerkem would use the information developed during the HAZOP study for the final design of the proposed biorefinery, as appropriate. Where the planned safeguards were identified as insufficient, recommendations for improved safeguards would be made to the design. In addition, Enerkem would ensure that prior to initiating construction that it was demonstrated that sufficient steps have been taken to reduce the risk of identified hazards to a level where no further practicable reduction measures would be possible.

As described above in Section 3.6.2, Enerkem would develop appropriate contingency plans (SPCC, SWPPP, and ERPs) that would:

- Analyze the potential for spills or releases of petroleum products or other hazardous materials;
- Outline steps to prevent releases or spills from occurring;
- Evaluate the potential impacts of releases should they occur; and
- Describe response actions that should be taken in the event of a release.

Enerkem would provide training to its personnel on the site-specific spill prevention and response measures contained in the contingency plans. In addition, Enerkem would meet with the local fire and emergency response providers to discuss potential emergencies, determine capabilities, and establish communication protocols and responsibilities. Additional details concerning emergency response coordination are provided in Section 3.13.

3.11.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery and associated infrastructure would not be constructed, and no impacts to health and safety would occur.

3.12 Utilities and Energy

This section describes existing utilities at the proposed project site and potential impacts to utilities from the proposed project and the No Action Alternative.

3.12.1 Affected Environment

The proposed biorefinery site is within the Three Rivers Landfill. This active commercial/industrial site has existing potable water supply, provided by Algoma Water Association. Sanitary waste is handled by septic systems. Storm water discharge is to a retention pond. There is an existing 10 megawatt powerline to the landfill.

3.12.2 Environmental Consequences of Proposed Action

The proposed project would require the following utilities. Proposed utility routes are shown on Figure 2.1-3.

3.12.2.1 Water Supply

Enerkem would obtain water for plant operations from three different sources.

Enerkem would receive potable water from the existing municipal line that supplies the existing Three Rivers Landfill's Office and Maintenance Shop. This line is currently in place and would continue to be maintained by the Algoma Water Association. The Algoma Water Association has confirmed that sufficient potable water is available from this line to meet project needs.

Enerkem would obtain process/make-up water from a proposed water well constructed on the biorefinery site. Enerkem would require a maximum water withdrawal of 5,000 gallons (19,000 liters) per day. Enerkem would locate the well on the southern portion of the site within the biorefinery's fenceline. See Section 3.6 for a discussion of water withdrawal and capacity.

Enerkem would receive cooling water from the City of Pontotoc WWTP and return it to the City of Pontotoc WWTP for discharge through a pipeline loop collocated in the same right-of-way as the wastewater pipeline along Beulah Grove Road and State Highway 76. Enerkem would use the effluent water for cooling purposes at the biorefinery and return the unevaporated remainder to the discharge point of the WWTP. The City of Pontotoc has confirmed that this volume of effluent water is available to the project. The City of Pontotoc would install a loop of 6-inch (15-centimeter) diameter polyvinyl chloride (PVC) piping from the City of Pontotoc WWTP located approximately 2.5 miles (4 kilometers) east of the proposed project site. All new pipeline construction would use open-trench methods, except where specialized methods, such as boring or HDD, were required to protect road crossings and streams. The City of Pontotoc would construct the cooling water loop.

3.12.2.2 Water Discharge

The proposed project would produce up to 67,000 gallons (254,000 liters) of process treated purged water and 900 gallons (3,400 liters) of sanitary wastewater per day. Enerkem would pretreat the process related wastewater in the on-site wastewater pretreatment facility and discharge it to the Industrial WWTP for further treatment. Enerkem would discharge the sanitary wastewater directly to the Industrial WWTP. The Industrial WWTP has confirmed that sufficient treatment capacity is available for this volume of wastewater. The project would also use up to 450,000 gallons (1.7 million liters) per day of Pontotoc WWTP effluent as a make-up for the cooling tower. Enerkem would return the cooling tower blowdown to the Pontotoc WWTP for discharge as described above. The Pontotoc WWTP has confirmed that capacity to accommodate this volume of water is available.

Enerkem would discharge process treated purged water and sanitary water from the proposed on-site wastewater treatment plant through a proposed 1-mile (1.6-kilometer), 6-inch (15-centimeter) diameter, wastewater pipeline to the existing Pontotoc County Industrial Park WWTP (Industrial WWTP), which is attached to an industrial park north of the proposed site for further treatment. The majority of the pipeline route would parallel Beulah Grove Road. At the end of Beulah Grove Road the pipeline would continue north through disturbed land to the Pontotoc County Industrial Parkway. The pipeline route would then turn west paralleling the parkway until terminating at the Industrial WWTP (Figure 2.1-3). Non-process water from cooling and boiler systems would also be sent to the Industrial WWTP. All new pipeline construction would use open-trench methods, except where specialized methods, such as boring or HDD, were required to protect road crossings and streams.

3.12.2.3 Natural Gas

A high-pressure natural gas pipeline would also support the biorefinery. The pipeline would be approximately 1.75 miles (2.8 kilometers) in length, and would parallel State Highway 76, from the State Highway 15 crossing to the project site. The City of Pontotoc has committed to supplying this capacity of natural gas and would construct and manage the pipeline. All new pipeline construction would use open-trench methods, except where specialized methods, such as boring or HDD, were required to protect road crossings and streams.

3.12.2.4 Oxygen

An ASU would provide oxygen for the gasification process. A third party (as yet to be determined) would construct, own, and operate the ASU. It would occupy less than 4 acres (1.6 hectares) of the Three Rivers

Industrial Site, adjacent to the Enerkem site and the electrical substation. Oxygen would be delivered by pipeline. If additional oxygen is required, it would be provided by truck delivery from external liquid oxygen production facilities. In addition, Enerkem would store a contingency oxygen supply to maintain operations in the event offsite oxygen supply is interrupted.

3.12.2.5 Power

The power needed for the biorefinery, MRF, and the ASU would require a new electrical substation to be constructed on 4 acres (1.6 hectares) in the southwest corner of the Three Rivers Industrial Site. A new approximately 2-mile (3.2-kilometer) powerline would cross road right-of-way, agriculture land, or planted pine to connect to an existing transmission line. PEPA would construct and maintain the electrical substation and TVA would construct and maintain the transmission line.

Impacts to land use are discussed in Section 3.1.2. Impacts to surface waters are discussed in Section 3.6.2.

3.12.3 Environmental Consequences of No Action Alternative

Under the No Action Alternative, the proposed biorefinery and associated infrastructure would not be constructed, and the project would have no effect on the existing infrastructure of the city of Pontotoc or Pontotoc County.

3.13 Waste Management and Hazardous Materials

This section describes the current and expected waste management and hazardous material handling procedures at the proposed project site.

3.13.1 Affected Environment

The proposed biorefinery site is located within the permitted footprint area of the Three Rivers Landfill. It would occupy about 12.5 acres (5.0 hectares) of the 208 acres (84 hectares) that are permitted as a Subtitle D landfill. The landfill was permitted to begin receiving waste in 1994 and has an ultimate design capacity of 13.8 million tons (12.5 million metric tons). Based on acceptance rate projections, this landfill is estimated to have a site life that would extend until 2079.

Because the proposed location for Enerkem's biorefinery at the landfill site is currently undeveloped, no hazardous materials are currently used and no waste of any kind is currently being generated at the proposed location.

3.13.2 Environmental Consequences of the Proposed Action Alternative

During construction, the proposed project would generate no more than 20 tons (18 metric tons) of construction waste per week. Enerkem would dispose of the waste in the Three Rivers Landfill. Construction would last 16 months.

During operations, the proposed project would generate approximately 2 tons (1.8 metric tons) per week of recyclables and non-hazardous solid waste that would include paper waste from office operations, empty containers (i.e., drums, totes, and boxes), scrap metal, wood, plastic products, and paper from plant operations. Enerkem would recycle these materials to the extent practicable. In addition to the biorefinery itself, Enerkem would construct an MRF to receive MSW and sort out recyclable materials such as glass, metals, and other materials (rocks, cement, ceramics). Enerkem would resell the recyclable materials and dispose of the inert materials in the Three Rivers Landfill. The balance of the sorted MSW would be shredded; dried and sized for Enerkem's gasifier and delivered by covered conveyor belt to the biorefinery.

The MRF and the biorefinery would extend the life of the landfill by removing and recycling material from the waste stream currently being disposed in the landfill.

The predominant solid waste streams generated as a result of the biorefinery process would include GSR, char, spent catalysts, and guardbed. If the GSR cannot be sold for beneficial reuse in the production of road or building materials, Enerkem would dispose of it at the Three Rivers Landfill. The char could be used as aggregate in the cement industry or landfilled at the landfill. Enerkem would recycle spent catalysts through their manufacturer.

The proposed biorefinery would generate a small quantity of hazardous waste. The hazardous waste would consist primarily of flammable liquids and laboratory chemicals. A licensed hazardous waste transportation company would transport the hazardous wastes off-site to a licensed hazardous waste treatment, storage, and disposal facility. Enerkem would neutralize spent acids and acidic waste that could not be reused on-site. Enerkem would dispose of neutralized solid waste off-site with other nonhazardous waste.

3.13.2.1 Hazardous Material Storage

The proposed biorefinery would store and use various hazardous materials. Table 3.13-1 summarizes the hazardous chemicals that would be present on-site in quantities equal to or greater than 6 cubic meters. The project would produce approximately 10 million gallons (38 million liters) of ethanol per year, but would store a maximum of 160,000 gallons (600,000 liters) at any one time.

Table 3.13-1

Summary of Hazardous Materials Stored On Site

Chemical	Designation[a]	Construction of Tank	Capacity (cubic meters)	Secondary Containment/ Leak Detection
Caustic soda	DOT Hazardous Materials List	Stainless Steel	25	Containment berm (110% of largest tank)
Sulfuric acid	DOT Hazardous Materials List	Stainless Steel	25	Containment berm (110% of largest tank)
Nitrogen	DOT Hazardous Materials List	Stainless Steel	150	Pressure tank
Carbon dioxide	DOT Hazardous Materials List	Stainless Steel	150	Pressure tank
Auxiliary fuels (diesel)	DOT Hazardous Materials List	Stainless Steel	25	Containment berm (110% of largest tank)
Methanol	DOT Hazardous Materials List	Carbon Steel	600	Containment berm (110% of largest tank)
Ethanol	DOT Hazardous Materials List	Carbon Steel	600	Containment berm (110% of largest tank)
Denaturing agent (methanol or gasoline)	DOT Hazardous Materials List	Carbon Steel	6	Containment berm (110% of largest tank)

[a]49 CFR 172.101
DOT = Department of Transportation

Enerkem would design and construct storage tanks located outside with secondary-containment structures sufficient to hold the contents of the largest tanks plus sufficient additional volume for rainfall. Any tanks located inside the buildings would also be located in secondary containment if determined to be necessary for employee safety or protection of the environment. Enerkem would construct each storage tank using materials compatible with the chemical being stored. In addition, the biorefinery would have a fire protection system, designed by an external consultant specializing in chemical and refinery fire suppression systems.

Enerkem would develop appropriate spill response, pollution prevention, and ERPs to address the medical and environmental hazards associated with the biorefinery. The plans would include, at a minimum, an SPCC Plan, a SWPPP, and an ERP. Enerkem would complete the plans in accordance with federal and Mississippi Occupational Safety and Health Administration and EPA and MDEQ regulations and guidance. Enerkem would acquire spill equipment kits as needed. Enerkem would provide spill response training to employees working with the hazardous materials stored and used on-site. These measures would mitigate potential impacts from spills of hazardous materials. Therefore, little to no impacts from waste and hazardous materials management would be expected to occur as a result of the proposed project.

3.13.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, no new waste materials would be generated and no hazardous materials would be stored on-site at the proposed location of the Enerkem biorefinery or proposed MRF. However, this land has been permitted to receive non-hazardous municipal solid waste within a Subtitle D landfill. If or when the site is eventually converted to be used as active landfill, waste appropriate to the landfill's permit would be disposed in it.

3.14 Transportation

This section discusses the existing traffic conditions and possible effects to traffic from the proposed project and the No Action Alternative.

3.14.1 Affected Environment

Vehicles would access the proposed biorefinery by Beulah Grove Road. Beulah Grove Road is an existing, two-lane, gravel road that traverses the Three Rivers Landfill property. Pontotoc County would pave approximately 3,000 feet (900 meters) of Beulah Grove Road in association with development of the proposed biorefinery. The planned paving of Beulah Grove Road is intended to mitigate dust and noise, and enhance safety for citizens and businesses in the area.

Beulah Grove Road connects to the south with State Highway 76 (also U.S. Highway 278 (US-278)), a four-lane, divided highway that passes north of the City of Pontotoc. US-278 continues east approximately 24 miles (39 kilometers) to Tupelo, Mississippi. To the west, US-278 passes through Oxford, Mississippi, approximately 27 miles (43 kilometers) from the proposed project site. Traffic to the site would be primarily from State Highway 76, then north to Beulah Grove Road.

According to the Mississippi Department of Transportation Traffic Volume Map (MDOT 2010, Figure 3.14-1), the annual average daily traffic (AADT) on State Highway 76 was estimated at 5,100 vehicles per day in 2008, based on a 48-hour monitoring event in 2005, adjusted for statewide traffic growth. Beulah Grove Road, south of State Highway 76 had an estimated traffic count of 160 in 2008 (based on adjusted 2005 data), but this volume may not be representative of the volume at the proposed project site, north of State Highway 76. To ensure that transportation impacts were fully understood, Enerkem commissioned a Traffic Impact Analysis for Beulah Grove Road (Cook Coggin 2010, Appendix C). North of State Highway 76, the estimated total daily volume for Beulah Grove Road is 40 vehicles per day.

The project site does not have direct rail or waterway access, and Enerkem would not receive materials via rail or water during construction or operations.

3.14.2 Environmental Consequences of the Proposed Action

Traffic on State Highway 76 and Beulah Grove Road in the vicinity of the project could experience a short-term increase in volume during construction and a lesser increase in volume during operation of the biorefinery.

Construction would require an estimated 145 personnel over the 16-month construction period. Deliveries of construction materials would be made by truck. Construction vehicles would enter and exit through a construction entrance while personal vehicles would enter through a separate gate. Both entrances would be off Beulah Grove Road. Beulah Grove Road receives a modest amount of traffic, and much of it is associated with the Three Rivers Landfill. The TRSWMA is a sponsor of the project, and Enerkem and TRSWMA would coordinate landfill and construction traffic to mitigate traffic concerns, if they arise. Assuming 300 vehicle trips per day at the peak of construction, the project would have less than a 5 percent impact on average daily traffic on State Highway 76.

During operations, the workforce would be 51 personnel over three shifts for continuous operation. Up to 10 additional personnel may be employed at the MRF at the Three Rivers Landfill. Because the feedstock would be delivered by conveyor belt, Enerkem would not require additional truck traffic for feedstock delivery, and the only increase in truck traffic would be up to 5 ethanol exports per day and an occasional delivery of reagents, catalysts, and other required chemicals. The Traffic Impact Analysis estimates a project-associated traffic volume of 220 vehicle trips per day (Cook Coggin 2010). This volume of traffic represents less than a 5 percent increase of the current average daily traffic on State Highway 76, and because it would occur over three shifts, it would not be concentrated during peak traffic times. The estimated peak-traffic volume of 65 vehicles per hour is below the capacity of two-lane road, and analysis of the intersection of Beulah Grove Road and State Highway 76 verified that this intersection has excess capacity to accommodate the peak-hour traffic associated with the project.

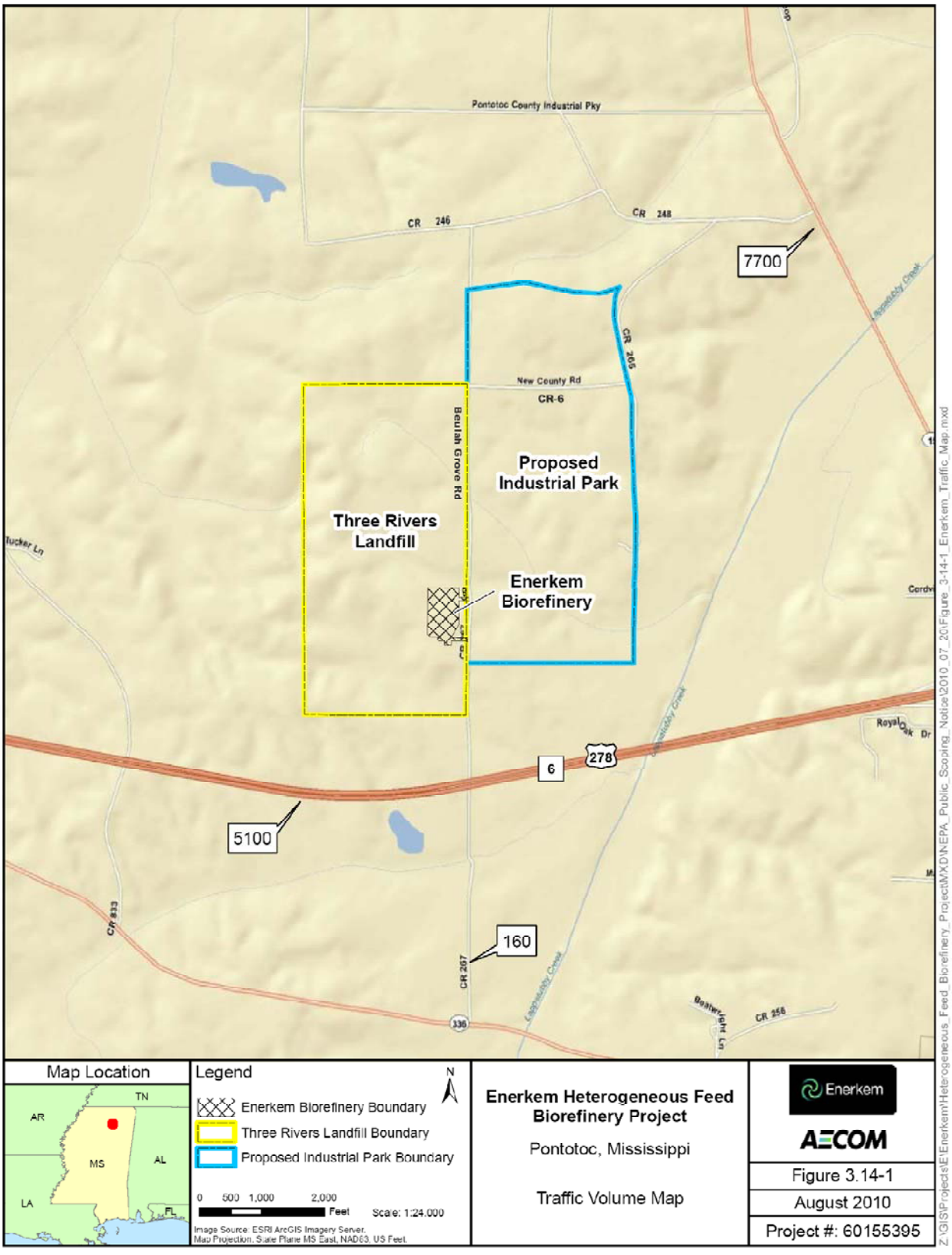

Figure 3.14-1. Traffic Volume Map.

The Traffic Impact Analysis analyzed the unsignalized intersection of Beulah Grove Road with State Highway 76 and determined that it had the current capacity to accommodate the peak hour traffic for the proposed biorefinery. From State Highway 76 to Beulah Grove Road, both right and left turning movements would operate at a Level of Service A with average control delays of less than 9 seconds per vehicle. From southbound Beulah Grove Road onto State Highway 76, a Level of Service B with average control delays of less than 14 seconds per vehicle could be expected. These very acceptable operating Levels of Service and control delays are indicative of the excess capacity in the existing intersection to accommodate the proposed traffic movements from the biorefinery (Cook Coggin 2010).

3.14.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the proposed biorefinery would not be constructed and operated. The segment of Beulah Grove Road used to access the Three Rivers Industrial Site would experience increased levels of traffic associated with the development and use of the industrial site but would not experience the increase in traffic associated with construction and operation of the biorefinery or MRF.

3.15 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.

3.15.1 Environmental Consequences of the Proposed Action Alternative

Development of the proposed Enerkem biorefinery would commit approximately 12.5 acres (5.0 hectares) of land previously permitted for landfill use to permanent use by the project. Enerkem would more than offset this commitment of area by the estimated 90 percent reduction in landfilled volume (and therefore increase in landfill operating lifespan) during the 30-year lifespan of the biorefinery. It would also commit roadside right-of-way and industrial space to pipeline right-of-way. This use is compatible with roadside maintenance and many industrial activities, so this committed land would not be preempted from other uses.

It would commit the various construction materials used for the proposed project, but during the projected lifespan of the project, equipment would require periodic replacement, and Enerkem would recycle replaced items for other uses where possible.

The biorefinery would "reclaim" approximately 330 tons (300 metric tons) per day of sorted MSW previously committed to disposal in the landfill. Enerkem would obtain cooling water for the project from the effluent stream of the City of Pontotoc WWTP. It would be committed to cooling purposes rather than being discharged to Lyon Creek, the receiving waterbody. The proposed project also commits the natural gas, electricity, fuel, oil, and maintenance costs necessary for the operation of the biorefinery. The resources Enerkem would commit to operations of the biorefinery would be irreversible commitments.

These commitments would result in the production of 10 million gallons (38 million liters) per year of ethanol. By providing a renewable, non-petroleum source of fuel, the Enerkem project would reduce the commitment of petroleum, a non-renewable resource. There would be a generally consistent relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

3.15.2 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, the Enerkem biorefinery would not be constructed and operated. No short-term or irretrievable commitments of resources would occur, but the benefits of the project to produce a renewable, non-petroleum fuel source, preserve landfill capacity, and reduce GHG emissions would not be realized.

4.0 CUMULATIVE IMPACTS

CEQ regulations stipulate that the cumulative effects analysis within an EA consider the potential environmental impacts resulting from the "incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions" (40 CFR 1508.7). Because the impacts of the proposed project generally would be minor and localized, DOE focused it's evaluation of cumulative impacts of the proposed project and reasonably foreseeable future actions in Pontotoc, Mississippi.

The City of Pontotoc is located in the northeastern corner of the state of Mississippi, 13 miles east of Tupelo, 30 miles west of Oxford, 15 miles south of New Albany, and north of Houston. The city of Pontotoc is home to about 5,400 people with the county covering around 29,000. The county is predominantly rural with some industry. The largest industry in the area is furniture and related product manufacturing.

4.1 Reasonably Foreseeable Actions

The proposed biorefinery site is within the Three Rivers Landfill site in undeveloped industrial space. The Three Rivers Landfill site comprises approximately 208 acres (84 hectares) that are permitted as a Subtitle D landfill and is owned by the TRSWMA. The current landfill occupies about 56 acres (23 hectares) of this site. The landfill was permitted to begin receiving waste in 1994 and has an ultimate design capacity of 13.8 million tons (12.5 million metric tons). Based on acceptance rate projections, this landfill is estimated to have a site life that would extend until 2079. The environmental impacts as a result of construction and operation of the proposed project, would be additive with those of the landfill's current and future operations as discussed in Section 3.

Two other industrial developments within the vicinity of the project have been identified through a discussion with the Pontotoc Chamber of Commerce and the Three Rivers Planning and Development District.

The first industrial development is on land that has no land-use zoning immediately adjacent to the site to the east. The approximately 300-acre (120-hectare) parcel is under development as the Three Rivers Industrial Site and is expected to be converted to a more industrial character over the next 2 to 10 years. The Three Rivers Industrial Site is being developed by and on land owned by TRSWMA. The site is marketed by Three Rivers Planning and Development District in conjunction with the County of Pontotoc and the board has agreed to sell sections of the land for industrial development purposes. At present, there is one industrial client with an active interest in the Three Rivers Industrial Site. Marketing efforts are ongoing, and additional clients are expected. Because of the development of the Toyota Plant just west of Blue Springs, development of the Three Rivers Industrial Site is reasonably foreseeable. However, no specific industries have been identified to date.

The second reasonably foreseeable action is the new Toyota Plant located just west of Blue Springs, Mississippi, approximately 10 miles (16 kilometers) northeast of the proposed biorefinery. The plant is planned to be in operation in December 2011. The buildings at the Toyota Plant are constructed and installation of equipment is expected to start soon. The new plant is located on a 1,700-acre (690-hectare) site adjacent to I-22 (US 78), a limited access four-lane highway from Memphis, Tennessee to Birmingham, Alabama. Approximately 60 people are currently employed at the site, and the number of workers could reach 2,000 during operations.

4.2 Cumulative Impacts Summary

Because the impacts from the biorefinery are minimal, only a few resource areas have been identified as likely to be cumulatively affected. There would be cumulative impacts associated with new development at the Three Rivers Industrial Site due to its proximity. Although the distance between the Toyota Plant and the proposed biorefinery is approximately 10 miles, based upon the scale of the workforce employed by the Toyota Plant and the resources required for its manufacturing operations, there would also likely be cumulative impacts to the landfill from the plant and the proposed biorefinery. The following cumulative impacts have been identified:

- The Three Rivers Industrial Site and the Toyota Plant would generate an increased volume of waste material, which would be managed at the Three Rivers Landfill. Through recycling of non-organic materials and conversion of organic materials into a salable product, the Enerkem biorefinery would reduce the volume of waste landfilled at Three Rivers Landfill by as much as 90 percent during its 30-year projected lifespan. This reduction in waste would be a beneficial impact of the project that would help offset the projected increase in landfill waste from the other projects and extend the life of the landfill.

- Facilities at the Three Rivers Industrial Site would generate air emissions. The amount of emissions is impossible to quantify with the information available at present, but it is reasonable to assume that these future developments would be regulated by federal and state agencies to ensure that the area remains in attainment for air quality. Although the proposed biorefinery would cause air emissions that would add to the overall level of air pollutants, it would also result in a decrease of landfill emissions and would support DOE's mission to reduce dependency on fossil fuels and curb GHG emissions.

- Development of the Three Rivers Industrial Site could, depending on the future tenants, increase the demand for water supply, utilities, and the production of wastewater. Without knowing the identity of those tenants, the current analysis must assume that all applicable environmental permits would be obtained prior to construction and operation of new facilities. Because the proposed biorefinery's water requirements are very low, and the contribution to cumulative impacts would be similarly low. The utility requirements for the proposed biorefinery are also low and further development would be unlikely to exceed the capacity of utility providers.

- The Three Rivers Industrial Site could increase traffic on Beulah Grove Road and the surrounding highways. As shown by the traffic study (Cook-Coggin 2010), Beulah Grove Road has sufficient capacity for the Enerkem biorefinery. Depending on the future tenants of the Industrial Site, additional traffic volume on Beulah Grove Road could result in the need for additional road improvements. Future traffic studies would be needed to determine if future improvements are necessary to accommodate further development of the Three Rivers Industrial Site when project details become available.

The proposed project would have a positive impact upon the local economy through the creation of jobs and spending in the area as well as by extending the life of the Three Rivers Landfill. This positive impact would further enhance the net benefits related to operation of the Toyota Plant and foreseeable expansion at the Three Rivers Industrial Site. Local resources such as schools, hospitals, parks, and public safety agencies could also expect an increase in activity due to the population increase. However, these resources would be supported by accompanying increases in the local tax digest due to the same growth factors.

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Appendix A
Public Involvement Correspondence

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

June 9, 2010

SUBJECT: Notice of Public Scoping – Enerkem Corporation Proposed Heterogeneous Feed Biorefinery, Pontotoc, Mississippi (DOE/EA 1790)

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Enerkem Corporation to construct and operate a 300 ton-per-day gasification-to-ethanol biorefinery that would use the biomass fraction of sorted municipal solid waste as feedstock. The proposed biorefinery would be located within the boundary of a working landfill in Pontotoc, Mississippi. Details of the proposed project and its location are contained in the attachment to this letter. Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provision of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR 1021), DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects that cannot be avoided should this proposed project be implemented.
- Evaluate viable alternatives to the proposed project.
- 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 project be implemented.

Probable Environmental Effects/Issues Scoped for the Environmental Assessment

The EA will describe and analyze any potential impacts on the environment that would be caused by the project and will identify possible mitigation measures to reduce or eliminate those impacts that may result to:

- Land Use
- Air Quality
- Biological Resources
- Cultural Resources
- Noise and Odor
- Safety and Occupational Health
- Socioeconomics and Environmental Justice
- Utilities
- Traffic and Transportation
- Aesthetics
- Waste Management and Hazardous Materials
- Water Resources

Development of a Reasonable Range of Alternatives

DOE is required to consider a reasonable range of alternatives to the proposed action during an environmental review. The definition of alternatives is governed by the "rule of reason." An EA must consider a reasonable range of options that could accomplish the agency's purpose and need and reduce environmental effects. Reasonable alternatives are those that may be feasibly carried out based on environmental, technical, and economic factors.

The No Action Alternative will be addressed. The need for project redesign, or a project alternative, will be determined during the course of environmental review.

Public Scoping

The DOE will make this letter available to all interested federal, state, and local agencies to provide input on issues to be addressed in the EA. Agencies are invited to identify the issues, within their statutory responsibilities that should be considered in the EA. The general public is also invited to submit comments on the scope of the EA.

No formal public scoping meeting is currently planned for this project. This letter as well as the draft EA, when it is available, will be posted in the DOE Golden Field Office online reading room: http://www.eere.energy.gov/golden/Reading_Room.aspx.

The DOE Golden Field Office welcomes your input throughout our NEPA process. Please provide any comments on this scoping letter on or before July 2, 2010 to:

Lisa Jorgensen
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401
lisa.jorgensen@go.doe.gov

We look forward to hearing from you.

Sincerely,

Kristin Kerwin
NEPA Compliance Officer

Enclosure

Attachment

Enerkem Inc.'s Heterogeneous Feed Biorefinery
Proposed Project Description and Location

The U.S. Department of Energy (DOE) is proposing to provide federal funding of up to $50 million to support Enerkem Inc.'s (Enerkem's) Heterogeneous Feed Biorefinery Project (Project). The proposed Project would include final design, construction, and operation of a 330 ton-per-day biorefinery in Pontotoc, Mississippi, that uses as feedstock the dried and sorted biomass fraction of municipal solid waste (MSW). Enerkem's biorefinery would produce approximately10 million gallons of ethanol per year for commercial sale. Based on preliminary construction cost estimate, the total project cost is $101 Million.

The proposed biorefinery would be sited within the existing boundaries of a Subtitle D landfill, the Three Rivers Landfill in Pontotoc County, Mississippi. The Three Rivers Landfill is located approximately 4½ miles north of the City of Pontotoc, which is approximately 17 miles west of Tupelo, Mississippi, on State Highway 76.

The proposed site is nine acres of undeveloped upland industrial space within the existing Three Rivers Landfill. Currently the site contains planted pines that are 12 to 13 years old. The proposed landfill site is used for commercial/industrial purposes but there are no zoning restrictions. The surrounding area is mostly forested land, pasture, and industrial property with a few residences occurring within 500 feet of the Three Rivers Landfill property. The adjacent property east of Beulah Grove Road, is in an early developmental stage as the Three Rivers Industrial Site. It occupies land owned by the Three Rivers Solid Waste Management Authority (TRSWMA), and will be governed by their board of directors. The site is marketed by Three Rivers Planning and Development District in conjunction with the County of Pontotoc. Approximately 3,000 feet of Beulah Grove Road will be improved (paved) as part of the development of the Three Rivers Industrial Site. This road will also serve as vehicular access to the biorefinery. The Three Rivers Landfill does not have direct rail access on-site, and Enerkem is not anticipating to ship materials via rail during operations. However, Enerkem may be using a limited amount of rail transport during construction.

Water for plant operations would be supplied from three different sources. Potable water would be supplied by the Algoma Water Association. Process/make-up water would be supplied from a proposed water well constructed on the southern portion of the site. Lastly, cooling water would be provided from a pipeline loop with the Pontotoc Wastewater Treatment Plant (WWTP) as detailed below. Process treated purged water and sanitary water would be discharged from a proposed onsite wastewater treatment plant through a proposed 1-mile wastewater pipeline to an existing industrial WWTP that is attached to an industrial park north of the proposed site for further treatment. Non-process water from cooling and boiler systems would also be sent to the industrial WWTP. Cooling water would be supplied by the Pontotoc WWTP and returned to the WWTP for discharge through a pipeline loop collocated in the same right-of-way as the wastewater pipeline. Natural gas would be supplied through a high-pressure natural gas pipeline alongside Highway 76 from a tie-in near the intersection with State Highway 15, approximately

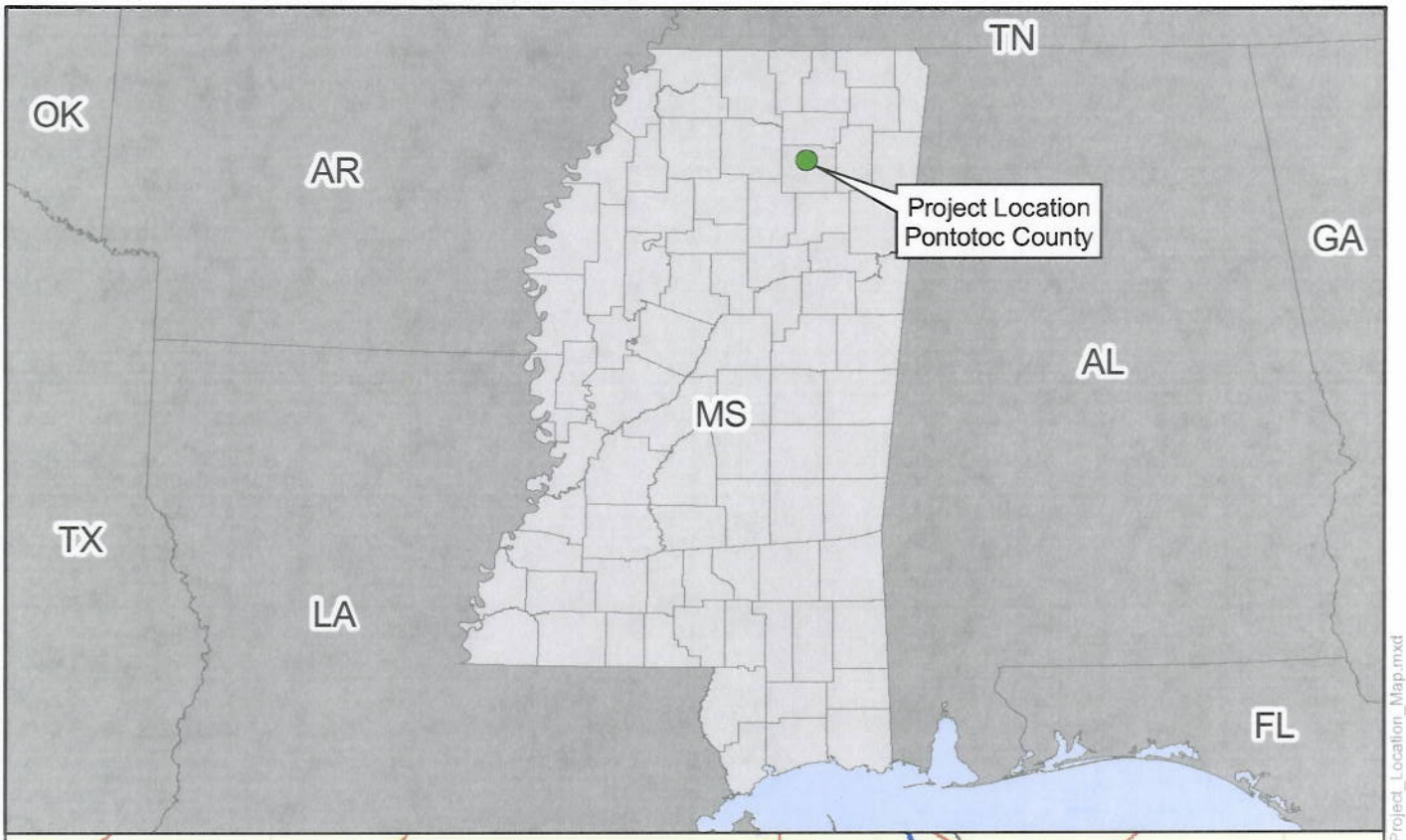
1.75 miles to the east. Liquid oxygen for the refining process would be provided by a new liquid oxygen plant that would occupy less than 5 acres of the Three Rivers Industrial Site, adjacent to the Enerkem site. The oxygen would be delivered through cryogenic piping. The additional power needed for the biorefinery and the oxygen plant would require a new electrical substation to be constructed on 4 acres in the southwest corner of the Three Rivers Industrial Site. A new approximately 2-mile powerline would cross primarily road right-of-way and/or agriculture/silviculture lands to connect to an existing transmission line. Potential wetland impacts from utility installation would be temporary and authorized under Nationwide Permit No. 12; no mitigation would be required.

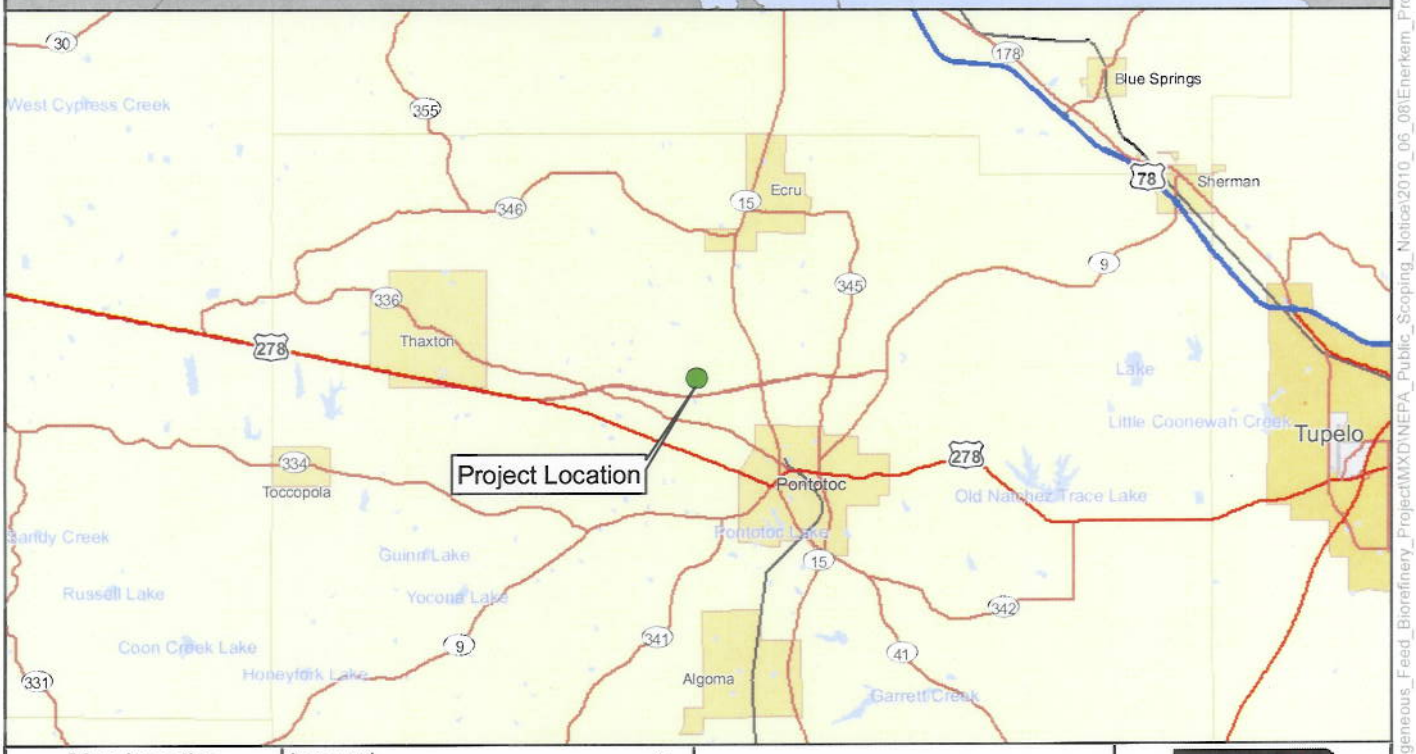
The feedstock for the biorefinery would be post-sorted MSW. By siting the biorefinery within the Three Rivers Landfill, it would have immediate access to this feedstock. The MSW feedstock would be presorted in a material recycling facility (MRF), and then transferred by covered conveyor to the biorefinery to be processed as described below. Enerkem anticipates the use of 330 tons per day of post-sorted, dried MSW. The MRF is not part of the DOE-funded proposed activity, but it is a necessary support facility, and its potential impacts will be assessed along with those of the biorefinery.

Enerkem would use an advanced gasification process that has the flexibility to convert low-value heterogeneous forms of biomass, such as post-sorted MSW, into fuels like ethanol, as well as various green chemicals. The Enerkem technology platform is based on a state-of-the-art gasification system coupled with a proprietary gas cleaning and conditioning process. The product of Enerkem's thermo-chemical process is a chemically clean synthetic gas, which is converted through catalytic reactions to produce ethanol and other green chemicals.

Project location maps and an aerial photo of the proposed site location are attached.

Figure 1 – Project Location Map
Figure 2 – Aerial Photograph





Map Location

Legend

Project Location

N

Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

June 8, 2010

Project #: 60155395

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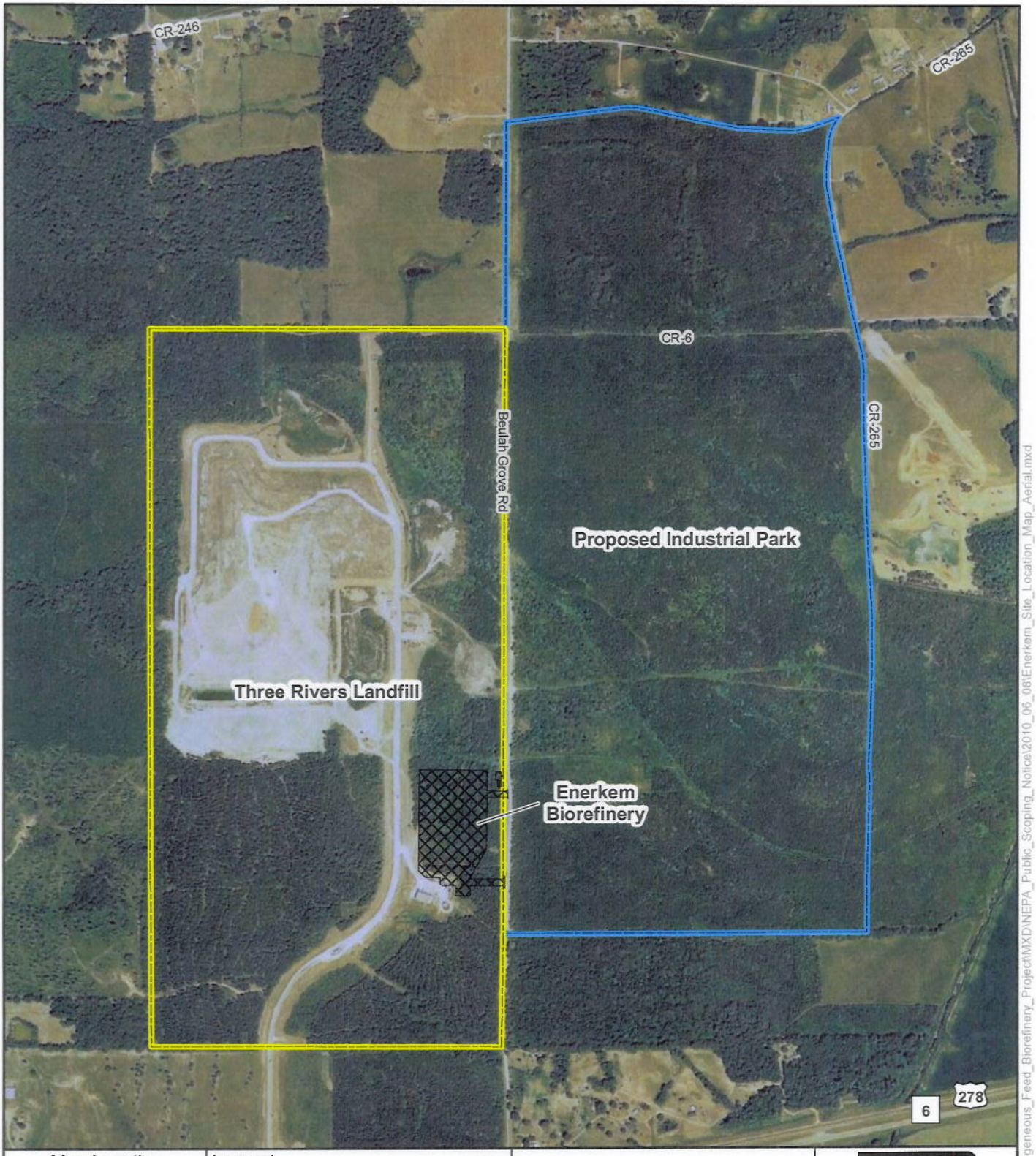

Map Location

Legend

N

Enerkem Biorefinery Boundary

Three Rivers Landfill Boundary

Proposed Industrial Park Boundary

0 250 500 1,000 Feet

Scale: 1:12,000

Image Source: ESRI ArcGIS Imagery Server.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Aerial Map

Enerkem

AECOM

Figure 2

June 8, 2010

Project #: 60155395

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FW MDEQ response to Notice of Scoping

From: Jorgensen, Lisa [lisa.jorgensen@go.doe.gov]
Sent: Wednesday, June 30, 2010 10:14 AM
To: Suderman, Keith; SChristiansen@enerkem.com
Cc: Kerwin, Kristin; Walker, Susan; Doyle, Glenn
Subject: FW: MDEQ response to Notice of Scoping

Below are comments on the public scoping letter for the Enerkem project. Another set of comments are expected from the TVA before Friday.

Thanks,
Lisa

-----Original Message-----
From: Chad_Winter@deq.state.ms.us [mailto:Chad_Winter@deq.state.ms.us]
Sent: Monday, June 28, 2010 1:59 PM
To: Jorgensen, Lisa
Cc: Harry_Wilson@deq.state.ms.us; Tracy_Tomkins@deq.state.ms.us
Subject: MDEQ response to Notice of Scoping

Ms. Jorgensen,

In response to Ms. Kristin Kerwin's (NEPA Compliance Officer) letter dated June 9, 2010, regarding the Notice of Public Scoping - Enerkem Corporation Proposed Heterogeneous Feed Biorefinery, Pontotoc, Mississippi (DOE/EA 1790), theletter specified, “Agencies are invited to identify the issues, within their statutory responsibilities that should be considered in the EA.”

Therefore, this Office has identified the following issues that are within this Office's statutory responsibilities.

1. It appears that the proposed facility would require a total acreage disturbance of more than 5-acres, therefore a Large Construction Stormwater Notice of Intent (NOI) will be required.

2. Also, a Baseline Stormwater General Permit for Industrial Activities may be considered necessary depending upon a finalized site layout.

3. Due to the potential air criteria pollutant emissions of equipment associated with the project, the facility would be required to apply for an Air Construction Permit and an Air Operating Permit. * The facility submitted an Air Construction Permit application on January 26, 2010.

4. Since the proposed project would use treated effluent discharged from the Pontotoc POTW for plant cooling tower operations, and then discharge the effluent back to the POTW (pre-treatment) or to the POTW’s discharge pipe (post-treatment), coordination with this Office regarding the Pontotoc POTW will be required.

* Review and approval/concurrence by this Office for the City’s “water reuse system (pipework)” of the POTW treated effluent to the proposed facility will be required.

5. The proposed facility will be required to apply for and obtain a solid waste processing permit due to their processing of municipal waste received, and sorted, by the Three Rivers Landfill.

* Three Rivers will also be required to apply for a solid waste processing permit since they will be incorporating new activities within their existing solid waste permitted activities (i.e. sorting the waste). Also, Three Rivers will be required to amend their Regional Solid Waste Management Plan.

6. Process wastewater discharged from the proposed facility will require the facility to obtain a State Operating permit to discharge wastewater to the Pontotoc Industrial Park or Pontotoc POTW for treatment.

7. Since the proposed facility is to be located within the footprint of an existing, permitted solid waste landfill, there is reason to believe that wetland impacts will not occur. This is supported by the proposed, preliminary site layout submitted with the Air Construction Permit application on January 26, 2010. However, due to the facility's water needs for the cooling tower, there may be required stream crossing(s) of the piping that will be required to transport the water from the Pontotoc POTW to the facility. However, it is possible that a Nationwide or possibly even a General Permit may be adequate.

In conclusion, the aforementioned permitting activities would address, or take into consideration to some degree, the following items (as noted in the project description correspondence):

- Land Use
- Noise and Odor
- Air Quality and Meteorology
- Geology/Soils
- Biological Resources
- Water Resources
- Waste Management and Hazardous Materials
- Environmental Justice
- Utilities

Chad Winter
Environmental Permits Division
Agricultural Branch
(601) 961-5601

MISSISSIPPI
DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

Sam Polles, Ph.D.
Executive Director

June 28, 2010

Lisa Jorgensen
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, CO 80401

Re: Enerkem Corporation Proposed Heterogeneous Feed Biorefinery
DOE\EA 1790 **R# 7861**
Pontotoc, Pontotoc County, Mississippi

To Whom It May Concern,

In response to your request for information dated June 9, 2010, we have searched our database for occurrences of state or federally listed species and species of special concern that occur within 2 miles of the site of the proposed project. Please find our concerns and recommendations below.

Scientific name	Common name	Federal Status	State Status	State Rank
Ursus americanus	Black Bear	PS	LE	S1

State Rank
S1 — Critically imperiled in Mississippi because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.
S2 — Imperiled in Mississippi because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.
S3 — Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences).

State and Federal Status
LE Endangered — A species which is in danger of extinction throughout all or a significant portion of its range.
LT Threatened — A species likely to become endangered in foreseeable future throughout all or a significant portion of its range.

Based on the information provided, portions of this site are underlain by hydric soils and may be designated wetlands. If this project is approved, we ask consideration be given to any cumulative impacts of wetland disturbance and elimination.

Based on information provided, we conclude that if best management practices are properly implemented, monitored, and maintained (particularly measures to prevent, or at least, minimize negative impacts to water quality), the proposed project likely poses no threat to listed species or their habitats.

Please feel free to contact us if we can provide any additional information, resources, or assistance that will help minimize negative impacts to this area. We are happy to work with you to ensure that our state's precious natural heritage is conserved and preserved for future Mississippians.

Sincerely,

Joelle Carney, Database Manager/Biologist
Mississippi Natural Heritage Program
(601) 354-7303

Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

June 30, 2010

Ms. Lisa Jorgensen
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401

Dear Ms. Jorgensen:

SUBJECT: NOTICE OF PUBLIC SCOPING – ENERKEM CORPORATION PROPOSED HETEROGENEOUS FEED BIOREFINERY, PONTOTOC, MISSISSIPPI (DOE/EA 1790)

In response to Kristin Kerwin's letter dated June 9, 2010, requesting scoping comments on the above subject proposed for the Three Rivers Landfill in Pontotoc County, Mississippi. We note that the project is within the Tennessee Valley Authority's (TVA) Power Service Area, but outside the Tennessee River Valley. As such, TVA would not have a permitting action, but would supply power for this project to the local distributor, the Pontotoc Electric Power Association. Planning with the power distributor is in the early phases of discussion. As we proceed in eventually determining whether or not there are TVA actions we will re-engage contact.

In the interim, please maintain TVA on your mailing list for information or review of draft documents related to the proposed project. If you have any questions, please contact Anita Master of my staff at 423-751-8697 (aemasters@tva.gov) for further discussion.

Thank you for the opportunity to provide scoping comments on this project.

Sincerely,

Susan J. Kelly, Senior Manager
Federal Determinations
Environmental Permits & Compliance

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

June 22, 2010

Ms Lisa Jorgensen
NEPA Document Manager
Department of Energy
1607 Golden, Colorado 80401

Dear Ms Jorgensen:

The U.S. Fish and Wildlife Service (Service) has received your letter requesting comments on the Department of Energy's proposal to provide federal funding to Enerkem Corporation to construct a gasification-to-ethanol bio-refinery within the boundaries of the Three Rivers Landfill in Pontotoc County, Mississippi. The following comments are provided in accordance with the Endangered Species Act (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.).

Based on the information provided, the Service has determined that the proposed work is not likely to adversely affect any federally listed species or their habitats. No further consultation under section 7 of the ESA will be necessary unless the location of the project were to change, or new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered.

If you have any additional questions, please feel free to contact this office, at (601) 321-1136.

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Sincerely,

For Stephen Ricks
Field Supervisor

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

July 22, 2010

Mr. Jim Woodrick
Mississippi Department of Archives and History
Historic Preservation Division
P.O. Box 571
Jackson, MS 39205-0571

Dear Mr. Woodrick,

The U. S. Department of Energy is proposing to provide Federal funding to the Enerkem Corporation Heterogenous Feed Biorefinery in Pontotoc, Mississippi (Figure 1). The funds would provide for final design, construction, and operation of a biorefinery that would use biomass from municipal solid waste (MSW) as feedstock to produce ethanol.

The proposed biorefinery would be constructed within the existing boundaries of the Three Rivers, Subtitle D, landfill located approximately 4½ miles north of the City of Pontotoc, which is approximately 17 miles west of Tupelo, Mississippi, on State Highway 76. The prospective. site location is in sections 14 and 23, Township 9 South, Range 2 East (Figure 2) and consists of nine acres of undeveloped upland industrial space within the landfill boundary that currently contains planted pines that are 12 to 13 years old. The proposed landfill has no zoning restrictions and is currently used for commercial/industrial purposes. The surrounding area is mostly forested land, pasture, and industrial property, with a few residences located within 500 feet of the Three Rivers Landfill property. The adjacent property east of Beulah Grove Road, is owned by Three Rivers Solid Waste Management Authority (TRSWMA) and is in the early stages of development as the Three Rivers Industrial Site (Figures 3). The site is marketed by Three Rivers Planning and Development District in conjunction with the County of Pontotoc. Approximately 3,000 feet of Beulah Grove Road will be paved as port of the development. This road will also serve as vehicular access to the biorefinery.

Enerkem's advanced gasification process would produce approximately 10 million gallons of ethanol per year for commercial sale by using dried and post-sorted MSW as feedstock. By siting the biorefinery within the Three Rivers Landfill, it would have immediate access to the estimated 330 tons per day MSW necessary to operate the biorefinery. Potable water would be supplied by Algoma Water Association; process water would be supplied by a proposed well to be constructed on the southern portion of the site; and cooling water would be provided by a pipeline loop with the Pontotoc Wastewater Treatment Plant though a 1-mile pipeline that is attached to an industrial park north of the proposed site. Natural gas would be supplied through a pipeline along Highway 76 from a tie-in near the intersection of State Highway 15, approximately 75 miles to the east. Oxygen required for refining would be provided by a new plant that would occupy less than 5 acres of the Three Rivers Industrial Site, adjacent to the Enerkem site. An electrical substation to power the biorefinery would be constructed on four acres in the southwest corner of the Tree Rivers Industrial Site. A new 2-mile powerline would

cross primarily road right-of-way and/or agriculture/silviculture lands to connect to an existing transmission line (Figure 3).

The National Register of Historic Places (NRHP) identifies three resources within Pontotoc County: Lochinvar Plantation, Pontotoc Historic District, and Treaty of Pontotoc Site. The distance to the nearest property on the NRHP to the proposed site is approximately 5.4 miles. These properties are not expected to be affected by the Enerkem Corporation Heterogenous Feed Biorefinery project. Please note that your office previously reviewed the plans and associated survey documents for the original Landfill (1992, 1993) and a *Siting Criteria Compliance Demonstration* (SCCD) for expansion of the Landfill (1997). Approximately 780 acres were surveyed archaeologically by Dr. Jay K. Johnson for the original Landfill. Two prehistoric sites and three historic artifact scatters were recorded during Dr. Johnson's survey, but all were ineligible for listing on the National Register of Historic Places (NRHP). In addition, Section 5.14 of the SCCD states, "...Mr. Roger Walker, Review and Compliance Officer of the MDAH, replied in a letter dated November 24, 1997, that no properties listed in the National Register of Historic Places will be affected by the landfill expansion and properties eligible for listing in the Register are not likely to be present at the landfill site.

Proposed infrastructure would cross beyond the boundary of the Three Rivers Landfill, adjacent to existing roads and within the roadside right-of-way or silviculture areas. An "Unexpected Discoveries and Emergency Procedures Plan" was developed to address accidental discoveries during construction. Since the proposed site is located in an area that is an active landfill and associated infrastructure would be constructed in an industrial development, there is minimal potential for impact to historic or cultural resources. Based on the existing industrial development of the proposed site and the NRHP database review, DOE has determined that no historic properties within the proposed site, the area of potential effects, would be affected by construction or operation of this proposed project. In compliance with 36 CFR Part 800.4(d) (1), the Department of Energy asks the Mississippi Department of Archives and History Historic Preservation Division for its concurrence of this finding.

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*.

If you require additional information, or have any questions or comments about that project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgenson@go.doe.gov

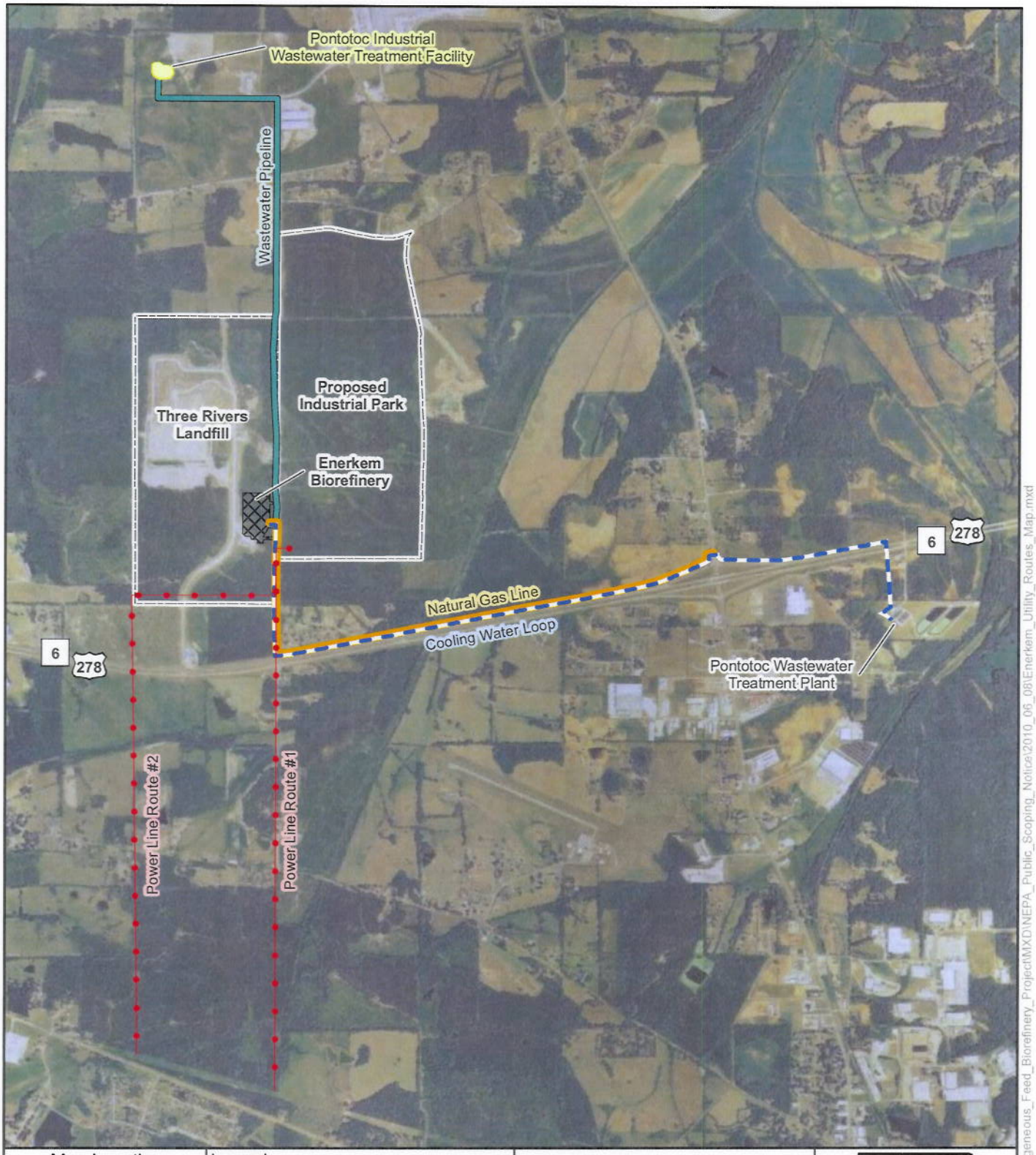
DOE will include correspondence with your agency in an appendix to the EA. DOE will send a Notice of Availability for the draft EA, when available, and respond to any specific comments you may have. At this time we anticipate a 15-day public comment period for this proposed project.

Please provide your comments within 30-days of receipt of this letter. Thank you in advance for your consideration.

Sincerely,

Kristin Kerwin
NEPA Compliance Officer

Attachments
Figure 1 – Project Location Map
Figure 2 – Details of Facility
Figure 3 – Utility Routes



Map Location

Legend

- Property Boundary
- Enerkem Biorefinery Boundary
- Pontotoc Industrial WWTF
- Natural Gas Line
- Cooling Water Loop
- Power Line Alternatives
- Wastewater Pipeline

0 1,250 2,500 Feet

Scale: 1:30,000 (1 inch = 2,500 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Utility Routes

Enerkem

AECOM

Figure 3

June 23, 2010

Project #: 60155395

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Map Location

Legend

Project Location

N

Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

May 20, 2010

Project #: 60155395

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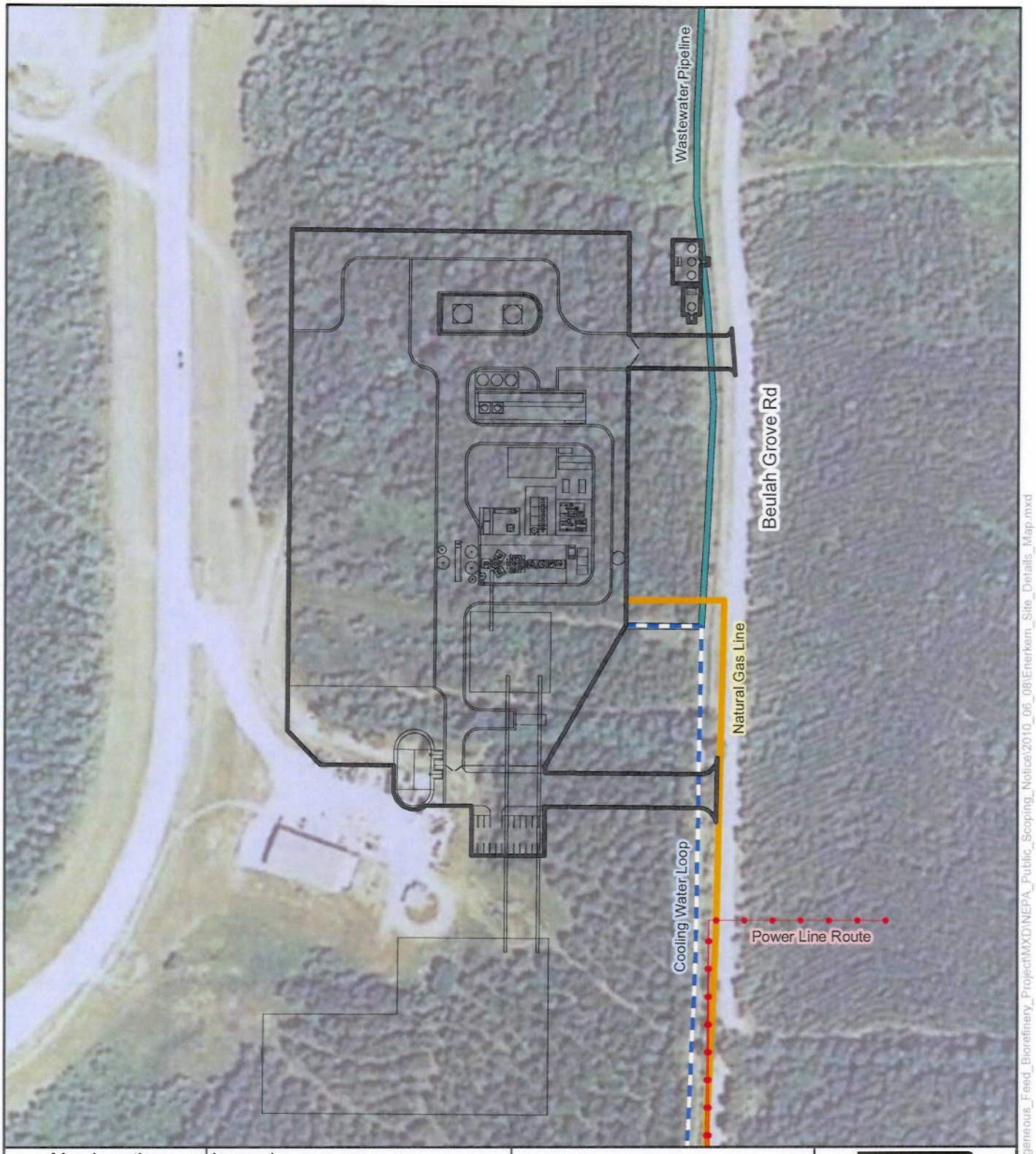

Map Location

Legend

- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Route
- Wastewater Pipeline

0 50 100 200 Feet

Scale: 1:2,400 (1 inch = 200 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Detail of Facility

Enerkem

AECOM

Figure 2

June 23, 2010

Project #: 60155395

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Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

July 22, 2010

Mịko Beasley Denson
Mississippi Band of Choctaw Indians
101 Industrial Road
Choctaw, MS USA 39350

Dear Mr. Denson:

The U. S. Department of Energy is proposing to provide Federal funding to the Enerkem Corporation Heterogenous Feed Biorefinery in Pontotoc, Mississippi (Figure 1). The funds would provide for final design, construction, and operation of a biorefinery that would use biomass from municipal solid waste (MSW) as feedstock to produce ethanol.

The proposed biorefinery would be constructed within the existing boundaries of the Three Rivers, Subtitle D, landfill located approximately 4½ miles north of the City of Pontotoc, which is approximately 17 miles west of Tupelo, Mississippi, on State Highway 76. The prospective. site location is in sections 14 and 23, Township 9 South, Range 2 East (Figure 2) and consists of nine acres of undeveloped upland industrial space within the landfill boundary that currently contains planted pines that are 12 to 13 years old. The proposed landfill has no zoning restrictions and is currently used for commercial/industrial purposes. The surrounding area is mostly forested land, pasture, and industrial property, with a few residences located within 500 feet of the Three Rivers Landfill property. The adjacent property east of Beulah Grove Road, is owned by Three Rivers Solid Waste Management Authority (TRSWMA) and is in the early stages of development as the Three Rivers Industrial Site (Figures 3 and 4). The site is marketed by Three Rivers Planning and Development District in conjunction with the County of Pontotoc. Approximately 3,000 feet of Beulah Grove Road will be paved as port of the development. This road will also serve as vehicular access to the biorefinery.

Enerkem's advanced gasification process would produce approximately 10 million gallons of ethanol per year for commercial sale by using dried and post-sorted MSW as feedstock. By siting the biorefinery within the Three Rivers Landfill, it would have immediate access to the estimated 330 tons per day MSW necessary to operate the biorefinery. Potable water would be supplied by Algoma Water Association; process water would be supplied by a proposed well to be constructed on the southern portion of the site; and cooling water would be provided by a pipeline loop with the Pontotoc Wastewater Treatment Plant though a 1-mile pipeline that is attached to an industrial park north of the proposed site. Natural gas would be supplied through a pipeline along Highway 76 from a tie-in near the intersection of State Highway 15, approximately 75 miles to the east. Oxygen required for refining would be provided by a new plant that would occupy less than 5 acres of the Three Rivers Industrial Site, adjacent to the Enerkem site. An electrical substation to power the biorefinery would be constructed on four acres in the southwest corner of the Tree Rivers Industrial Site. A new 2-mile powerline would cross primarily road right-of-way and/or agriculture/silviculture lands to connect to an existing transmission line.

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the National Environmental Policy Act.

DOE is initiating consultation and requesting information your tribe may have on properties of traditional religious and cultural significance within the vicinity of the proposed facility and any comments or concerns you have on the potential for this proposed project to affect those properties. This information is being requested to aid in the preparation of that EA and to meet our obligations under Section 106 of the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act of 1990. If you have any such information, require additional information, or have any questions or comments about that project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following address:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgenson@go.doe.gov

DOE will include correspondence with your tribe in an appendix to the EA. DOE will send a Notice of Availability for the draft EA, when available, to your office and respond to any specific comments you may have. At this time we anticipate a 15-day public comment period for this proposed project.

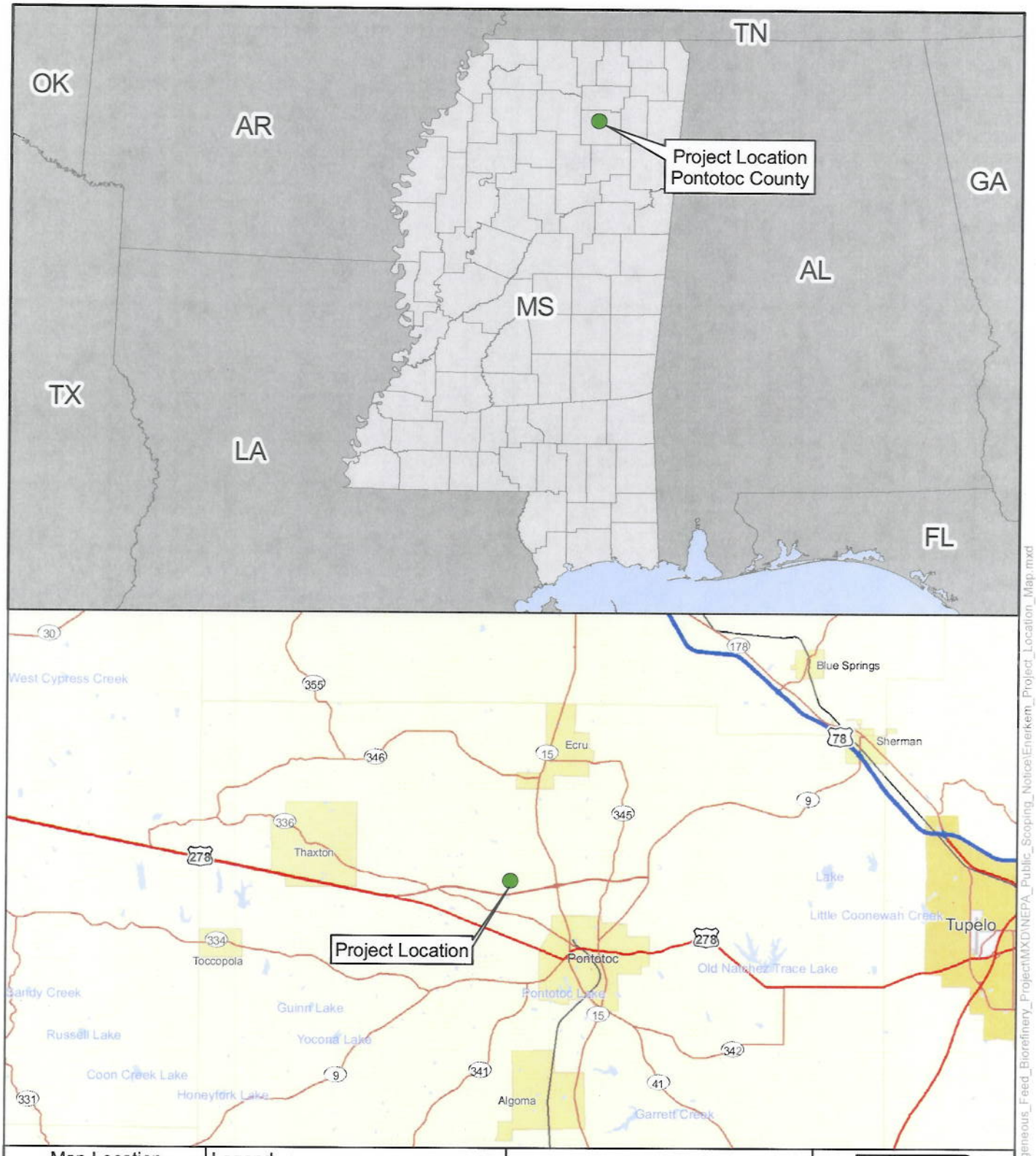
Please provide your comments within 30-days of receipt of this letter. Thank you in advance for your consideration.

Sincerely,

Kristin Kerwin

Kristin Kerwin
NEPA Compliance Officer

Attachments
Figure 1 – Project Location Map
Figure 2 – Topographic Map
Figure 3 – Details of Facility
Figure 4 – Utility Routes



Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

May 20, 2010

Project #: 60155395

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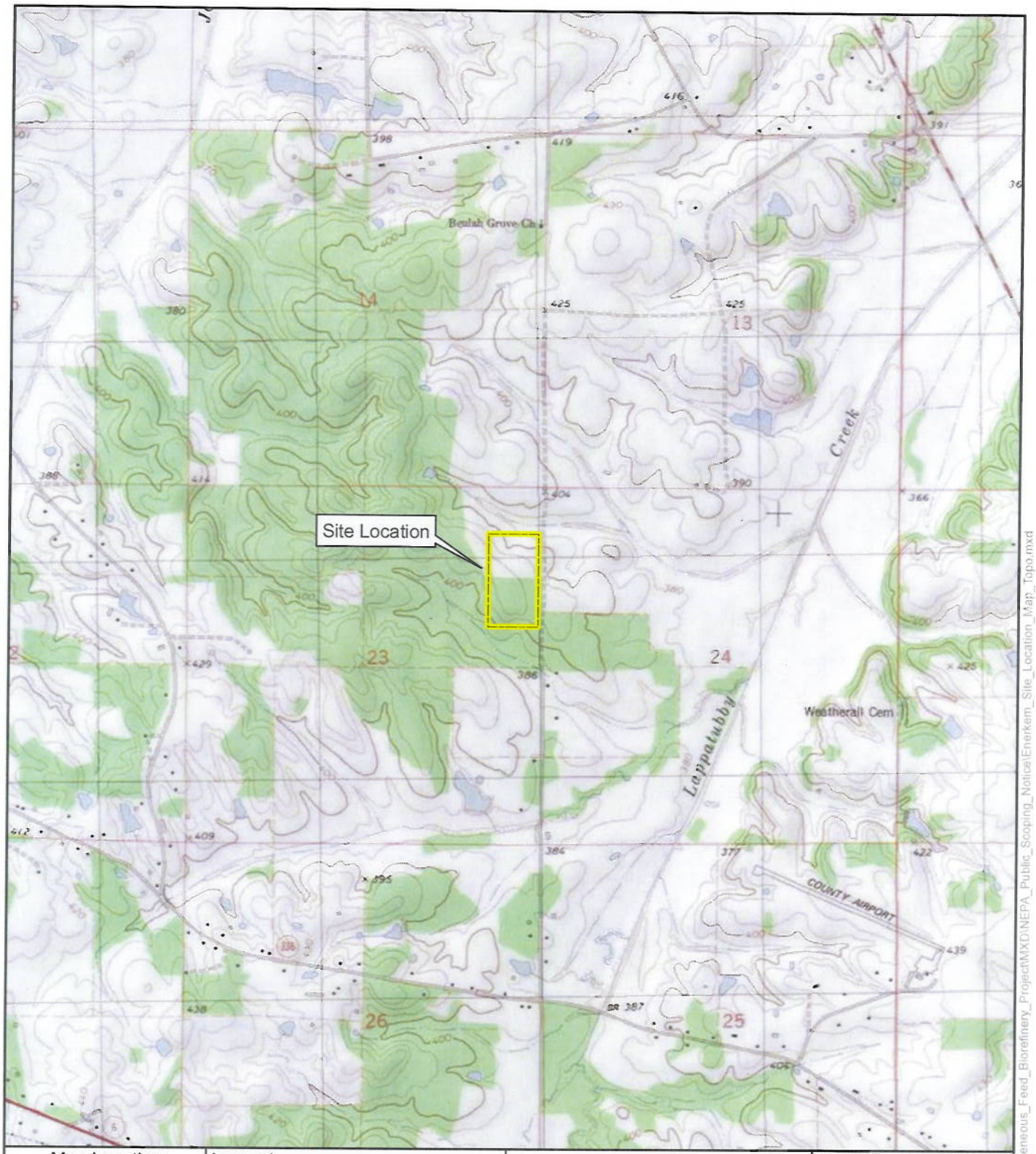

Map Location

Legend

Site Location

N

0 500 1,000 2,000 Feet Scale: 1:24,000

Image Source: USGS 24k Topographic Quadrangles.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Topographic Map

Enerkem

AECOM

Figure 2

May 13, 2010

Project #: 60155395

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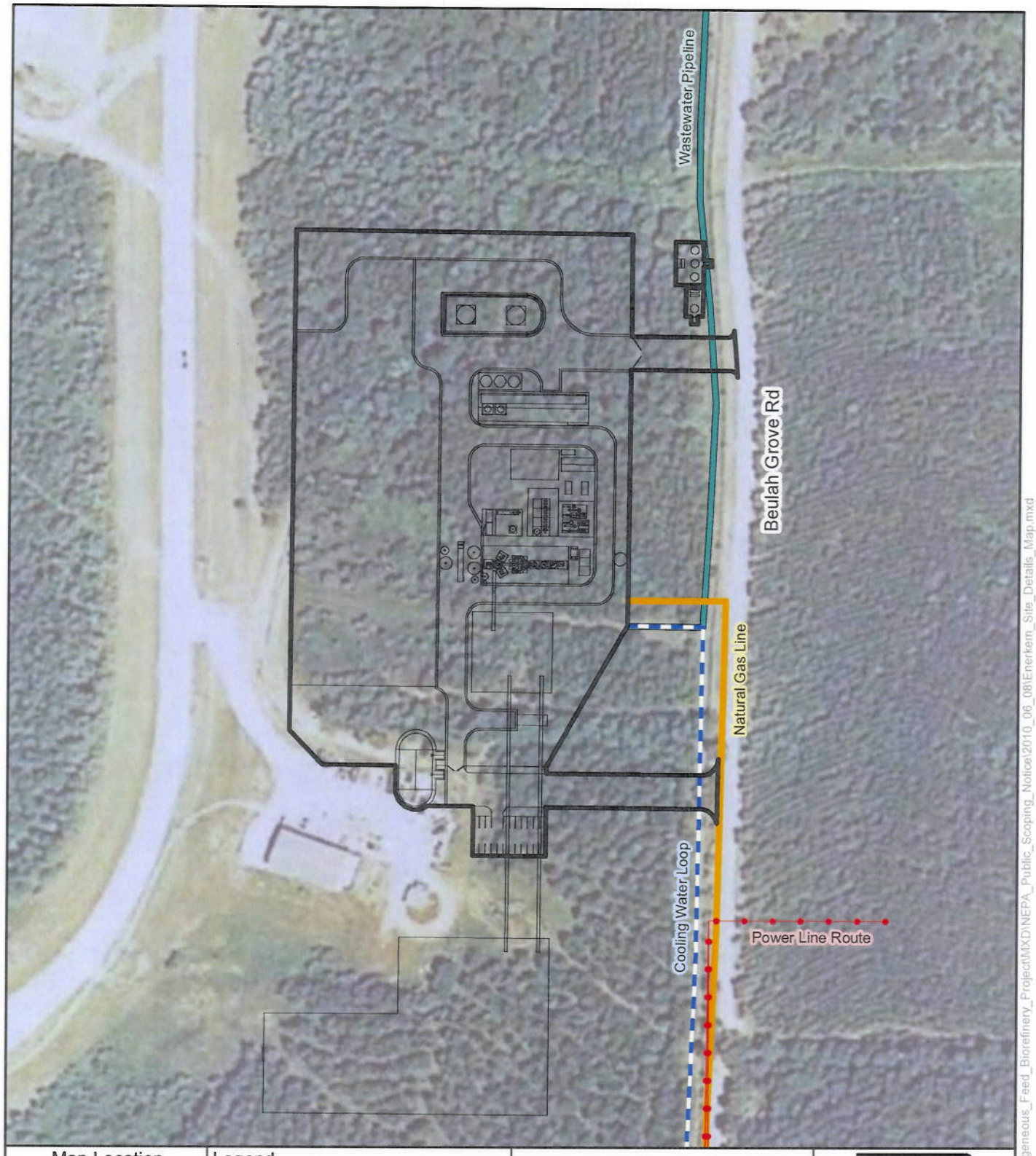

Map Location

Legend

- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Route
- Wastewater Pipeline

0 50 100 200 Feet

Scale: 1:2,400 (1 inch = 200 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Detail of Facility

Enerkem

AECOM

Figure 3

June 23, 2010

Project #: 60155395

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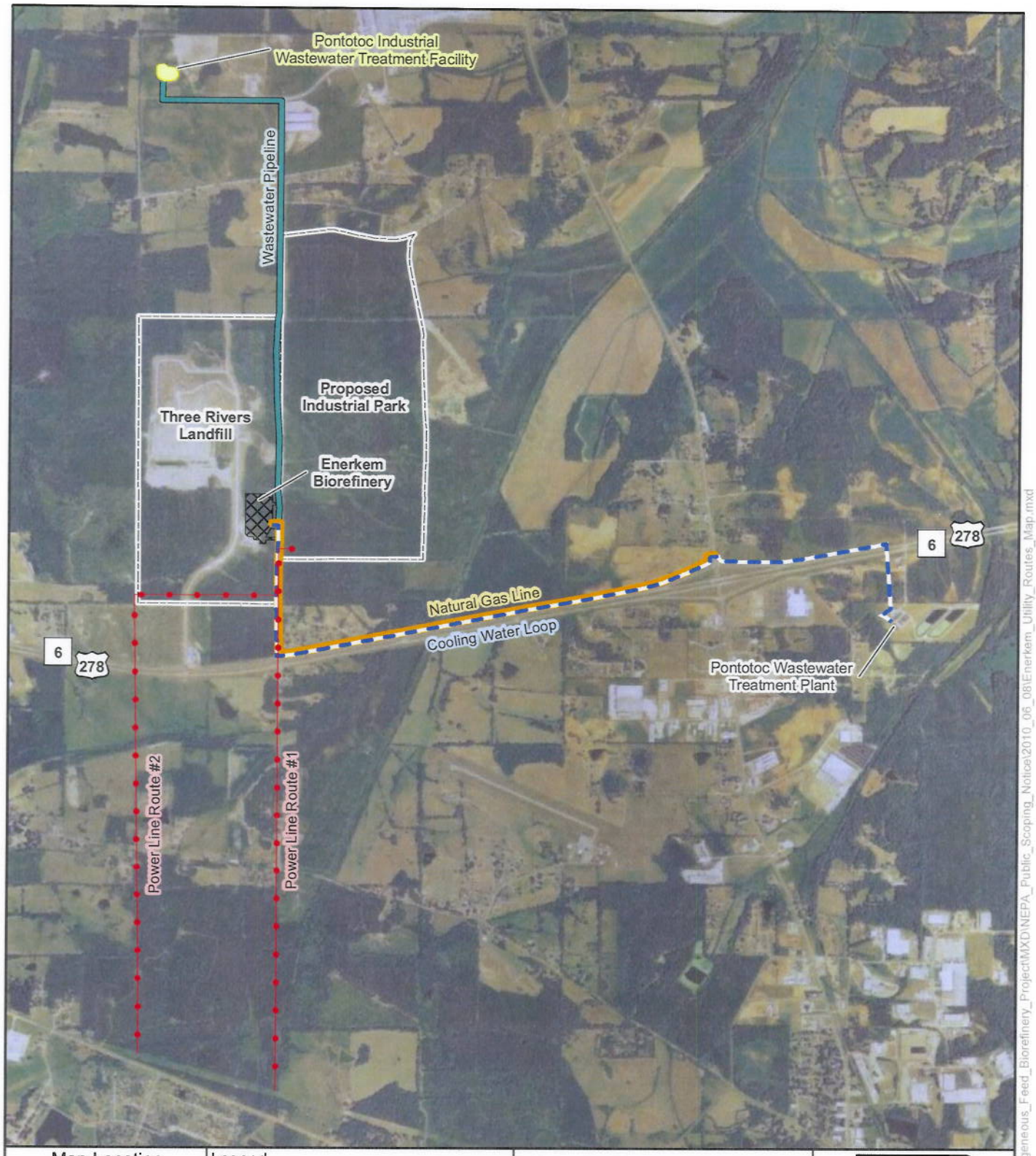

Map Location

Legend

- Property Boundary
- Enerkem Biorefinery Boundary
- Pontotoc Industrial WWTF
- Natural Gas Line
- Cooling Water Loop
- Power Line Alternatives
- Wastewater Pipeline

0 1,250 2,500 Feet

Scale: 1:30,000 (1 inch = 2,500 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Utility Routes

Enerkem

AECOM

Figure 4

June 23, 2010

Project #: 60155395

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AECOM
161 Cheshire Lane North, Suite 500
Minneapolis, MN 55441

763.852.4200 tel
763.473.0400 fax

June 25, 2010

Mr. James Woodrick
Mississippi Department of Archives & History
Historic Preservation Division
P.O. Box 571
Jackson, MS 39205-0571

Subject: Heterogeneous Feed Biorefinery Project, Three Rivers Landfill in Pontotoc County, Mississippi. AECOM Project No. 60155395

Dear Mr. Woodrick,

AECOM is retained by Enerkem Corporation (Enerkem) to complete an Environmental Assessment (EA) for Enerkem's Heterogeneous Feed Biorefinery Project (Project) at the Three Rivers Landfill (Landfill) in Pontotoc County, Mississippi. The Landfill is located approximately 4½ miles north of the City of Pontotoc in sections 14 and 23, Township 9 South, Range 2 East (**Figure 1**). The Project would be built on nine (9) acres of undeveloped upland within the boundaries of the Landfill (**Figure 2**).

We respectfully request your review of project details for compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, because federal funding is anticipated from the U.S. Department of Energy (DOE). Additional involvement of the Historic Preservation Division of the Mississippi Department of Archives & History (MDAH) will be requested through simultaneous compliance with the National Environmental Policy Act (NEPA).

Project Description

The proposed Project would include final design, construction, and operation of a 330 ton-per-day biorefinery in Pontotoc, Mississippi, that uses as feedstock the dried and sorted biomass fraction of municipal solid waste (MSW). Enerkem's biorefinery will produce ~10 million gallons of ethanol per year for commercial sale.

Currently the Project site consists of planted pines that are 12-13 years old; therefore, the subsurface has been disturbed previously. The proposed landfill site is currently used for commercial/industrial purposes with no zoning restrictions. Approximately 3,000 feet (0.6 miles) of Beulah Grove Road will be improved (widened and paved) as part of the development of the Three Rivers Industrial Site adjacent to the Project in sections 13 and 24, Township 9 South, Range 2 East (**Figure 2**); this road also will serve as vehicular access to the biorefinery.

Water for operations at the biorefinery will be supplied from three different sources. Potable water will be supplied by the Algoma Water Association through an existing pipeline. Process/make-up water will be supplied from a proposed water well to be constructed on the southern portion of the Project site. Lastly,

cooling water will be provided from a proposed pipeline loop with the Pontotoc Wastewater Treatment Plant (WWTP) as depicted in **Figure 3**.

Process treated purged water and sanitary water will be discharged from a proposed onsite wastewater pretreatment plant through a proposed 1-mile wastewater pipeline to the existing Pontotoc County Industrial WWTP north of the proposed site for further treatment.

Natural gas will be supplied through a new high-pressure natural gas pipeline alongside Highway 76 from a tie-in near the intersection with State Highway 15, approximately 1.75 miles to the east.

Liquid oxygen for the refining process will be provided by a new liquid oxygen plant that will occupy less than 4 acres of the Three Rivers Industrial Site, adjacent to the Landfill. The oxygen will be delivered through a minimal length of cryogenic piping.

The additional power needed for the oxygen plant and Project will require a new electrical substation to be constructed on 4 acres in the southwest corner of the Three Rivers Industrial Site. A new approximately 2-mile-long powerline will cross primarily road right-of-way (ROW) and/or agriculture/silviculture lands to connect to an existing transmission line.

The feedstock for the biorefinery will be post-sorted MSW. By siting the biorefinery within the Landfill, it will have immediate access to this feedstock. The MSW feedstock will be pre-sorted in a material recycling facility (MRF), and then transferred by covered conveyor to the biorefinery to be processed. The MRF is not part of the DOE-funded proposed activity, but it is a necessary support facility, and its potential impacts should be assessed along with those of the biorefinery.

Previous Investigations

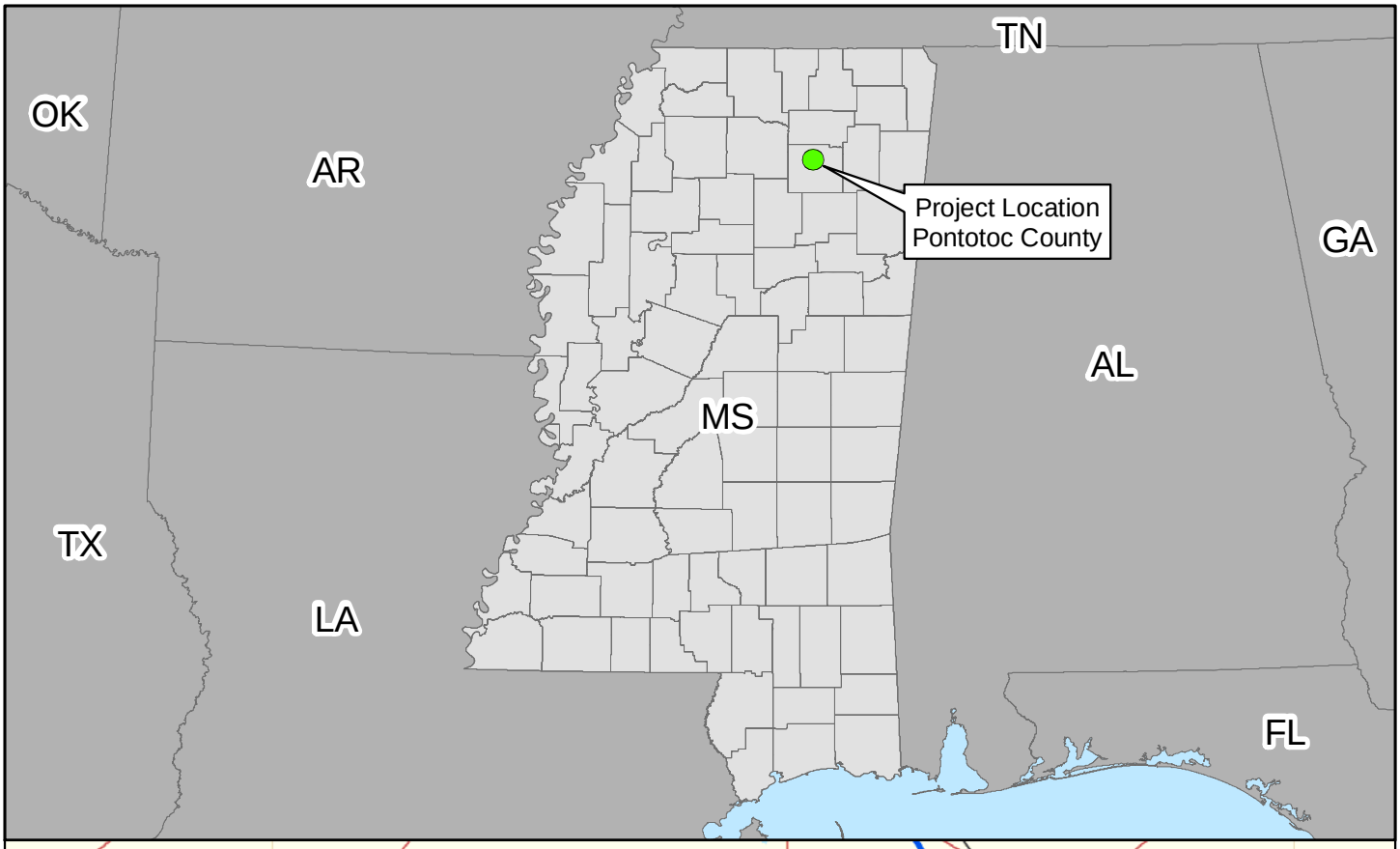
Please note that your office previously reviewed the plans and associated survey documents for the original Landfill (1992, 1993) and a *Siting Criteria Compliance Demonstration* (SCCD) for expansion of the Landfill (1997). Approximately 780 acres were surveyed archaeologically by Dr. Jay K. Johnson for the original Landfill. Two prehistoric sites and three historic artifact scatters were recorded during Dr. Johnson's survey, but all were ineligible for listing on the National Register of Historic Places (NRHP). In addition, Section 5.14 of the SCCD states, "…Mr. Roger Walker, Review and Compliance Officer of the MDAH, replied in a letter dated November 24, 1997, that no properties listed in the [National] Register [of Historic Places] will be affected by the landfill expansion and properties eligible for listing in the Register are not likely to be present at the landfill site."

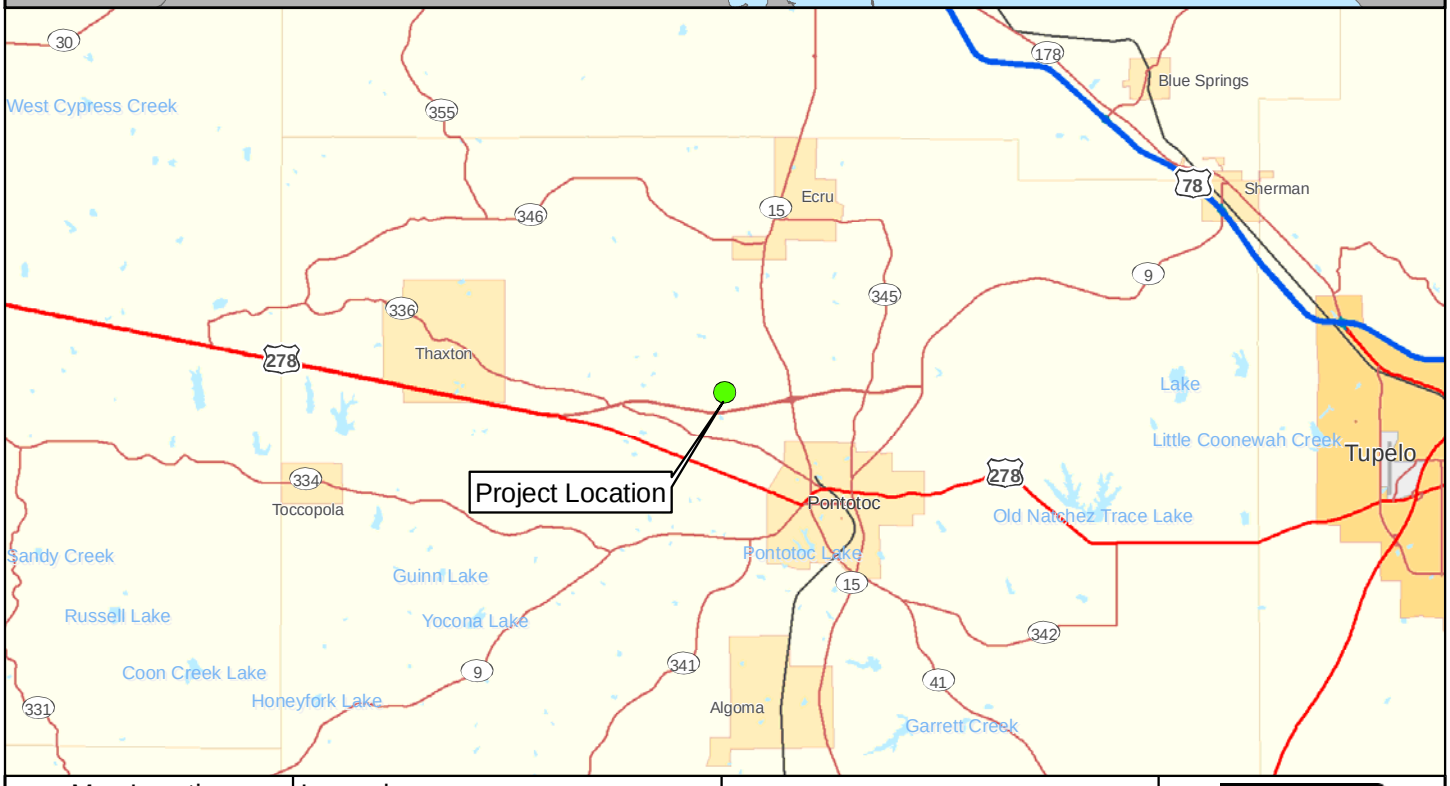
We look forward to the results of your forthcoming review of the proposed Project. Please contact Dr. Ollendorf with any questions or concerns.

Yours sincerely,

Amy L. Ollendorf, Ph.D., P.G., R.P.A.
Program Manager,
Cultural Heritage Planning & Management
Phone 763-551-2426
amy.ollendorf@aecom.com

Keith Suderman, Ph.D.
Program Manager
keith.suderman@aecom.com





Map Location

Legend

Project Location

N

Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

May 20, 2010

Project #: 60155395

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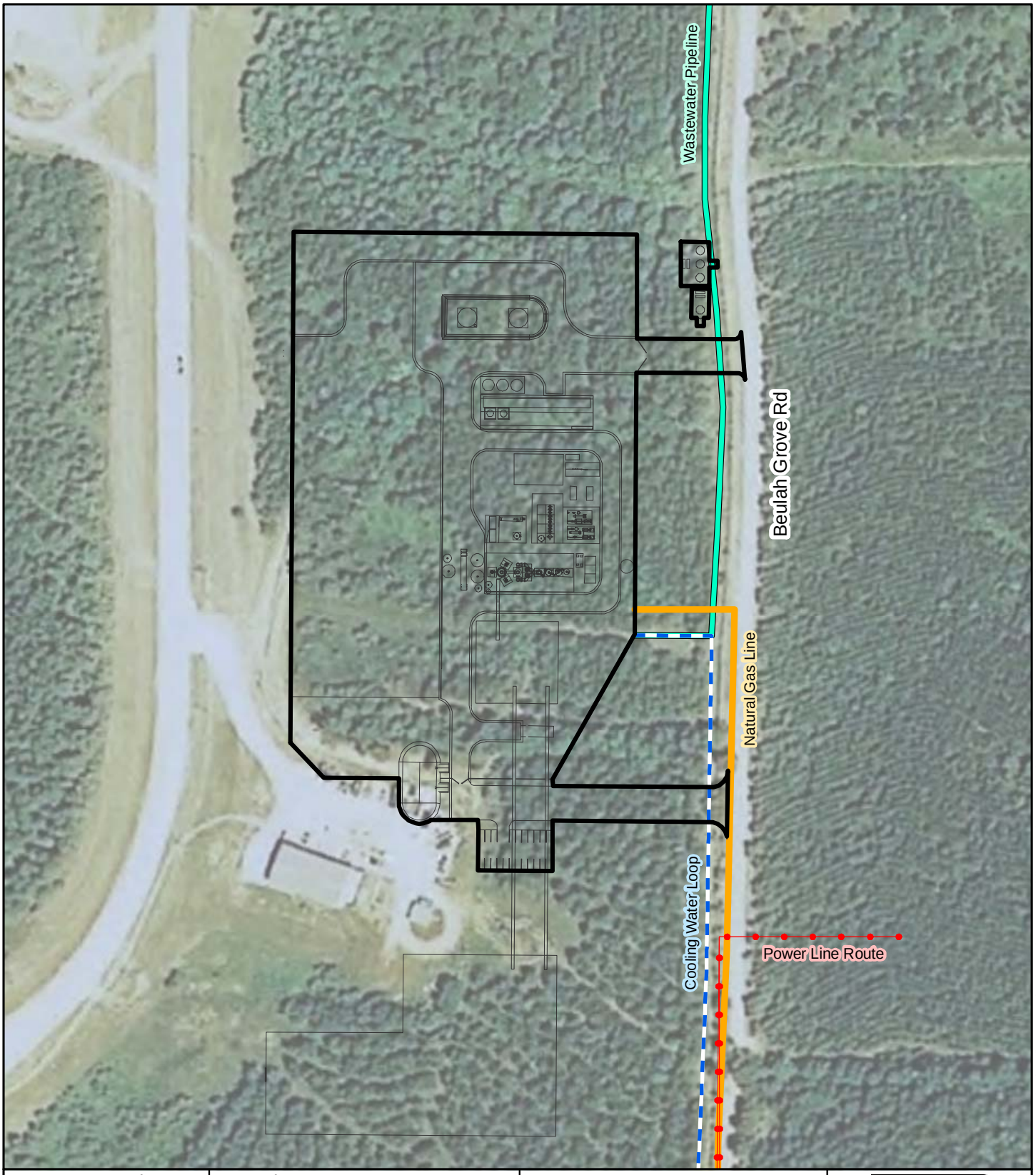

Map Location

Legend

- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Route
- Wastewater Pipeline

0 50 100 200 Feet

Scale: 1:2,400
(1 inch = 200 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Detail of Facility

Enerkem

AECOM

Figure 2

June 23, 2010

Project #: 60155395

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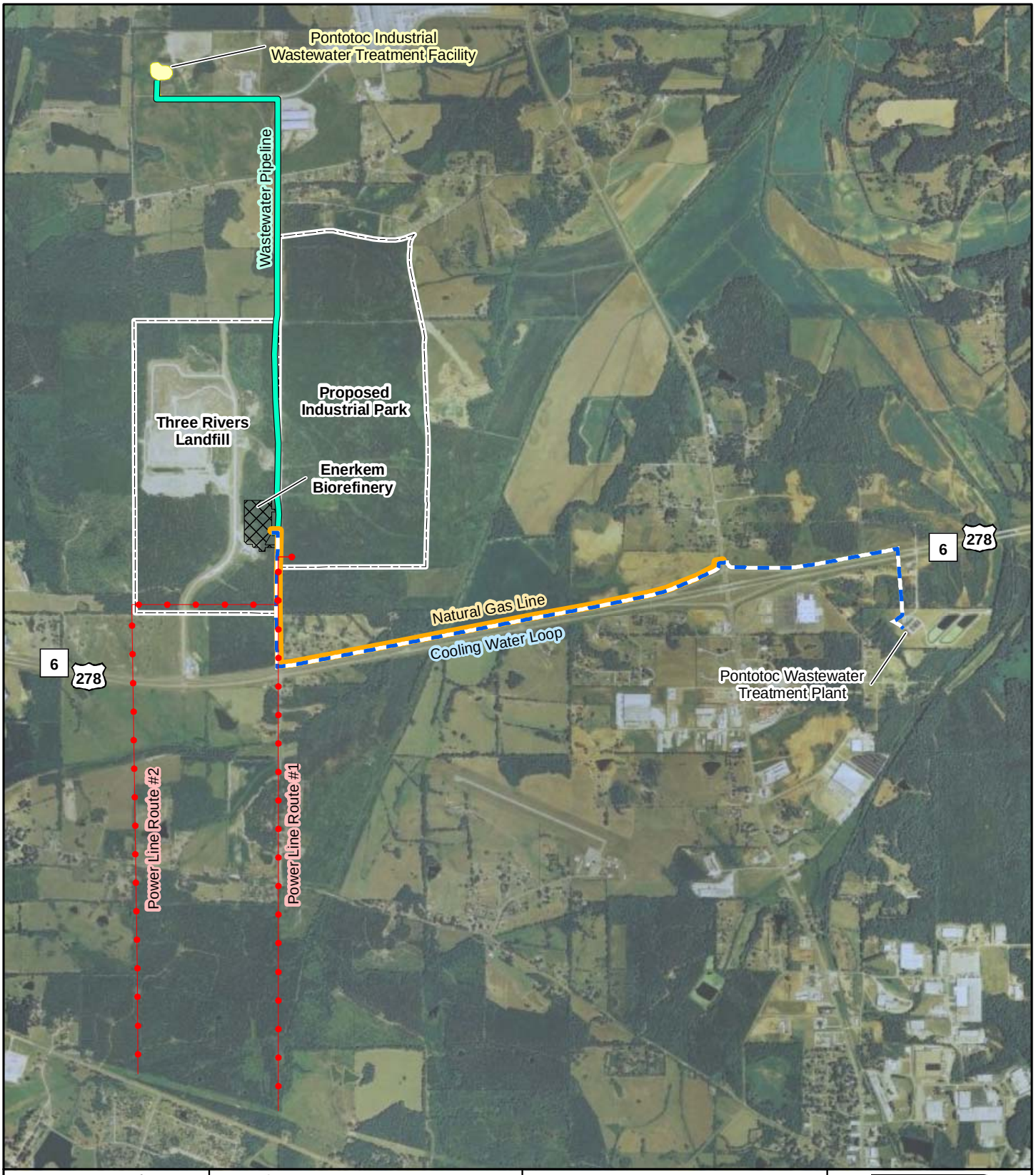

Map Location

Legend

- Property Boundary
- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Alternatives
- Wastewater Pipeline
- Pontotoc Industrial WWTF

0 1,250 2,500 Feet

Scale: 1:30,000 (1 inch = 2,500 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Utility Routes

Enerkem

AECOM

Figure 3

June 23, 2010

Project #: 60155395

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MISSISSIPPI DEPARTMENT *of* ARCHIVES AND HISTORY

MDAH

PO Box 571, Jackson, MS 39205-0571
601-576-6850 • Fax 601-576-6975
mdah.state.ms.us
H.T. Holmes, Director

July 12, 2010

RECEIVED JUL 16 2010

Dr. Amy L. Ollendorf
AECOM
161 Cheshire Lane North, Suite 500
Minneapolis, MN 55441

RE: Proposed heterogeneous feed biorefinery project, Three Rivers Landfill, MDAH Project Log #06-208-10, Pontotoc County

Dear Dr. Ollendorf:

We have reviewed your request for a cultural resources assessment, received on June 29, 2010, for the above referenced project in accordance with our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800. After reviewing the information provided, it is our determination that no cultural resources are likely to be affected. Therefore, we have no objection with the proposed undertaking.

Should there be additional work in connection with the project, or any changes in the scope of work, please let us know in order that we may provide you with appropriate comments in compliance with the above referenced regulations.

If you have any questions, please do not hesitate to contact us at (601) 576-6940.

Sincerely,

Jim Woodrick
Review and Compliance Officer

FOR: H.T. Holmes
State Historic Preservation Officer

AECOM
1360 Peachtree Street NE, Suite 500
Atlanta, GA 30309

404.965.9600 tel
404.965.9605 fax

June 25, 2010

Daniel Gregg
US Fish & Wildlife Service
6578 Dogwood View Parkway, Suite A
Jackson, MS 39213

Subject: Enerkem Corporation's Heterogeneous Feed Biorefinery Project
Pontotoc County, Mississippi

Mr. Gregg,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to support Enerkem Corporation's (Enerkem's) Heterogeneous Feed Biorefinery Project (Project). The proposed Project will include final design, construction, and operation of a 330-ton-per-day biorefinery in Pontotoc, Mississippi. The facility will be sited within the boundary of the existing Three Rivers Landfill and will use dried and sorted biomass of municipal solid waste (MSW) from the landfill as feedstock. The goal of the Enerkem biorefinery Project is to produce approximately 10 million gallons of ethanol per year for commercial sale.

The proposed facility will occupy approximately nine acres of undeveloped upland space within the existing landfill boundaries. Mapping of the proposed facility location as well as supporting infrastructure is provided as an attachment. Currently, the site of the proposed facility is predominantly covered by planted pines that are 12 to 13 years old. The surrounding area is mostly forested land, pasture, and industrial property. The immediate property to the east is owned by the Three Rivers Solid Waste Management Authority and in early development as the Three Rivers Industrial Site.

As noted in the attached mapping, infrastructure will need to be constructed to support the project including potable and process water, electrical power, natural gas, oxygen, and wastewater discharge (to an existing wastewater treatment plant).

- Water Supply – Water for plant operations will be supplied from three different sources. Potable water will be supplied by the Algoma Water Association. Process/make-up water will be supplied from a proposed water well constructed on the southern portion of the site. Lastly, cooling water will be supplied by the City of Pontotoc Activated Sludge Facility (City of Pontotoc Wastewater Treatment Plant [WWTP]) and returned to the WWTP for discharge through a pipeline loop located along Beulah Grove Road and State Highway 76;
- Electrical Power Supply – The biorefinery and associated oxygen plant will require a new electrical substation to be constructed on 4 acres in the southwest corner of the Three Rivers Industrial Site. The electrical substation will be constructed and maintained by the Pontotoc Electric Power Association. The new substation will be connected to an existing transmission line through a new 2-mile powerline that will be constructed and maintained by the Tennessee Valley Authority. The powerline will cross primarily road right-of-way and/or agriculture/silviculture lands;
- Natural Gas Supply – A new 1.75-mile natural gas pipeline will be constructed to supply the Enerkem facility. The gas pipeline will parallel State Highway 76, from the State Highway 15 crossing to the project site;
- Oxygen Supply – Liquid oxygen for the refining process will be provided by a new liquid oxygen plant that will occupy less than 4 acres of the Three Rivers Industrial Site, adjacent to the Enerkem site. Oxygen will be delivered to the Enerkem facility through a minimal length of cryogenic piping; and
- Wastewater Discharge – Process treated purged water and sanitary water will be discharged from a proposed onsite wastewater treatment plant through a 1-mile wastewater pipeline to the existing

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All new pipeline construction would be by open-trench methods, except where specialized methods, such as boring or HDD, would be required to protect road crossings and sensitive environmental features.

Based on the U.S. Fish and Wildlife Service record of threatened and endangered species by county in the state of Mississippi, only one species was identified as potentially present within Pontotoc County: the Price's potato bean (*Apios priceana*). This species is federally listed as threatened and is noted to occur state-wide. The species is thought to be a native of forest openings. As the proposed Enerkem site has been subject to silviculture practices it does not appear to represent suitable habitat for the potato bean.

The proposed Project facility is located within an area that is already permitted as a landfill site, and the utility routes are within or collocated with existing road and utility rights-of-way. AECOM does not anticipate that this Project will adversely affect protected species. The DOE is currently preparing a Draft Environmental Assessment of the Project, and we look forward to comments by the USFWS. If you have need of additional information or would like to conduct a site visit, please contact me at your convenience. We appreciate your continued participation in this important project.

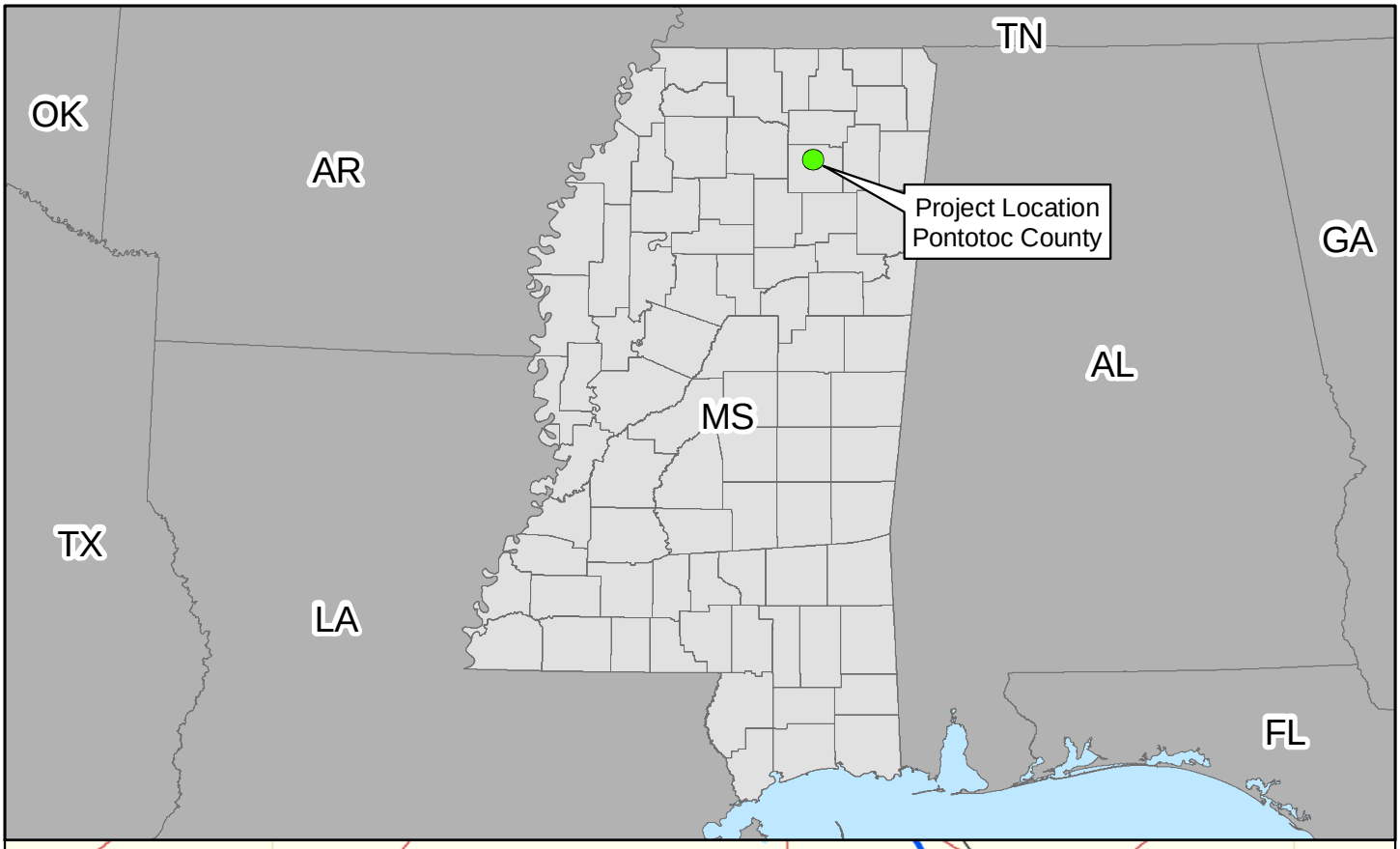
Sincerely,

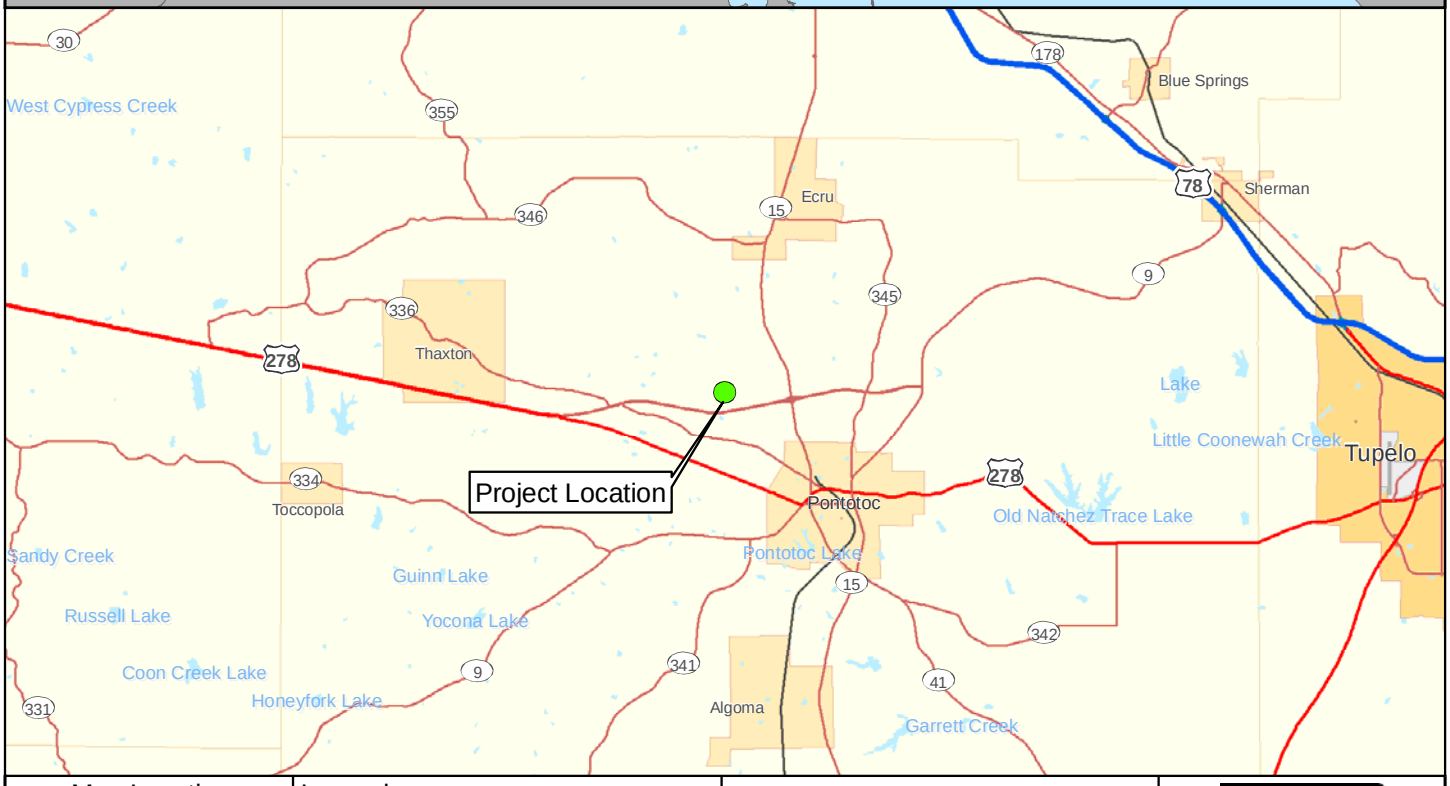
Allen Brooks, PhD
Project Specialist
allen.brooks@aecom.com
727-577-5430

Keith Suderman, PhD
Program Manager
keith.suderman@aecom.com

Cc: Mississippi Museum of Natural Science

State and Federally Protected Species Potentially Present in Pontotoc County, Mississippi				
Common Name (*Scientific Name*)	**Mississippi Status**	**Federal Status**	**Suitable Habitat**	**Likelihood to Affect**
Price's potato-bean (*Apios priceana)*	NL	T	Open, rocky, wooded slopes and floodplain edges. Sites are usually under mixed hardwoods or in associated forest clearings, often where bluffs or ravine slopes meet creek or river bottoms. Soils are well-drained and loamy, formed on alluvium or over calcareous boulders. Several populations extend onto road or powerline rights-of-way.	No. Site has been subject to silviculture practices and does not represent suitable habitat.
Key: E=Endangered; T=Threatened Source: USFWS 2010, NatureServe 2010.				





Map Location

Legend

Project Location

N

Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

May 20, 2010

Project #: 60155395

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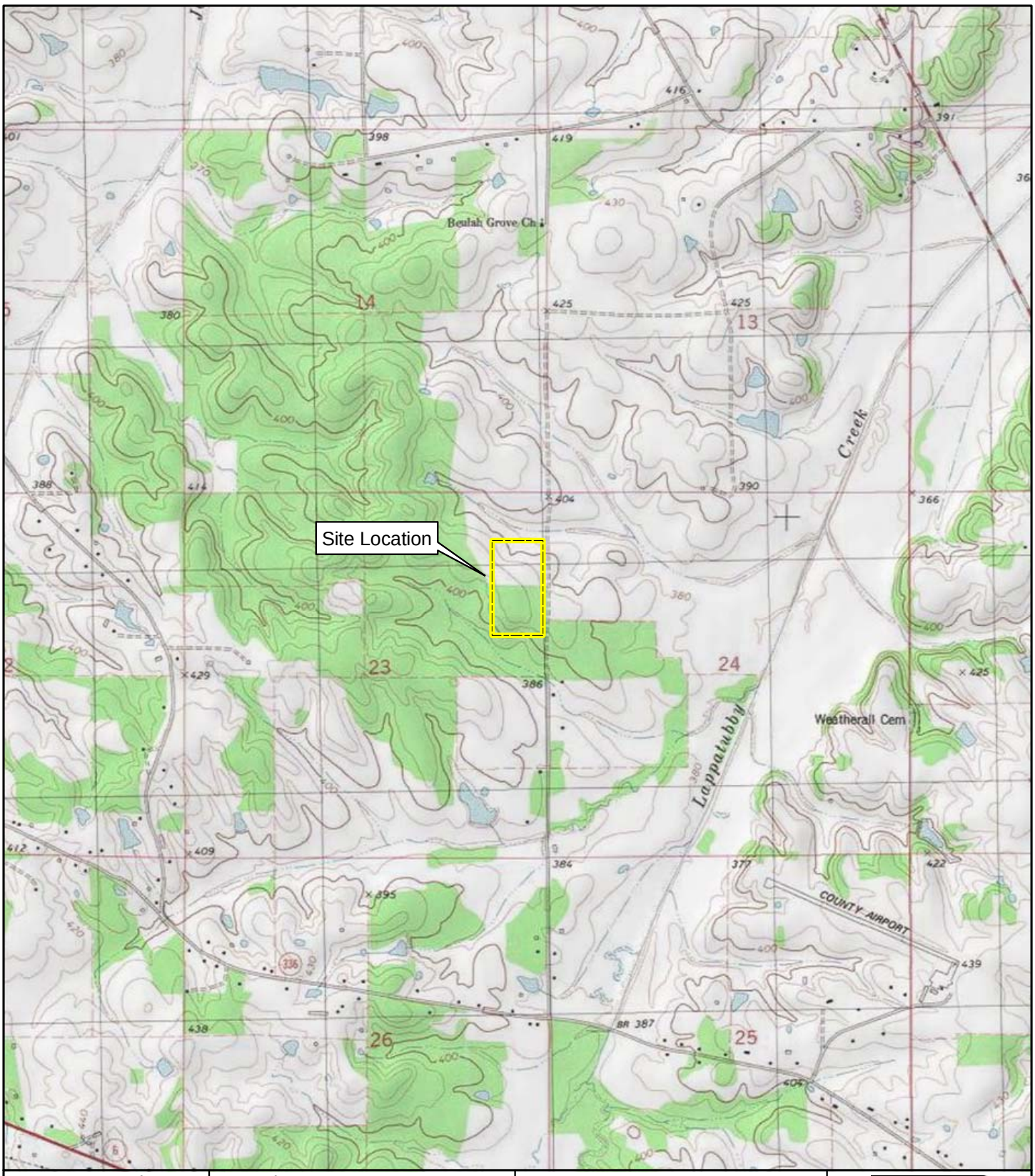

Map Location

Legend

Site Location

N

0 500 1,000 2,000 Feet

Scale: 1:24,000

Image Source: USGS 24k Topographic Quadrangles.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Topographic Map

Enerkem

AECOM

Figure 2

May 13, 2010

Project #: 60155395

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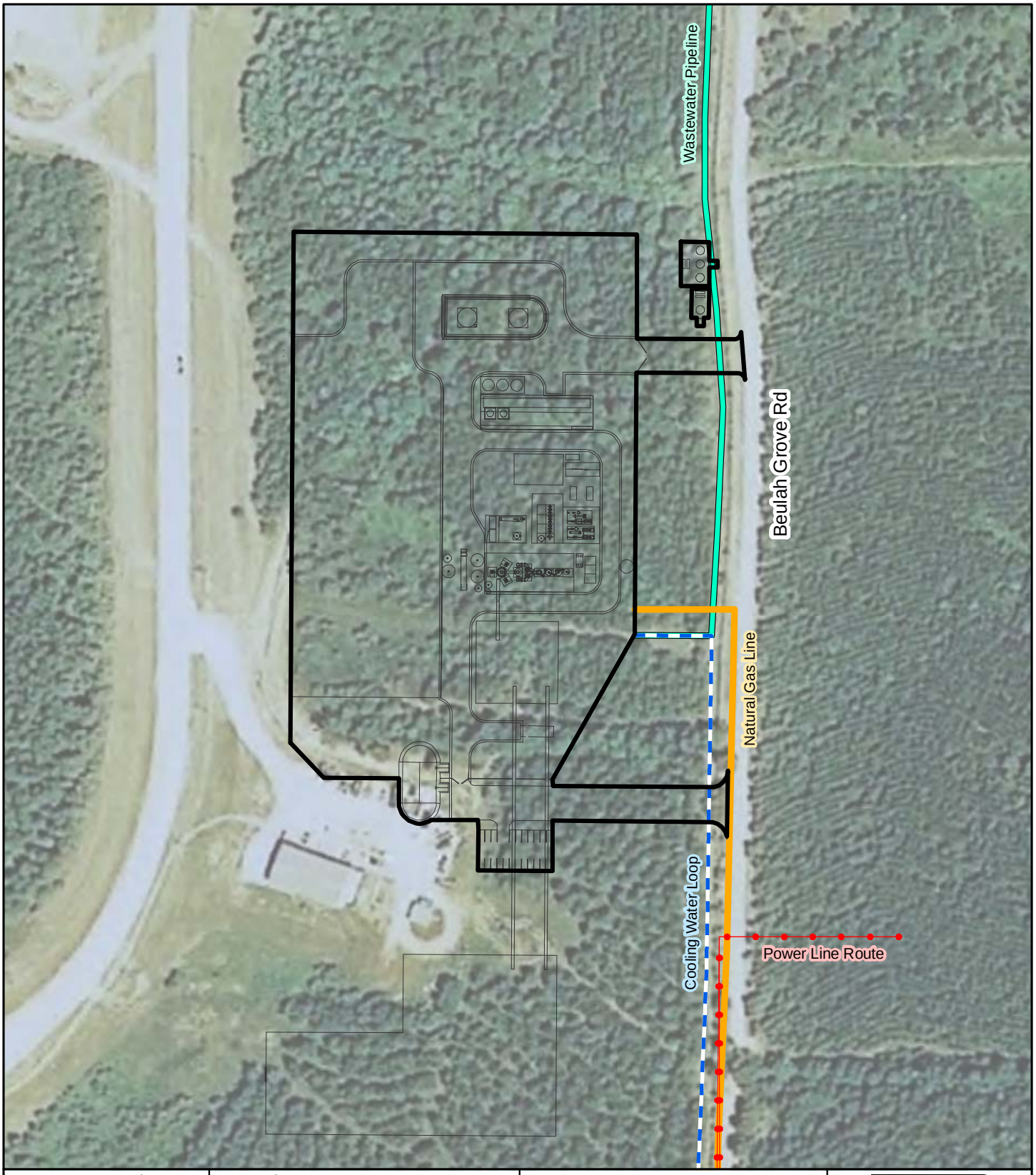

Map Location

Legend

- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Route
- Wastewater Pipeline

0 50 100 200 Feet

Scale: 1:2,400
(1 inch = 200 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Detail of Facility

Enerkem

AECOM

Figure 3

June 23, 2010

Project #: 60155395

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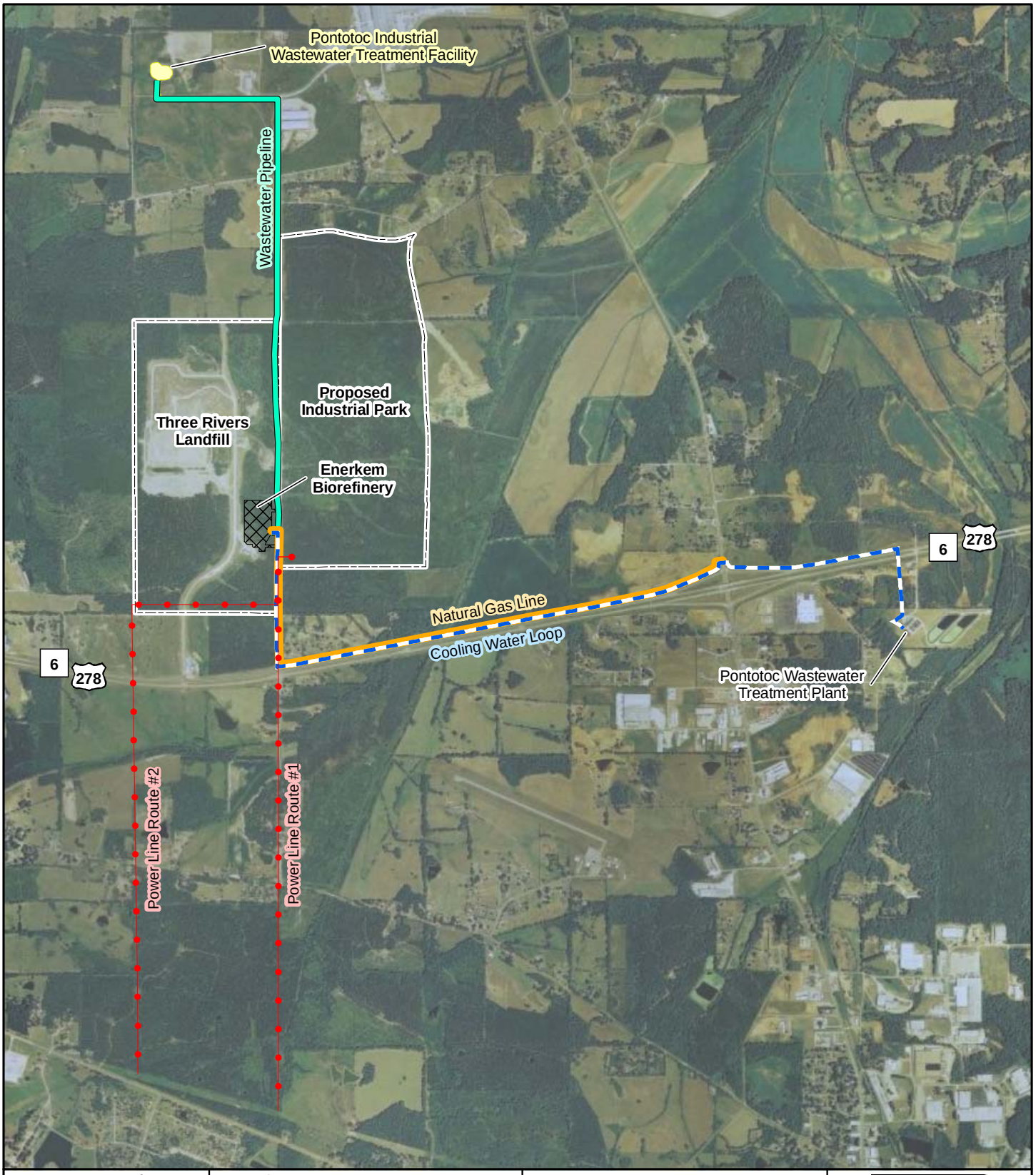

Map Location

Legend

- Property Boundary
- Enerkem Biorefinery Boundary
- Natural Gas Line
- Cooling Water Loop
- Power Line Alternatives
- Wastewater Pipeline
- Pontotoc Industrial WWTF

0 1,250 2,500 Feet

Scale: 1:30,000 (1 inch = 2,500 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Utility Routes

Enerkem

AECOM

Figure 4

June 23, 2010

Project #: 60155395

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AECOM
1360 Peachtree Street NE, Suite 500
Atlanta, GA 30309

404.965.9600 tel
404.965.9605 fax

June 25, 2010

Tom Mann
Mississippi Museum of Natural Science
2148 Riverside Drive
Jackson, MS 39202
601-354-7303

Subject: Enerkem Corporation's Heterogeneous Feed Biorefinery Project
Pontotoc County, Mississippi

Mr. Mann,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to support Enerkem Corporation's (Enerkem's) Heterogeneous Feed Biorefinery Project (Project). The proposed Project will include final design, construction, and operation of a 330-ton-per-day biorefinery in Pontotoc, Mississippi. The facility will be sited within the boundary of the existing Three Rivers Landfill and will use dried and sorted biomass of municipal solid waste (MSW) from the landfill as feedstock. The goal of the Enerkem biorefinery Project is to produce approximately 10 million gallons of ethanol per year for commercial sale.

The proposed facility will occupy approximately nine acres of undeveloped upland space within the existing landfill boundaries. Mapping of the proposed facility location as well as supporting infrastructure is provided as an attachment. Currently, the site of the proposed facility is predominantly covered by planted pines that are 12 to 13 years old. The surrounding area is mostly forested land, pasture, and industrial property. The immediate property to the east is owned by the Three Rivers Solid Waste Management Authority and in early development as the Three Rivers Industrial Site.

As noted in the attached mapping, infrastructure will need to be constructed to support the project including potable and process water, electrical power, natural gas, oxygen, and wastewater discharge (to an existing wastewater treatment plant).

- Water Supply – Water for plant operations will be supplied from three different sources. Potable water will be supplied by the Algoma Water Association. Process/make-up water will be supplied from a proposed water well constructed on the southern portion of the site. Lastly, cooling water will be supplied by the City of Pontotoc Activated Sludge Facility (City of Pontotoc Wastewater Treatment Plant [WWTP]) and returned to the WWTP for discharge through a pipeline loop located along Beulah Grove Road and State Highway 76;
- Electrical Power Supply – The biorefinery and associated oxygen plant will require a new electrical substation to be constructed on 4 acres in the southwest corner of the Three Rivers Industrial Site. The electrical substation will be constructed and maintained by the Pontotoc Electric Power Association. The new substation will be connected to an existing transmission line through a new 2-mile powerline that will be constructed and maintained by the Tennessee Valley Authority. The powerline will cross primarily road right-of-way and/or agriculture/silviculture lands;
- Natural Gas Supply – A new 1.75-mile natural gas pipeline will be constructed to supply the Enerkem facility. The gas pipeline will parallel State Highway 76, from the State Highway 15 crossing to the project site;
- Oxygen Supply – Liquid oxygen for the refining process will be provided by a new liquid oxygen plant that will occupy less than 4 acres of the Three Rivers Industrial Site, adjacent to the Enerkem site. Oxygen will be delivered to the Enerkem facility through a minimal length of cryogenic piping; and
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Based on the U.S. Fish and Wildlife Service record of threatened and endangered species by county in the state of Mississippi, only one species was identified as potentially present within Pontotoc County: the Price's potato bean (*Apios priceana*). This species is federally listed as threatened and is noted to occur state-wide. The species is thought to be a native of forest openings. As the proposed Enerkem site has been subject to silviculture practices it does not appear to represent suitable habitat for the potato bean.

The proposed Project facility is located within an area that is already permitted as a landfill site, and the utility routes are within or collocated with existing road and utility rights-of-way. AECOM does not anticipate that this Project will adversely affect protected species. The DOE is currently preparing a Draft Environmental Assessment of the Project, and we look forward to comments by the Mississippi Museum of Natural Science. If you have need of additional information or would like to conduct a site visit, please contact me at your convenience. We appreciate your continued participation in this important project.

Sincerely,

Allen Brooks, PhD
Project Specialist
allen.brooks@aecom.com
727-577-5430

Keith Suderman, PhD
Program Manager
keith.suderman@aecom.com

Cc: US Fish & Wildlife Service

State and Federally Protected Species Potentially Present in Pontotoc County, Mississippi				
Common Name (*Scientific Name*)	**Mississippi Status**	**Federal Status**	**Suitable Habitat**	**Likelihood to Affect**
Price's potato-bean (*Apios priceana)*	NL	T	Open, rocky, wooded slopes and floodplain edges. Sites are usually under mixed hardwoods or in associated forest clearings, often where bluffs or ravine slopes meet creek or river bottoms. Soils are well-drained and loamy, formed on alluvium or over calcareous boulders. Several populations extend onto road or powerline rights-of-way.	No. Site has been subject to silviculture practices and does not represent suitable habitat.
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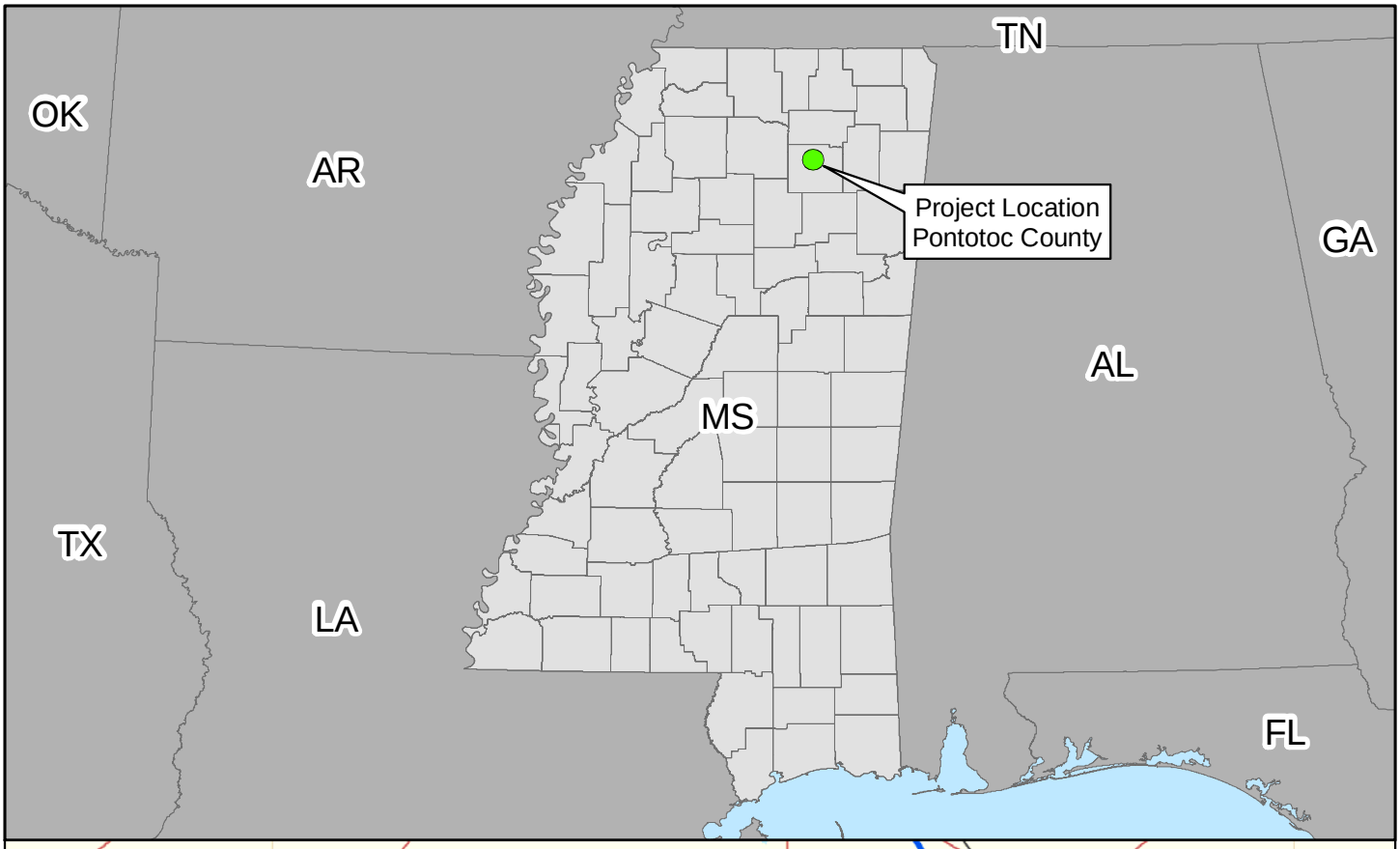

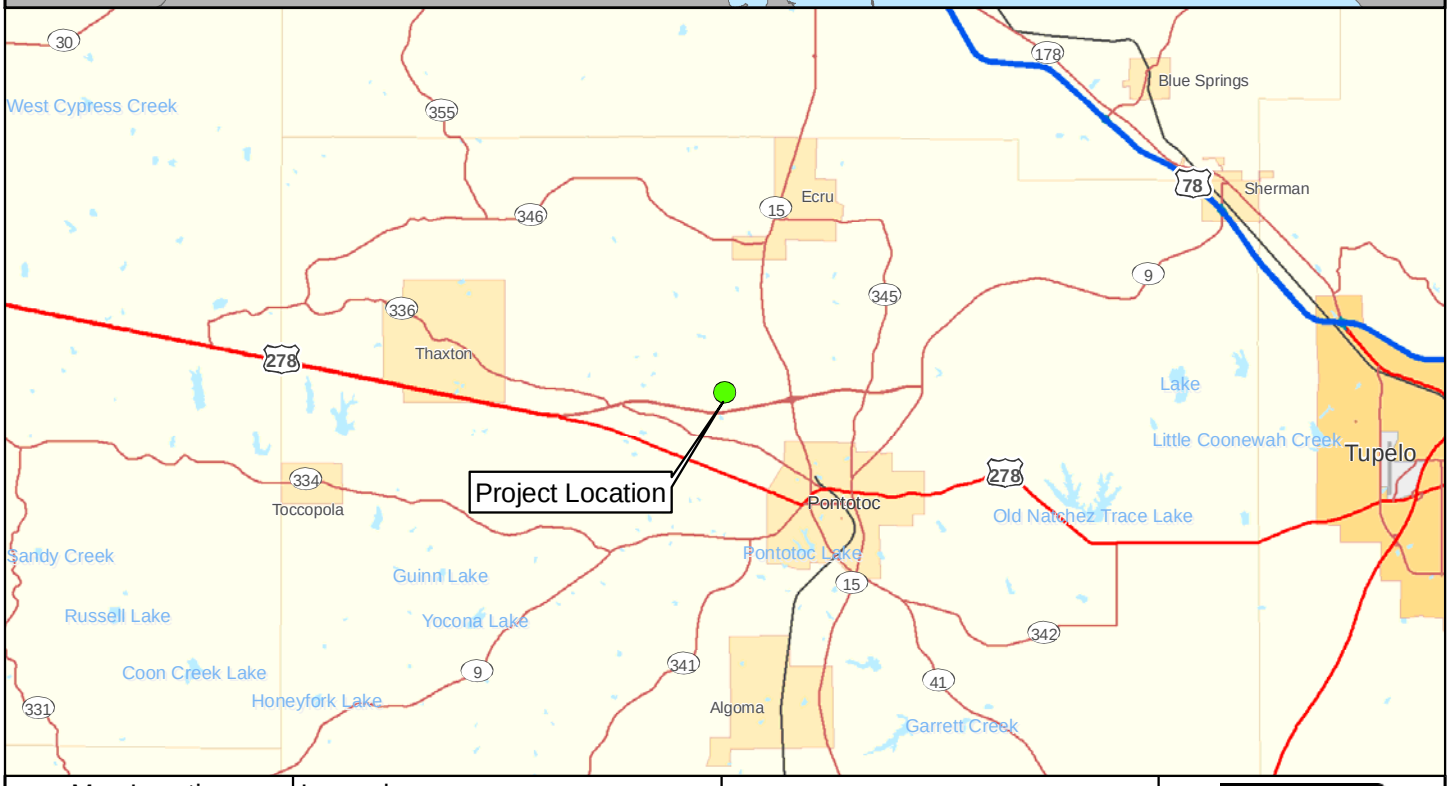

Map Location

Legend

Project Location

N

Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Project Location

Enerkem

AECOM

Figure 1

May 20, 2010

Project #: 60155395

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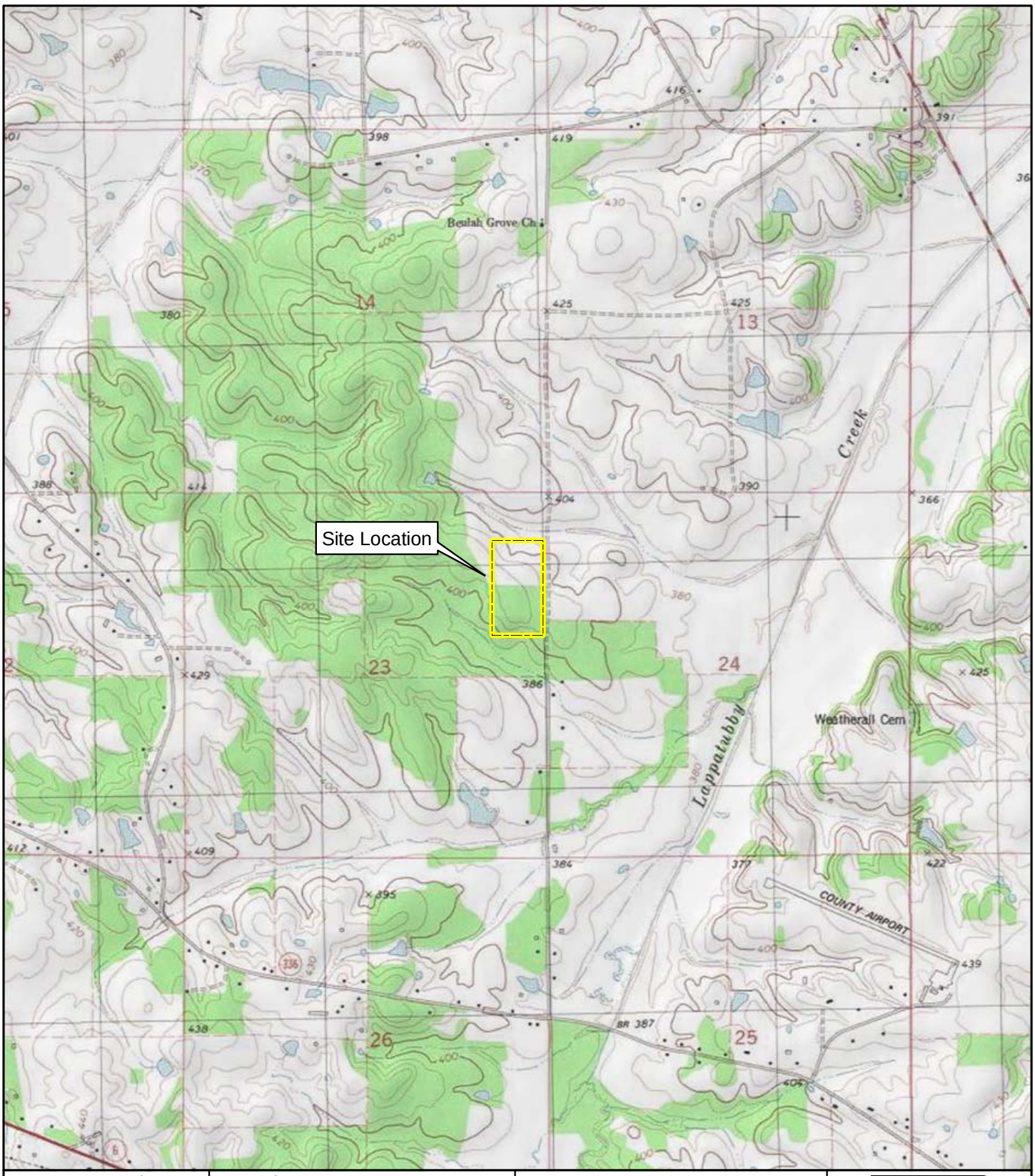

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Scale: 1:24,000

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Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Topographic Map

Enerkem

AECOM

Figure 2

May 13, 2010

Project #: 60155395

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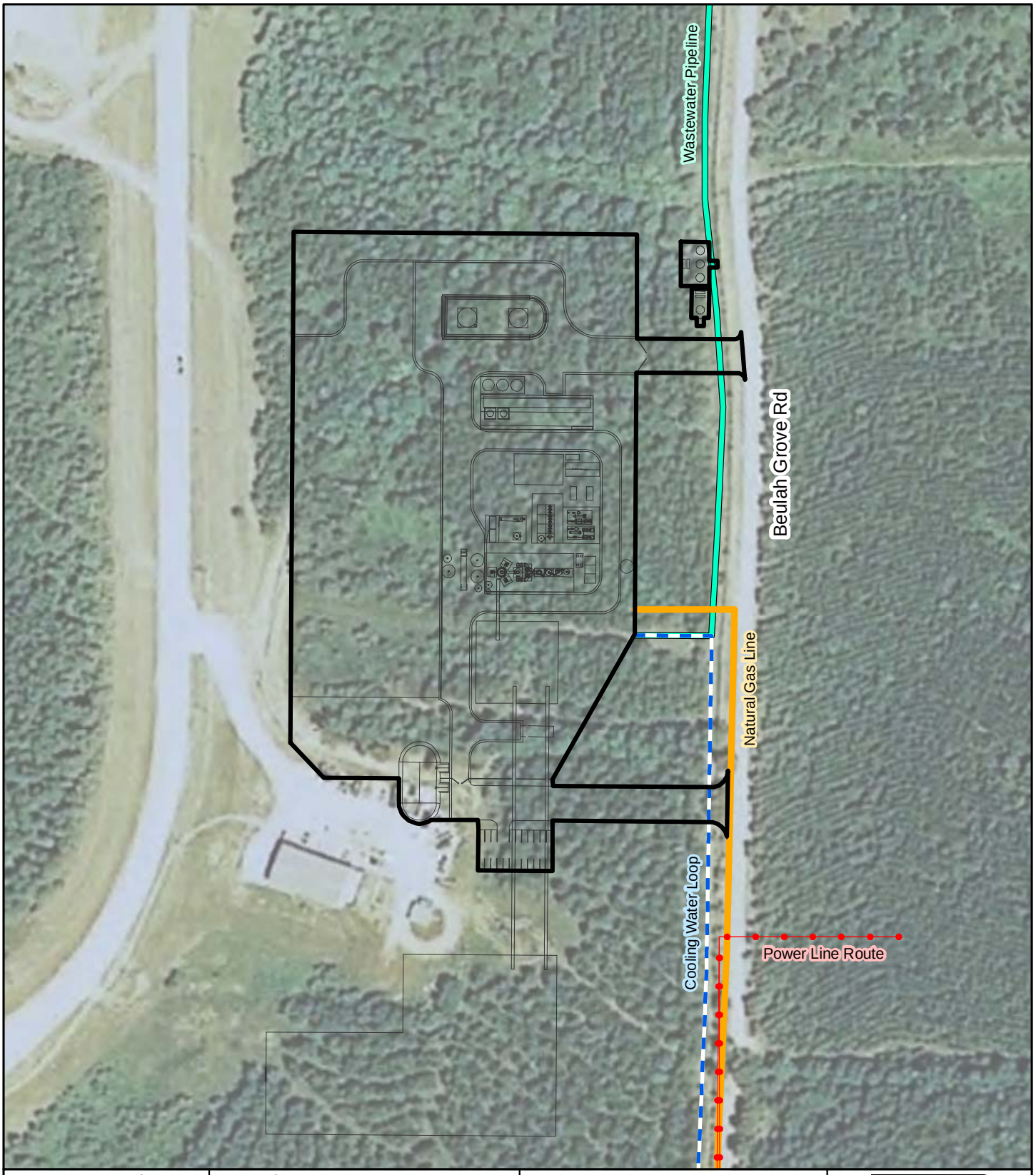

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- Natural Gas Line
- Cooling Water Loop
- Power Line Route
- Wastewater Pipeline

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Scale: 1:2,400
(1 inch = 200 ft)

N

Image Source: ESRI - Microsoft Virtual Earth Imagery.
Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Detail of Facility

Enerkem

AECOM

Figure 3

June 23, 2010

Project #: 60155395

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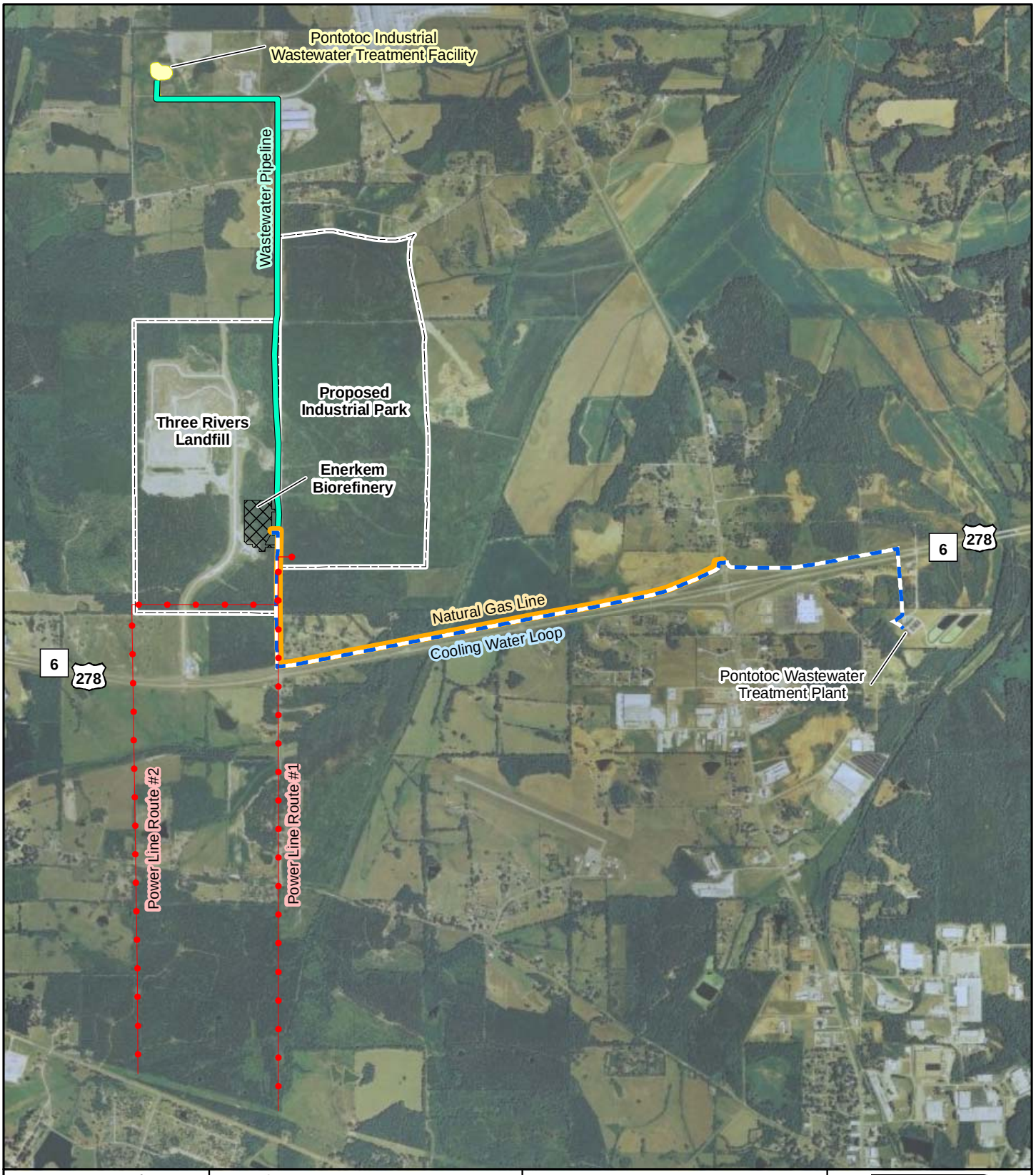

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Map Projection: State Plane MS East, NAD83, US Feet.

Enerkem Heterogeneous Feed Biorefinery Project

Pontotoc, Mississippi

Utility Routes

Enerkem

AECOM

Figure 4

June 23, 2010

Project #: 60155395

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MISSISSIPPI
DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

Sam Polles, Ph.D.
Executive Director

July 14, 2010

Allen Brooks
AECOM
1360 Peachtree Street NE
Suite 500
Atlanta, GA 30309

Re: Enerkem Corporation
Heterogeneous Feed Biorefinery Project
Pontotoc, Pontotoc County, Mississippi

R# 7877

To Whom It May Concern,

In response to your request for information dated June 25, 2010, we have searched our database for occurrences of state or federally listed species and species of special concern that occur within 2 miles of the site of the proposed project. Please find our concerns and recommendations below.

Scientific Name	Common Name	Federal Status	State Status	State Rank
Apios priceana	Price's Potato Bean	LT		S1

State Rank
S1 — Critically imperiled in Mississippi because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.
S2 — Imperiled in Mississippi because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.
S3 — Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences).

State and Federal Status
LE Endangered — A species which is in danger of extinction throughout all or a significant portion of its range.
LT Threatened — A species likely to become endangered in foreseeable future throughout all or a significant portion of its range.

Based on information provided, we conclude that if best management practices are properly implemented, monitored, and maintained (particularly measures to prevent, or at least, minimize negative impacts to water quality), the proposed project likely poses no threat to listed species or their habitats.

Please feel free to contact us if we can provide any additional information, resources, or assistance that will help minimize negative impacts to this area. We are happy to work with you to ensure that our state's precious natural heritage is conserved and preserved for future Mississippians.

Sincerely,

Joelle Carney, Database Manager/Biologist
Mississippi Natural Heritage Program
(601) 354-7303

The Mississippi Natural Heritage Program (MNHP) has compiled a database that is the most complete source of information about Mississippi's rare, threatened, and endangered plants, animals, and ecological communities. The quantity and quality of data collected by MNHP are dependent on the research and observations of many individuals and organizations. In many cases, this information is not the result of comprehensive or site-specific field surveys; most natural areas in Mississippi have not been thoroughly surveyed and new occurrences of plant and animal species are often discovered. Heritage reports summarize the existing information known to the MNHP at the time of the request and cannot always be considered a definitive statement on the presence, absence or condition of biological elements on a particular site.

WILLIAMS RESEARCH
John Williams, Principal Researcher
19815 NW Nestucca Dr
Portland OR 97229
503-439-9028
Fax-503-533-4082
John.williams3@comcast.net

RE: Public Scoping for Enerkem, Heterogeneous Feed Biorefinery, (DOE/EA 1790)

Dear Ms. Jorgensen:

I am a consultant to the Concerned Citizens for Clean Air, a group of persons who live with their families, and work in and near the vicinity of the proposed Enerkem plant.

The Citizens submit the following concerns for scoping of the NEPA analysis for this project.

An EIS should be required. This project will consume $50 million in taxpayer funds which is a significant amount, and will produce large amounts of finished products through its operations near an existing municipal dump.

This project has the potential to cause and contribute to significant odors, elevated levels of air pollution, dangers of fire and explosion, toxic material releases, and unstated, large amounts of water usage.

ECONOMICS

The Citizens would also appreciate a discussion of the economics of the facility, since the proposed total $101 million cost for Enerkem would be enough money to build a 70 million gallon ethanol facility with corn as a feedstock.

The ethanol market is relatively glutted right now with plants closing and going bankrupt. But Enerkem proposes production of only 10 million gallons annually which is an initial construction cost of $10/gallon/capacity, compared to a $1.40/gallon/capacity cost for construction costs for corn based ethanol. On its face, this facility will produce ethanol so expensively that it cannot survive economically.

This $10/gallon construction cost is far higher that the $5/gallon construction cost cited in published accounts of garbage to ethanol plants. Those articles also assumed a $2/gallon sales price for ethanol, while the current Mississippi price is $1.74/gallon.

AIR EMISSIONS

Please describe all sources of air pollution from this facility, including crushers, conveyors, storage piles, silos, fermentation tanks, gasifier units, heaters, boilers, flares, loading facilities and other direct and indirect sources, the likely resulting emissions in ton/year and parts per million, and the cumulative impacts.

FIRE AND EXPLOSION

Ethanol is highly flammable and many ethanol plants have experienced fires. Hydrogen may also be generated/stored on site. An oxygen plant will also operate there. Please describe how the facility and local emergency responders will be equipped to deal with fires and explosions, including training in use of foam fire retardants, and special equipment to apply foam to ethanol and other fires.

TOXICS

Please describe the toxicity of all raw materials and plant components, including but not limited to the catalysts, and the cradle to grave life story of these materials while coming to, residing at, and leaving the plant, including measures taken to prevent toxic releases.

WATER

Please describe the water source and quantity used, any water treatment prior to usage, the water quality after usage, the destiny of the water discharges, and subsequent treatment.

Please send me a copy of any subsequent NEPA documents and notify me of future public review opportunities including meetings.

Yours, John Williams

NOTICE OF AVAILABILITY

The U.S. Department of Energy (DOE) has prepared a draft Environmental Assessment (EA) to analyze and describe the potential environmental impacts associated with the:

Heterogeneous Feed Biorefinery

Pontotoc, MS

DOE/EA 1790

DOE's Golden Field Office has prepared a draft EA in accordance with the National Environmental Policy Act (NEPA). Enerkem Corporation is proposing to use Federal funding from DOE under the American Recovery and Reinvestment Act of 2009 to construct and operate a gasification-to-ethanol biorefinery in Pontotoc, MS. The draft EA is available for review on the DOE Golden Field Office website:

http://www.eere.energy.gov/golden/Reading_Room.aspx

Public comments on the results of the environmental impacts of implementing the proposed action will be accepted until **September 7, 2010.** Please mail comments to the **DOE Golden Field Office**, c/o Lisa Jorgensen, 1617 Cole Boulevard, Golden, CO 80401, or by email to lisa.jorgensen@go.doe.gov.

Organization	Street Address	City	State	Zip Code	Notes
Agencies					
USACE – Vicksburg District	4155 E. Clay Street	Vicksburg	MS	39183	
Mississippi Department of Environmental Quality (MDEQ)	PO Box 2261	Jackson	MS	39225-2261	Trudy Fisher, Executive Director
MDEQ Environmental Permits Division	PO Box 2309	Jackson	MS	39225	Chad Winter
U.S. Fish & Wildlife Service (USFWS) Jackson Mississippi Field Office	6578 DOGWOOD VIEW PARKWAY, SUITE A	Jackson	MS	39213	Stephen Ricks, Field Supervisor
Mississippi Department of Wildlife, Fisheries, & Parks (MDWFP)	2148 Riverside Drive	Jackson	MS	39202-1353	Joelle Carney, Database Manager/Biologist
Mississippi Dept of Agriculture and Commerce	PO Box 1609	Jackson	MS	39215	Jim Lipe
Mississippi Museum on Natural Science (MMNS)	2148 Riverside Drive	Jackson	MS	39202-1353	
Mississippi Department of Transportation (MDOT)	P.O. Box 1850	Jackson	MS	39215	
Mississippi Department of Archives and History (MDAH)	P.O. Box 571	Jackson	MS	39205-0571	Mr. Jim Woodrick
Local Government					
Pontotoc Chamber of Commerce	12 West Reynolds Street	Pontotoc	MS	38863	
Bill Rutledge, Mayor of Pontotoc	116 N Main Street	Pontotoc	MS	38863	
Wayne Stokes, President Pontotoc County Board of Supervisors					
Pontotoc Circuit Clerk	11 E. Washington St.	Pontotoc	MS	38863	
Pontotoc County Tax Assessor	11 E. Washington St.	Pontotoc	MS	38863	
Pontotoc County Tax Collector	11 E. Washington St.	Pontotoc	MS	38863	
Pontotoc Municipal Court Clerk	225 W. Reynolds St.	Pontotoc	MS	38863	
Pontotoc Police Chief	116 N Main Street	Pontotoc	MS	38863	
City of Pontotoc Parks and Recreation Department	374 Hwy 15 S	Pontotoc	MS	38863	
Governor of Mississippi	PO Box 139	Jackson	MS	39205	Haley Barbour
Community Stakeholders					
Pontotoc County Library	111 N. Main Street	Pontotoc	MS	38863	
Sherman Public Library	PO Box 181 20 W Lamar	Sherman	MS	38869	

Organization	Street Address	City	State	Zip Code	Notes
Tennessee Valley Authority (TVA) Environmental Permits & Compliance	1101 Market Street	Chattanooga	TN	37402-2801	Susan J. Kelly, Senior Manager
Nearby Landowners					
American Furniture Manufacturing	604 Pontotoc County Indus Rd	Ecru	MS	38841	
Oxford Sand	585 Pontotoc County Indus Rd	Ecru	MS	38841	
Pontotoc County Airport	Co Rd 256	Pontotoc	MS	38863	
Genesis Furniture Industries	380 Maggie Drive	Pontotoc	MS	38863	
Walmart Supercenter	100 McCord Rd	Pontotoc	MS	38863	
Tribal Leaders					
Mississippi Band of Choctaw Indians	101 Industrial Road	Choctaw	MS	39350	Miko Beasley Denson
Media Outlets					
Pontotoc Progress	13 E. Jefferson St	Pontotoc	MS	38863	
WTVA, Inc.	Post Office Box 350	Tupelo	MS	38802	
Northeast Mississippi Daily Journal	1242 South Green St.	Tupelo	MS	38804	
Oxford Eagle	P.O. Box 866	Oxford	MS	38655	
WSEL 1440 AM	Hwy 6 E	Pontotoc	MS	38863	
WSEL 96.7 FM	Hwy 6 E	Pontotoc	MS	38863	
W15CG Owner: Unity Broadcasting Network	P.O. Box 790 504 N 3rd St	Boonesville	MS	38829	
NGOs					
Alliance to Save Energy	1850 M Street NW, Suite 600	Washington	DC	20036	Contact: Kateri Callahan
American Association of Blacks in Energy	1625 K Street NW, Suite 405	Washington	DC	20006	Contact: Frank M. Stewart
Audubon Society	285 Plains Road	Holly Springs	MS	38635	
National Wildlife Federation	901 E Street NW, Suite 400	Washington	DC	20004	Contact: Jim Lyon
Nature Conservancy	4245 N Fairfax Drive	Arlington	VA	22203	Contact: Thomas Cassidy
Union of Concerned Scientists	1707 H Street NW, Suite 600	Washington	DC	20006	Contact: Alden Meyer
Mississippi Association of Conservation Districts	PO Box 23005	Jackson	MS	39225	
Citizens for Clean Energy, Inc.	3417 4th Avenue S	Great Falls	MT	59405	Contact: Richard Liebert

Organization	Street Address	City	State	Zip Code	Notes
Institute for Energy and Environmental Research	6935 Laurel Avenue, Suite 201	Takoma Park	MD	20912	
United States Energy Association	1300 Pennsylvania Avenue NW, Suite 500, MB 142	Washington	DC	20004	
Project Stakeholders					
Rho Capital Partners, Inc.	152 West 57th Street	New York	NY	10019	Contact: Joshua Ruch
Braemar Energy Ventures	340 Madison Avenue, 18th Floor	New York	NY	10017	Contact: Neil S. Suslak Managing Director
Valero Energy Corporation	P.O. Box 696000	San Antonio	TX	78269-6000	Contact: Jim Gillingham Sr. Vice President, Alternate Energy and Project Development
Eco-Energy	725 Cool Springs Blvd., Suite 500	Franklin	TN	37067	Contact: JC Caudell Manager, Business Development
Three Rivers Solid Waste Management Authority	75 South Main Street P.O. Box 690	Pontotoc	MS	38863	
Ceres, Inc.	1535 Rancho Conejo Blvd.	Thousand Oaks	CA	91320	Contact: Michael Stephenson Vice President of Operations
Mississippi Loggers Association	P.O. Box 659 105 North Archusa Ave	Quitman	MS	39355	Contact: Cecil Johnson Executive Director
Mississippi State University Dave C. Swalm School of Chemical Engineering	Box 9595	Mississippi Stat	MS	39762	Contact: Todd French Co-Director of the Renewable Fuels and Chemical Laboratory
Williams Research	19815 NW Nestucca Drive	Portland	OR	97229	John Williams, Principal Researcher
Mississippi Technology Alliance Strategic Biomass Initiative	134 Market Ridge Drive	Ridgeland	MS	39157	Contact: Sumesh Arora Director
State of Mississippi Mississippi Development Authority	P.O. Box 849	Jackson	MS	39205-0849	Contact: Drew Troxler Project Manager, Global Business Division
Local Paper					
Pontotoc Progress	13 E Jefferson St	Pontotoc	MS	38863	
Regional Television Broadcast Company					
WTVA, Inc.	Post Office Box 350	Tupelo	MS	38802	

Appendix B
Unexpected Discoveries and Emergency Procedures Plan

Unexpected Discoveries and Emergency Procedures Plan

Enerkem Corporation Heterogeneous Feed Biorefinery Project
Pontotoc County, Mississippi

Archaeological or historical sites are occasionally discovered during construction projects regardless of whether the area was previously subject to a cultural survey and archaeological inventory. This Unexpected Discoveries and Emergency Procedures Plan is designed to address all such instances in which cultural resources that may be adversely impacted as a result of a project are inadvertently discovered during construction. Cultural resources are defined as historic properties as defined by the National Historic Preservation Act (NHPA), cultural items as defined by the Native American Graves and Repatriation Act, archeological resources as defined by Archaeological Resources Protection Act, sacred sites as defined in Executive Order 13007 to which access is afforded under the American Indian Religious Freedom Act, and collections and associated records as defined in 36 CFR 79. In accordance with the NHPA of 1966, the Historic Preservation Division of the Mississippi Department of Archives and History (MDAH) administers review and compliance responsibilities under both federal and state (Antiquities Act of Mississippi) laws.

If cultural resources are discovered during construction of the Enerkem Corporation's (Enerkem) Heterogeneous Feed Biorefinery Project (Project), Enerkem will take several steps to avoid or minimize damage to that resource. The Department of Energy and MDAH will immediately be notified and given as much information about the resource as is possible (e.g., resource type, location, and size). If necessary, a mitigation plan will be drafted and submitted to the MDAH for their review and comment. Enerkem will wait until the mitigation plan has been approved before resuming construction of the Project.

American Indians Religious Freedom Act of 1978 (AIRFA)

AIRFA promotes coordination with Native American religious practitioners regarding the effects of federal undertakings upon their religious practices. In the event of an unexpected discovery, Enerkem's consultation will follow National Historic Preservation Act (NHPA) guidelines, as amended. Impacts of importance to Native Americans may include flora and fauna, viewsheds, artifacts, and sites. Guidelines for AIRFA are still not determined; therefore all questions will be directed to the MDAH.

Disposition of Human Remains

The discovery of human remains from an unmarked grave or cemetery could be caused by construction. Due to the sensitive nature of such a situation, it will be addressed immediately by halting all construction in the area. Enerkem will then immediately contact the coroner and sheriff. In Mississippi, all unmarked burials and abandoned cemeteries are the responsibility of the MDAH under House Bill 780, Laws of Mississippi, 1971. This includes all Native American grave sites as well as many historic Euro-American, African-American and other cemeteries. In addition to coordination with MDAH, Enerkem will make reasonable efforts to identify and locate parties who can demonstrate direct kinship of the interred individual to determine the most appropriate treatment of the remains. If necessary, the procedures will also comply with the *Native American Graves Protection and Repatriation Act* and the United States Department of Agriculture's *Accidental Disturbance of Human Remains* and a qualified archaeologist will investigate the discovery within two days.

Enerkem or its agents will treat all human remains with dignity and respect until they are reinterred. Enerkem will not, under any circumstances, remove the remains from the Project area without following the procedures listed in this plan and in agreement with the MDAH. Based on previous correspondence and the requirements submitted with respect to this Project, the following agencies and/or Native American groups may need to be contacted, as appropriate, in the event of discovery and/or disturbance of unanticipated human remains:

Mr. James Woodrick
Mississippi Department of Archives & History
Historic Preservation Division
P.O. Box 571
Jackson, MS 39205-0571
(601) 576-6940

Kim Bedford
Pontotoc County Coroner
P.O. Box 914
Pontotoc, MS 38863
(662) 419-2875

Neal Davis
Pontotoc County Sheriff
490 HWY 6, W
Pontotoc, MS 38863
(662) 489-3165

Chief Philip Martin
Mississippi Band of Choctaw Indians
101 Industrial Rd.
Choctaw, MS 39350
(601) 656-5251

Appendix C
Traffic Study

Traffic Impact Analysis

Enerkem Bio-Fuel Development

on

Beulah Grove Road (CR 267)

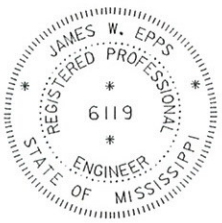
Pontotoc County, Mississippi

for

Three Rivers Solid Waste Management Authority
Pontotoc, Mississippi

by

Cook Coggin Engineers, Inc.
Tupelo, Mississippi
June 2010



James W. Epps, PhD, PE, PTOE (No. 862)

Introduction. The proposed Enerkem Inc. Heterogeneous Feed Biorefinery Project is to be sited within the existing boundaries of a Subtitle D landfill operated by the Three Rivers Solid Waste Authority in Pontotoc County, Mississippi. The proposed site is nine (9) acres of undeveloped upland industrial space containing planted pine tress that are 12-13 years old. The proposed site is currently used for commercial/industrial purposes, but there are no zoning restrictions. The only access to the proposed site is provided by two drives on Beulah Grove Road approximately 2,200 feet and 2,900 feet, respectively north of MS Hwy 76.

Figure 1. Beulah Grove Road

Beulah Grove Road/County Road 267 in Pontotoc County connects MS Hwy 336 to the south through MS Hwy 76 to Mathews Bend/County Road 246 to the north, a total distance of approximately 2.3 miles. The section of Beulah Grove Road north of MS Hwy 76 is a paved two-lane road for approximately 500 feet, then is an unimproved 30-foot crowned gravel road for approximately 8,400 feet to Mathews Bend/CR 246. Mathews Bend is a 20-foot DBST (double bituminous surface treatment) paved roadway and provides access to the Pontotoc County Industrial Park to the north. Mathews Bend/CR 246 also provides access to MS Hwy 15 to the east on McWhirter Bend/CR 248.

Current Traffic Conditions. Current traffic levels are estimated from 2008 MDOT records. The traffic volumes provided are average daily traffic (ADT) volumes and represent the average total traffic volume (vehicles) per day (vpd), as follows:

5,100 vpd	ADT on MS Hwy 76 west of Beulah Grove Road intersection
7,700 vpd	ADT on MS Hwy 15 north of McWhirter Bend intersection
160 vpd	ADT on Beulah Grove Road south of MS Hwy 76 intersection

There were no MDOT traffic count data available for Beulah Grove Road north of MS Hwy 76. It is likely that virtually all of the 160 vpd on Beulah Grove Road south of MS Hwy 76 is distributed to and from MS Hwy 76 to the north and MS Hwy 338 to the south. On Beulah Grove Road just north of MS Hwy 76, there are three (3) single family dwellings which are expected to generate most of the current traffic on Beulah Grove Road. From the ITE Trip Generation Manual (Volume 2, page 269), estimated Average Vehicle Trip Ends for Single-Family Detached Housing on a typical Weekday was computed to be 15 vpd. Additional traffic would result from any cut-through traffic to and from the Pontotoc Industrial Park toward MS Hwy 76. This traffic would not be substantial, however, because of the unimproved gravel surface currently provided on Beulah

Grove Road. Because of the improved pavement surfaces on Mathews Bend and McWhirter Bend, most of that Hwy 76-bound traffic would use those two roads to Hwy 15, then turn south to Hwy 76. It is expected that an estimated count of 15 vpd would use Beulah Grove Road for access to MS Hwy 76 to the south. Another minor source of traffic would be the residential development that is concentrated along the northern end of Beulah Grove Road adjacent to the intersection of Mathews Bend. The majority of this traffic bound for MS Hwy 76 is expected to use Mathews Bend and McWhirter Bend to MS Hwy 15 south to MS Hwy 76. A small portion of that traffic is expected to use Beulah Grove Road and its gravel surface. Another 10 vpd is added to that Beulah Grove Road north volume, making a total daily volume of 40 vpd.

Expected Traffic Conditions. The proposed Enerkem facility is expected to operate three 8-hour shifts per day, seven days per week with approximately 60 total employees. From the ITE Trip Generation Manual (Volume 2, page 90), estimated Average Vehicle Trip Ends for General Light Industrial on a typical Weekday based on Employees was computed to be 208 vpd. An additional 10 trips (5 trucks at 2 trips per day) per day are expected for trucks transporting ethanol from the site. Two additional trips are expected for a truck to delivery general supplies to the facility each day. The total number of daily trips to and from the facility on Beulah Grove Road is therefore expected to be 220 vpd with 50 percent inbound and 50 percent outbound.

Traffic Impacts. The expected traffic generated by the proposed Enerkem facility will be distributed to Beulah Grove Road and subsequently to MS Hwy 76. The additional ADT (average daily traffic) volume to be distributed to MS Hwy 76 is 220 vpd, and represents an increase in traffic of less than 5.0 percent. The traffic impacts of the additional traffic would be at a time when a shift-change occurred during the peak hour time on the adjacent street, MS Hwy 76. The additional traffic generated by one shift of employees (20) during the weekday peak-hour of MS Hwy 76 is computed from the ITE Trip Generation Manual (Volume 2, page 92), Average Vehicle Trip Ends for General Light Industrial on a typical Weekday based on Employees. This additional traffic volume is computed to be 65 vph, 39 vph of which will exit the facility to MS Hwy 76, and 26 vph of which will enter the facility from MS Hwy 76. A summary of the peak hour turning movements at the Beulah Grove Road/MS Hwy 76 intersection are provided in Table 1 below.

An analysis of the unsignalized intersection with stop-sign control on the minor (Beulah Grove Road) approaches using the HCM 2000 software and the peak hour volumes above revealed that the intersection of two-lane Beulah Grove Road and divided four-lane MS Hwy 76 had the current capacity to easily accommodate the expected peak hour traffic for the proposed Enerkem facility. The operational statuses of the various turning movements through the subject intersection are measured by the term Level of Service (LOS). When the numbers of gaps in the opposing traffic streams are sufficient to allow the minor traffic movements to freely enter or cross the major traffic

Highway	Movement/ Direction	Peak Hour Volume, vph	Remarks
Hwy 76	EB/WB Thru	510	20% ADT, 50-50
Hwy 76	EB Left	13	50% Entering PHV
Hwy 76	WB Right	13	50% Entering PHV
BG Road	SB Left	13	33% Exiting PHV
BG Road	SB Thru	13	33% Exiting PHV
BG Road	SB Right	13	33% Exiting PHV

Table 1. Peak Hour Turning Movements
Beulah Grove Road at MS Hwy 76

streams, the Level of Service for that minor traffic movement will be very good, LOS A or LOS B. As the number of available acceptable gaps decrease, the Level of Service also decreases as the minor traffic stream is delayed while waiting for an acceptable gap in the opposing major traffic stream. The various Levels of Service for an unsignalized intersection with stop-sign control on the minor approaches are provided in Table 2 below. Under the peak hour volumes provided in Table 1 above, both (right and left) turning movements from MS Hwy 76 to Beulah Grove Road operated at Level of Service A with average control delays of less than 9 seconds per vehicle. The southbound Beulah Grove Road traffic movements which shared a single traffic lane experienced slightly more delay, operating at Level of Service B with average control delays of 14 seconds per vehicle. These very acceptable operating Levels of Service and control delays are indicative of the excess capacity in the existing intersection to accommodate the proposed traffic movements from the Enerkem facility.

Recommendations. It is proposed that the Beulah Grove Road be improved with stabilized base, HMA (hot mix asphalt) pavement, and adequate shoulders from the MS Hwy 76 3,000 feet to the north beyond the last driveway to the proposed Enerkem facility. Due to the increased traffic volumes on Beulah Grove Road, the proposed roadway improvements are essential. The HMA pavement will provide a stable operating pavement surface during times of inclement weather. The HMA pavement will also eliminate the dust associated with traffic on a gravel road during periods of dry weather which would be unbearable to the current residents along the Beulah Grove Road.

Level of Service	Control Delay seconds/vehicle	Remarks
A	< 10.0	Free flow; gaps > reqd
B	10.0 - 15.0	Free flow, gaps > reqd
C	15.0 - 25.0	Stable flow
D	25.0 - 35.0	Unstable flow
E	35.0 - 50.0	Capacity; gaps = reqd
F	> 50.0	Forced flow; inadequate number of gaps

Table 2. Operational Levels of Service
Minor Approach Stop-sign Controlled Intersection

In addition, it is also determined that a left-turn lane on the southbound Beulah Grove Road approach is not needed. In fact, from an operational standpoint, it would be better if a left-turn lane were not provided and the southbound left-turn and through movements shared a single lane. These movements are both required to utilize the same storage space in the median area and the provision of a left-turn lane would only serve to increase the indecision of the motorist as they attempted to complete their desired movement. The same recommendation would also apply for the northbound Beulah Grove Road approach on the opposite side of MS Hwy 76.

References

Institute of Transportation Engineers, Trip Generation, 7th Edition, Volumes 1-3, Washington, DC, 2003.

McTrans Center, University of Florida, Highway Capacity Software (HCS2000), Version 4.1f, Gainesville, FL, 2003.

Transportation Research Board, Highway Capacity Manual (HCM 2000), National Research Council, Washington, DC, 2000.