AECOM Environment

Prepared for:
U.S. Department of Energy

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AECOM
Minneapolis
Project Number 60140143
June 2010

Final Environmental Assessment and Notice of Wetland Involvement

Construction and Operation of a Proposed Cellulosic Biorefinery, BlueFire Fulton Renewable Energy, LLC, Fulton, Mississippi

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Executive Summary

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

In February 2006, pursuant to § 932 of the EPAct 2005, DOE issued a Funding Opportunity Announcement (FOA) for applications to design, construct, and operate an integrated biorefinery employing cellulosic feedstocks for the production of combinations of (i) liquid transportation fuels; (ii) bio-based chemicals; (iii) substitutes for petroleum-based feedstocks and products; and (iv) energy in the form of electricity or useful heat. BlueFire Ethanol, Inc. (BlueFire) applied for, and was one of six companies selected to negotiate for, award of financial assistance to aid in the construction and operation of their planned cellulosic ethanol production facility.

Based on this selection, DOE proposes to provide financial assistance (the Proposed Action) to BlueFire for the design, construction and operation of the cellulosic ethanol production facility, the BlueFire Fulton Renewable Energy, LLC. Project (the Fulton Project) in the City of Fulton, Mississippi. The financial assistance would cover up to $88 million of the estimated $300 million project cost.

In accordance with DOE and National Environmental Policy Act (NEPA) implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. The proposal to use Federal funds to support the Fulton Project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with NEPA (42 United States Code [USC] §§ 4321 et seq.) and DOE's NEPA implementing regulations (10 Code of Federal Regulations [CFR] Section 1021.330) and procedures, this environmental assessment and notice of wetland involvement (EA) examines the potential environmental impacts of DOE's Proposed Action and a No Action Alternative.

The Fulton Project consists of the design, construction and operation of a biorefinery facility producing ethanol and other co-products from cellulosic materials utilizing a patented concentrated acid hydrolysis process. The Fulton Project is being developed by BlueFire to produce in excess of 18 million gallons per year (gpy) of ethanol from about 700 metric bone dry tons (BDT) per day of cellulosic materials consisting unmerchantable timber, logging residues and/or merchantable timber (biomass).

The objectives of the Fulton Project are as follows:

- Design and construct a commercial scale biorefinery that utilizes advanced cellulose-to-ethanol conversion technologies; the cellulosic feedstock would be primarily biomass.

- Implement a sustainable biomass collection, storage, and delivery system to provide feedstock to the biorefinery.

- Maximize alternative energy production and minimize traditional energy usage.

- Operate the biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.
  - Enable replication of the technology at new cellulose to ethanol facilities.

In compliance with the statutory mandate of EPAct 2005 § 932, DOE has implemented a program to demonstrate the commercial application of integrated biorefineries that produce ethanol from cellulosic feedstocks. The total project cost is being shared with over 60% being provided by BlueFire Ethanol and less than 40% by DOE. Funds for the initial phases of the work that include engineering design and NEPA totaled about $15MM and came from program funds. The construction and operational commissioning of the Fulton facility will be supported using American Recovery and Reinvestment Act funds. DOE would provide approximately $81MM for this phase with the balance of the total project cost being covered by BlueFire Ethanol, Inc. The facility that would be constructed and operated as a result of the Proposed Action would meet the requirements of §932 by using renewable supplies of wood to produce fuel-grade ethanol. The Proposed Action also would support DOE's mission to reduce dependency on fossil fuels and commercialize cellulosic technologies as well as curb GHG emissions. By providing financial assistance to support the construction of the proposed cellulosic ethanol production plant, DOE would support national energy needs and the development of alternative fuel sources.

This report presents the EA prepared pursuant to the DOE NEPA process. This report provides information on:

- The proposed Fulton Project;
- The alternatives considered, including the No Action Alternative; and
- The potential environmental impacts/benefits of the Proposed Action.

The EA study areas include:

- Occupational Health and Safety
- Air Quality and Meteorology
- Geology and Soils
- Biological Resources
- Water Resources
- Waste Management and Hazardous Materials
- Infrastructure
- Cultural Resources
- Land Use
- Noise
- Aesthetics
- Traffic
- Socioeconomics and Environmental Justice

Acronyms, Abbreviations, and Terms

°F	Degrees Fahrenheit
$\mu g/m^3$	microgram per cubic meter
A.K.A.	Also Known As
ACLS	Advanced Cardiac Life Support
AED	Automated External Defibrillator
AERMOD	A computer based atmospheric dispersion modeling program used for evaluating the ambient concentration of air pollutants from stationary sources
AMSL	Above Mean Sea Level
Arith.	Arithmetic
AST(s)	Above Ground Storage Tank(s)
BDT	Bone Dry Ton
biomass	unmerchantable timber, logging residues and/or merchantable timber
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CFB	Circulating Fluidized Bed Boiler
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CIP	Clean In Place
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CuFt	Cubic Feet
dBA	Decibels Adjusted
DOE	U.S. Department of Energy
DOT	Department of Transportation
E-85	85% Ethanol Fuel
EA	Environmental Assessment
EAC	Early Action Compact
EMA	Eutaw-McShan Aquifer
EPAct 2005	Energy Policy Act
ERP	Emergency Response Plan
ft^2	Square Feet
FDA	US Food and Drug Administration

FERC	Federal Energy Regulatory Commission
FOA	Funding Opportunity Announcement
g	Gravity
GHG	Greenhouse Gas
gpd	gallons per day
gpm	Gallons per minute
gpy	Gallons per year
HAP(s)	Hazardous Air Pollutant(s)
HID	High Intensity Discharge
ID	Identification
Inc.	Incorporated
Kw	Kilowatt
lbs	Pounds
Logging residues	Logging residues consist of tree tops, branches, stumps, and bark associated with timber harvesting activities
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
Merchantable Timber	Timber suitable for commercial harvest such as for lumber, paper products, or building materials
mg/L	Milligram per Liter
mg/m^3	milligram per cubic meter
mgd	Million Gallons per Day
mgy	Million Gallons per Year
MMBtu	Million British Thermal Units
MSDOT	Mississippi Department of Transportation
mph	Miles per Hour
MWh	Megawatt Hours
NAAQS	National Ambient Air Quality Standards
NGA	Natural Gas Act
NEMRWD	Northeast Mississippi Regional Water District
NEPA	National Environmental Policy Act
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System

NRCS	Natural Resources Conservation Service
NSA	Nearest Sensitive Area
NWI	National Wetland Inventory
Opportunity Biomass	Opportunity biomass is woody biomass as defined above that is procured from open market sources when economically feasible rather than from contract sources. Storm damaged trees would be a potential example of opportunity biomass
OSHA	Occupational Safety and Health Administration
PGA	Peak Ground Acceleration
PHA	Process Hazard Analysis
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 microns
PM2.5	Particulate Matter less than 2.5 Microns
ppm	Part per Million
proof	**Alcoholic proof** is a measure of how much alcohol (i.e., ethanol) is in an alcoholic beverage. Proof is twice the percentage of alcohol by volume.
PSM	Process Safety Management
PW	Production Well
qty	Quantity
RO	Reverse Osmosis
RPW	Relatively Permanent Water
SHPO	Mississippi State Historic Preservation Office
SMB	Simulated Moving Bed
SOP(s)	Standard Operating Procedure(s)
SO_2	Sulfur Dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPL	Sound Pressure Level
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
tpy	Tons per year
TRSWMA	Three Rivers Solid Waste Management Authority
TRPDD	Three Rivers Planning and Development District
$\mu g/m^3$	Microgram per Cubic Meter
unmerchantable timber	Unmerchantable timber consists of trees that are too young for commercial harvest, have a growth form that makes them unsuitable for commercial processing (such as very crooked or forked multiple times, or trees that

	have been damaged (lightning struck or broken by wind) and cannot be used for commercial purposes
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
vpd	vehicles per day
WRAP	Wetland Rapid Assessment Procedure

1.0 Introduction

1.1 Background

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

In February 2006 pursuant to § 932 of the EPAct 2005, DOE issued a FOA for applications to design, construct, and operate an integrated biorefinery employing cellulosic feedstocks for the production of combinations of (i) liquid transportation fuels; (ii) bio-based chemicals; (iii) substitutes for petroleum-based feedstocks and products; and (iv) energy in the form of electricity or useful heat. BlueFire applied to the FOA, and was one of six companies selected to negotiate for, award of financial assistance to aid in the construction and operation of their planned cellulosic ethanol production facility.

Based on this selection, DOE proposes to provide financial assistance to BlueFire for the design, construction and operation of the Fulton Project near the City of Fulton, Mississippi. The financial assistance would cover up to $88 million of the estimated $300 million project cost. About $6.4 MM of program funds are being used to complete the engineering design and NEPA requirements. Approximately $81.2 MM of American Recovery and Reinvestment Act funds appropriated in FY 2009 would be used to carry out the construction phase of the project. BlueFire Ethanol, Inc. is cost sharing well over 60% of the total project cost.

In accordance with DOE and NEPA implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. The proposal to use Federal funds to support the project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with NEPA (42 USC §§ 4321 et seq.) and DOE's NEPA implementing regulations (10 CFR Section 1021.330) and procedures, this EA examines the potential environmental impacts of DOE's Proposed Action and a No Action Alternative.

1.2 The National Environmental Policy Act

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

- Assess the environmental impacts/benefits of its proposed actions;
- Identify any adverse environmental effects that cannot be avoided should a proposed action be implemented;
- Evaluate alternatives to the proposed action, including a No Action Alternative;
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and

- Characterize any irreversible and irretrievable commitments of resources that would be involved should the proposed action be implemented.

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

This evaluates the potential individual and cumulative effects of the Proposed Action. No other action alternatives are analyzed in detail. For purposes of comparison, this EA also evaluate the impacts that would occur if DOE were to decide not to subsidize the construction and operation of the proposed plant (the No Action Alternative).

This EA has been prepared under DOE's regulations and guidelines for compliance with NEPA (42 USC §§ 4321 *et seq*.). The Draft EA was made available to interested members of the public and to Federal, State, and local agencies for review and comment prior to DOE's final decision on the Proposed Action.

1.3 Proposed Project Overview

The Fulton Project consists of the design construction and operation of a biorefinery facility producing ethanol and other co-products from cellulosic materials utilizing a patented concentrated acid hydrolysis process. The Fulton Project is being developed by BlueFire to produce in excess of 18 million gallons per year (gpy) of ethanol from about 700 metric bone dry tons per day (BDTPD) of cellulosic materials consisting primarily of unmerchantable timber, logging residues and/or merchantable timber (biomass).

The objectives of the Fulton Project are as follows:

- Design and construct a commercial scale biorefinery that utilizes advanced cellulose-to-ethanol conversion technologies; the cellulosic feedstock will be primarily biomass.
- Maximize alternative energy production and minimize traditional energy usage.
- Operate the biomass collection and biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.
  - Enable replication of the technology at new cellulose to ethanol facilities.
  - Demonstrate greenhouse gas emissions benefits
  - Create local economic development

1.4 Background and Site History

The proposed Fulton Project would be located on approximately 38 acres of land situated in the City of Fulton within the Port Itawamba Industrial Park, Itawamba County, Mississippi (Figure 1, Site Location Map in Appendix A). The City of Fulton is located approximately 19 miles east of Tupelo, Mississippi on US Highway 78. The proposed site is within ½ mile of the future Interstate Highway, I-22, with access to both commercial rail lines and the Tennessee-Tombigbee Waterway. The

Tennessee-Tombigbee Waterway provides a low cost and energy efficient trade link between the Sunbelt states and 14 river systems totaling some 4,500 miles of navigable waterways that serve mid-America.

The proposed Fulton Project site is currently vacant. The Fulton Project would not result in significant change to the topography of the site although surface leveling and grading would be completed to prepare for equipment foundation construction, drainage control, and paving activities. The site is relatively flat and partially wooded (Figure 2 – Proposed Fulton Project Site in Appendix A). The proposed site is zoned commercial/ industrial.

Through the use of the Arkenol concentrated acid hydrolysis process, BlueFire (the sole US licensee of that technology) would design, construct, and operate The Fulton Project that would convert approximately 700 metric tons per day (tpd) of cellulosic material into roughly 18 million gallons of fuel grade ethanol per year. Actual production volume would be dependent on the actual cellulose and hemicellulose content of the feedstock slate for any given day. This fuel would contribute to the cellulosic biofuel mandates under the 2010 federal renewable fuel standard (aka RFS2), starting at 6.5 million gallons per year by 2010 escalating to 16 billion gallons per year by 2022.

1.5 Purpose and Need

In compliance with the statutory mandate of EPAct 2005 § 932, DOE has implemented a program to demonstrate the commercial application of integrated biorefineries that produce ethanol from cellulosic feedstocks. Additionally, the DOE has established a loan guarantee program under Title XVII of the Energy Policy Act of 2005 as amended in Section 406 of the American Recovery and Reinvestment Act of 2009 to support debt financing for projects in the U.S. that employ energy efficiency, renewable energy, advanced transmission and distribution technologies and leading biofuels projects. The facility that would be constructed and operated as a result of the Proposed Action would meet the requirements of §932 by using renewable supplies of biomass, primarily wood and wood waste to produce fuel-grade ethanol and could be eligible under the loan guarantee program if all other criteria are met. The Proposed Action also would support DOE's mission to reduce dependency on fossil fuels and commercialize cellulosic technologies. By providing financial assistance to support the construction of the proposed cellulosic ethanol production plant, DOE would support national energy needs and the development of alternative fuel sources.

1.6 Public Scoping and Draft Environmental Assessment Public Comment Process

DOE guidance on public participation U.S. Department of Energy Environment, Safety And Health Office of NEPA Policy and Assistance, Second Edition, August 1998 http://nepa.energy.gov/nepa_documents/TOOLS/GUIDANCE/Volume2/4-1-pubpart.html) for Environmental Assessments requires:

- Notifying the host state and host tribe, affected states and tribes as appropriate, and the general public whenever possible, of a decision to prepare an EA
- Making a draft EA available to host and affected states and tribes, and on request, members of the public for preapproval review
- Making a proposed FONSI available to the public before the final decision in certain circumstances; and

- Making completed EAS and issued FONSIs available to the public

DOE considers public participation a fundamental component of DOE's decision making. DOE's goals for public participation are to:

- Actively seek and consider public comments and incorporate the views of stakeholders in making decisions.
- Inform the public in a timely manner about and empower them to participate in DOE's decision making processes.
- Incorporate credible, effective public participation processes into all of DOE's activities, at headquarters and in the field.

1.6.1 Public Scoping

In accordance with the applicable regulations and policies, DOE sent scoping letters to potentially interested local, state, and Federal agencies, including the U.S. Fish and Wildlife Service (USFWS), the Mississippi Department of Environmental Quality (MDEQ), the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP), the Mississippi Department of Transportation (MSDOT), and the Mississippi Department of Archives and History (MDAH). DOE also sent scoping letters to other potentially interested individuals and environmental, civic, business, and local government organizations to solicit public comment. DOE published the 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. In response to the scoping letters, DOE received two comment letters, one from the United States Fish and Wildlife Service (USFWS), the second from the Mississippi Department of Archives and History (MDAH). The USFWS letter did not raise any specific objections or concerns about the Proposed Action. The MDAH letter contained a Section 106 determination of No Effect which indicates that no cultural resources will be adversely affected by the proposed project. Appendix B contains a copy of the scoping letters and the scoping letter distribution list.

1.6.2 Draft Environmental Assessment

Upon availability of the Draft Environmental Assessment, DOE sent post cards to the distribution list alerting stakeholders that the Environmental Assessment was available in the DOE Golden Field Office online reading room: http://www.eere.energy.gov/golden/Reading_Room.aspx . The postcard invited comments from potentially interested parties for 30 days prior to publication of a decision document. Appendix B contains a copy of the postcard.

One comment was received from a concerned citizen in Portland, Oregon. The commenter was concerned that the community was not given the opportunity to participate in the NEPA process. The commenter requested a public hearing and extension of the public comment period. In addition, the commenter was concerned that impacts resulting from air emissions, wetlands losses, accident risks, and traffic and noise impacts were not adequately covered in the Draft Environmental Assessment and that an Environmental Impact Statement (EIS) may be more appropriate for this project. The comment is available *in toto* as part of the Administrative Record for this Environmental Assessment.

Under DOE regulation Subpart D §1021.400, the Fulton Project falls into the classes of actions that normally require EAs but not necessarily EISs. However, even if the action did not fall into one of the classes of actions that normally requires an EA but not necessarily an EIS, DOE regulation states that if a proposal is not encompassed within the classes of actions listed in the appendices to subpart D that DOE shall either : (1) Prepare an EA and, on the basis of that EA, determine whether to prepare and EIS or a FONSI; or (2) Prepare and EIS and ROD. After preparation and public review of the Draft EA, DOE has determined to prepare a FONSI.

By sending the scoping letter and Notices of Availability to the State, Tribes, and to local leaders and members of the communities in both Fulton and Tupelo, Mississippi, DOE is confident that the community was given an opportunity to participate in the NEPA process. Local leaders are very involved in supporting the success of this project as shown in Appendix I of this Environmental Assessment.

BlueFire Fulton Renewable Energy, LLC provided DOE with the best available information for air emissions, wetlands losses, accident risks and traffic and noise analysis at the design stage of the Fulton Project. This information is based on conservative estimates and may overestimate the actual impacts. Section 2.2.5.3 of this Environmental Assessments presents the approvals and permits required for this project. In addition, a Mitigation Action Plan has been developed and will be incorporated by reference into the Finding of No Significant Impact to ensure best management practices (BMP) and appropriate mitigation measures would be implemented upon construction and operation of the Fulton Project.

1.7 Report Content

This report presents the EA prepared for the DOE NEPA process. This report provides information on:

- The Proposed Action Alternative;
- The No Action Alternative; and
- The potential environmental impacts of the proposed Fulton Project.

The EA study areas include:

- Occupational Health and Safety
- Air Quality and Meteorology
- Geology and Soils
- Biological Resources
- Water Resources
- Waste Management and Hazardous Materials
- Infrastructure
- Cultural Resources
- Land Use
- Noise
- Aesthetics
- Traffic
- Socioeconomics and Environmental Justice

2.0 Project Alternatives

This section of the EA describes the No Action Alternative and The Fulton Project.

As discussed in greater detail in Section 2.1, the No Action Alternative consists of the Fulton Project facility not being constructed.

As discussed in Section 1.1, the Proposed Action is DOE's proposal to provide financial assistance to BlueFire for the construction and operation of a cellulosic ethanol production facility and a solid fuel boiler system that will use spent solids from the cellulose based ethanol system. The Fulton Project would produce approximately 18.4 mgy of ethanol. The Fulton Project would be located near the City of Fulton, Mississippi. The financial assistance would cover up to $88 million of project costs.

2.1 No Action Alternative

For purposes of analysis in this EA, the No Action Alternative is used to evaluate the potential impacts that would occur if the Fulton Project were not built and operated and no supporting infrastructure were constructed. Under the No Action Alternative, no DOE financial assistance would be awarded to BlueFire.

2.2 Proposed Action

As discussed in Section 1.1, the Proposed Action is DOE's proposal to provide financial assistance to BlueFire for the construction and operation of the Fulton Project.

This section will describe the different unit operations required to operate The Fulton Project, the waste streams generated, and the estimated workforce requirements. The basic components of the project would be:

- Cellulosic Material Collection, Receiving, and Handling
- Cellulosic Material Conversion to Sugars
- Fermentation of Cellulosic Sugars
- Ethanol Distillation
- Ethanol Storage and Loading
- Solid Fuel Boiler
- Co-products production
- Supporting Infrastructure

2.2.1 Project Overview and Purpose

The objectives of the Fulton Project would be as follows:

- Construct a commercial scale biorefinery that utilizes advanced cellulose-to-ethanol conversion technologies; the cellulosic feedstock will be primarily biomass.
- Maximize alternative energy production and minimize traditional energy usage.

- Operate the biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.
  - Facilitate replication of the technology at new greenfield cellulose to ethanol facilities.

2.2.2 Project Location and Site Plan

The Fulton Project would be constructed in the northwest quarter (NW ¼) of Section 1, Township 10 South, Range 8 East, Itawamba County, Mississippi under a lease agreement with Itawamba County. The subject property is located in the northwest quarter (NW ¼) of Section 1, Township 10 South, Range 8 East, Itawamba County, Mississippi (Figure 2 – Proposed Fulton Project Site). The property is approximately 38 acres in size and is situated along the east side of Access Road and west of Spring Street and the Mississippian Railroad. Primary access to the property is provided via Access Road from the southern and western property boundaries (Wildlife Technical Services, Inc., 2009a).

The proposed site is located in the southwestern portion of Fulton, Mississippi in close proximity to the Tenn-Tom Waterway and the Itawamba Port. Historically rural in nature, numerous manufacturing facilities have been constructed in the vicinity since the completion of the Tenn-Tom Waterway. The subject property in its current condition can best be described as a predominant forested tract with open fallow fields located in the southern portion of the site. The eastern portion of the property can be characterized as uplands while the western portion of the property lies within the historical floodplain of the Tombigbee River. The land use of the subject property appears to have been utilized for row crop and cattle production through time until the construction of the Tenn-Tom Waterway. Currently, J&J Appliance and Furniture is the only structure found on the property (Wildlife Technical Services, Inc., 2009a).

2.2.3 Process Description

The following paragraphs present a process description for the proposed project.

2.2.3.1 Biomass Receiving System

The proposed Fulton Project would use green wood as the primary biomass. The plant would require approximately 427,680 tons per year (tpy) (~1,296 tpd) of prepared woody biomass chips at 24% moisture to produce approximately 18.4 mgy of anhydrous fuel-grade ethanol (18.9 mgy denatured). Assuming approximately 14% bark content of the biomass and approximately 42% moisture content as-harvested, total as-harvested biomass requirements would be approximately 651,638 green tpy. Feedstock for the ethanol plant would be ¾"-minus in size at approximately 1032 tpd rate for the process and ¾" to 3" in size at approximately 264 tpd rate for the boiler fuel to supplement the lignin by-product.

Biomass would be purchased through local timber suppliers working under contract to BlueFire. BlueFire plans to receive biomass to be used for the Fulton Project from various sources such as local chip mills.

Pre-processing of biomass, debarking, chipping, and screening, would be expected to occur at the chip mills and biomass delivered to the site would be ready for process use. However, the analysis in this EA conservatively includes equipment located onsite with related emissions associated with the pre-processing operations to ensure that the potential to emit for the facility is complete.

Biomass purchased from feedstock suppliers would be delivered to the Fulton Project site via rail, truck or barge. If available, biomass processed at the former American Cellulose chip mill would be conveyed directly from the chip mill property to the proposed Fulton Project site using a totally enclosed belt conveyor or by trucks over the short distance to the Fulton Project site. The conveyor would be able to transfer chips directly into the process, bypassing the biomass day pile and biomass handling equipment. Biomass barges would be received either at the barge dock at the former American Cellulose or Itawamba County Port Authority docks. An enclosed conveyor would be constructed from the County Port to the Fulton Project site.

Unprocessed wood (less than 3 feet in length) received on-site would be cleaned using a vibrating screen to remove dirt, stones, debris and oversized material. Screen separation, grinders, a drum separator, and sizing screen/trommels would be utilized to prepare the wood for use in the process. Particulates from the biomass processing equipment would be controlled with a baghouse prior to release to atmosphere. Cleaned and dried chips would be conveyed to the process. The oversize material would be used as fuel for the circulating fluidized bed boiler (CFB) described in Section 2.2.3.13. The remaining material removed by the screen would be sent off-site for re-use by others or disposal in a local licensed landfill.

2.2.3.2 On-site Biomass Storage

There would be four biomass storage locations at the plant:

1. Biomass day pile

   Biomass received on site would be stored in a day pile if not transferred directly for process or boiler use. The size of the biomass storage pile would be approximately 650 tons, enough for approximately 12 hours of operation. Biomass from the day pile would be recovered using an automatic chain reclaim conveyor and run through the biomass processing equipment if the biomass size exceeds process specifications. The biomass would pass through a ¾” trommel/separator where the ¾”-plus would be sent to the boiler fuel bin while the ¾”-minus would be transferred to the biomass drying system described in Section 2.2.3.13.

2. Dry Biomass Storage Building

   Process feedstock, ¾”-minus chips, would be passed through a rotary drum dryer (Refer to Section 2.2.3.3) to reduce the moisture content to less than 10%. The dried biomass would then be conveyed to a dry biomass storage building (40,000 ft^2) with approximately 3 days storage capacity (2,600 tons). The stored biomass would be continuously withdrawn by a reclaim conveyor to the decrystalizer hopper. Particulate emissions from the dry biomass storage building would be controlled by a baghouse.

3. Biomass Receiving Storage Pile

   BlueFire’s feedstock procurement plan would also routinely evaluate the availability for cost effective biomass from the open market, also known as “opportunity” biomass. Opportunity biomass would be brought directly to the proposed Fulton Project site and unloaded into a secondary biomass storage pile. The size of the biomass storage pile would be directly related to the amount of opportunity biomass available but not larger than approximately 18,000 tons (14 days supply).

4. Boiler Day Pile

The oversized (¾” to 3”) material from the biomass processing could be stored in a boiler day pile to be used as boiler supplemental fuel. The maximum capacity of the pile would be approximately 800 tons, enough for approximately 3 days operation. This pile could also receive low value green waste such as bark or tree prunings. The material would be withdrawn by a reclaim conveyor to the boiler supplemental fuel bin.

2.2.3.3 Biomass Drying

Biomass with approximately 24% or more moisture content would be conveyed to a rotary drum dryer. The biomass would be dried to less than 10% moisture content. The dried biomass would be conveyed from the biomass dryer to a dry biomass storage building. The dry biomass storage shed would be approximately 40,000 square feet in size and designed to hold approximately 2,600 tons of dry biomass (3 days biomass storage for process).

The rotary dryer would utilize the exhaust from the biomass boiler described in Section 2.2.3.13. The hot exhaust would be approximately 450°F when entering the rotary dryer. Exhaust gases from the dryer would vent through a cyclone separator to remove recoverable biomass before passing through pollution control equipment, including a recirculating slurry lime scrubber and a fabric filter (baghouse). An induced draft fan would draw the exhaust gases through this equipment and then discharge to atmosphere via a boiler exhaust stack fitted with a continuous emission monitoring system (CEM) for nitrogen oxides.

The recirculating lime slurry scrubber in the flue gas train would react with sulfur dioxide in the exhaust gases to form calcium sulfate (gypsum). The dry gypsum particulate would then be captured in the fabric filter (baghouse). The fabric filter would also control particulate matter emitted by the dryer.

Lime for the dry lime scrubber would be purchased from an off-site vendor. The lime would be transferred into a lime silo using the pneumatic conveyor system on the delivery truck. Emissions from the lime transfer process would be controlled by a baghouse.

Fly ash and gypsum from the fabric filter would be transferred to a storage silo prior to off-site sales as soil amendment and/or road base material. Particulate matter from the ash silo and loadout would be controlled by a baghouse.

2.2.3.4 Biomass Processing

Dry biomass would be conveyed from the dry biomass building via a reclaim conveyor to a process feed silo. The silo would be sized to hold sufficient biomass for approximately one hour supply to the process. The biomass would be fed into the process using a rotary valve and a screw auger.

Biomass feedstock would be mixed in an extruder reactor at about 85ºC (less than the boiling point of water) for a short period of time with approximately 75% concentrated sulfuric acid to form a “gel” of solids and soluble, cellulosic polymers. The acid would act as a catalyst and would not be consumed, breaking down the lignin and converting the wood into an amorphous gel. The gel would be pushed to a screw auger feeding a positive displacement, high-solids pump.

Water would be added to the de-lignified gel in the screw auger to form a slurry. The slurry would be pushed to a plug-flow reactor with sufficient residence time to allow complete hydrolysis of the solution. Water in the presence of acid would break the polymer sugar chains into component molecule parts at the weak molecular bond points to produce fermentable, monomer sugars.

The mixture of lignin residue and acidic sugar solution would be pumped to filter presses. The lignin and other solids residue would be separated from the acidic sugar solution.

2.2.3.5 Lignin Processing

The lignin filter cake would contain unrecoverable sugars, some unconverted cellulose and hemicellulose, elemental carbon, minor amounts of acid (sulfuric), and other non soluble components present in the feedstock. The filter cake would be washed with water using a countercurrent, multistep, cake washing process. The clean, washed, filter cake would contain less than 1% residual acid. The intermediate rinse aliquots would be stored in aboveground tanks prior to use. The water from the final step of the cake rinse process would be recycled for use in the earlier hydrolysis step described in Section 1.1.1.4.

The clean lignin residue would be conveyed "wet" to the boiler fuel feed silo. The cake would be a compacted, fibrous material holding smaller particles with a consistency like "wet fiberboard". The constituents would vary slightly with the biomass feedstock, but would be approximately 50% moisture, 30% lignin, 10% cellulosics, 5% inorganics/sugar lost and 5% ash. It would have a dry heating value of approximately 7,200 BTU/lb and would contain less than 0.5% residual free sulfur.

Table 2-1 Approximate Proximate Analysis of Mixed Lignin and Oversized Biomass Boiler Fuel (%):

Reporting Basis	**As-Received**	**Dry**	**Air Dry**
Moisture	50%	0%	35.73%
Ash	6%	12%	7.71%
Volatile	30.54%	61.08%	39.23%
Fixed Carbon	13.46%	26.92%	17.30%
Total	**100%**	**100%**	**100%**
Sulfur	0.50	1.00	0.64
Btu/lb (HHV)	4,609	9,218	6,346
MMF Btu/lb	3,608	7,216	
MAF Btu/lb		7,220	

2.2.3.6 Separation of Sugars and Acid

Following filtration of the lignin, the acidic sugar solution would be pumped through a polishing filter to remove any residual, fine, particulate matter. The solids from the filter would be backwashed to the upstream side of the primary filter press where they would be added to the lignin cake. The acid and sugar solution, together with the first cake-rinse water, would be separated into component acid and sugar streams using a liquid-liquid separation process known as liquid chromatography in a Simulated Moving Bed (SMB) system. The SMB chromatography system would use the differences in ionic charge and physical size between the sugar and acid molecules to separate them. Essentially, the resin-filled vessels (beds) would permit the sugar molecules to pass through at a faster rate than the acid molecules, permitting a physical separation and concentration of the sugar and acid fractions.

Elution water from the acid recovery unit (ARU), consisting of excess condensate and water from the bottom of the distillation column, would be used to assist in separating the two streams.

The SMB chromatography system would allow recovery of approximately 98% of the sulfuric acid and 99.5% of the sugar solution entering the separator. The small fraction not "recovered" would end up in the opposite stream (<2% sugars in the acid and <0.5% acid in the sugar solution).

2.2.3.7 Acid Reclamation

The acid recovered in the SMB would be diluted with water as it went through the process and would need to be reconcentrated before it could be reused at the front end of the process again. The Acid Reconcentrator Unit (ARU) would use steam generated in the CFB boiler to remove water from the diluted acid in a set of multi-effect evaporators. The acid would be reconcentrated to approximately 75%, a concentration that is optimal for the front-end decrystallization process and relatively easy to achieve since water is more difficult to remove as the acid concentration increases. The concentrated acid would be pumped to an above-ground storage tank for reuse in the process.

The water removed from the dilute acid solution would be recovered through condensation and used as elution water in the SMB process. A cooling tower dedicated to the ARU would help condense the water evaporated from the acid solution and would provide cooling for the condensing, barometric condensers.

2.2.3.8 Sugar Stream Neutralization

The sugar stream would still contain a small amount of acid (<1%) which would help maintain sterile (non-fermentative) conditions. This acid (H_2SO_4) would be neutralized with lime ($Ca(OH)_2$) to form gypsum ($CaSO_4$). This would follow the chemical reaction:

- $H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4 + 2H_2O$

Using excess lime would also precipitate dissolved metals that might inhibit fermentation. The solid crystals of gypsum would be precipitated out of solution and collected by a filter press. The neutralized sugar solution would then be pH adjusted and pumped to the fermentation system.

Lime for the neutralization system would be purchased from an off-site vendor. The lime would be transferred into a lime silo using the pneumatic conveyor system on the delivery truck. Emissions from the lime transfer process would be accomplished by an integral product filter separator.

BlueFire would evaluate possible beneficial reuse of the gypsum, such as agricultural application. In the event that beneficial reuse is not available, the gypsum would be disposed in a licensed landfill.

2.2.3.9 Fermentation

Nutrients would be added to the sugar solution for the continuous fermentation system. Fermentation would be achieved using commercially available brewers yeast. The fermentation system would not require a genetically modified organism (GMO).

Continuous fermentation would eliminate the required fill/empty/CIP time of batch fermentation systems and allow recycling of high concentrations (10 times batch or 20-30 g/l) of acclimated yeast to yield 100% glucose utilization in less than 12 hours of fermentation time.

The sugar solution would be fermented in a series of four fermentation tanks to produce "beer" and carbon dioxide (CO_2). The beer, containing approximately 6% ethanol, would be pumped to a beer well (tank) and then to the distillation and dehydration system.

The CO_2 gas stream would pass through a wet scrubber to recover ethanol and trace organics in the gas stream before being sent to the circulating fluidized bed boiler (CFB) for control of VOCs and HAPs.

Spent yeast from the fermentation system would be removed from the beer by a centrifuge system. A portion of the yeast would be recycled to fermentation and the surplus yeast would be sold off-site as high-protein animal feed.

2.2.3.10 Distillation and Dehydration

Beer would be continuously pumped from the beerwell to the distillation column to yield an ethanol product of approximately 190 proof (95%). Under pressure, the 190 proof ethanol vapor would be pushed through one of two molecular sieve beds where the remaining water vapor would be captured in the ceramic sieve packing to yield 200-proof (anhydrous) ethanol. The 200 proof vapor leaving the molecular sieve vessel would then be condensed and directed into one of two 30,000 gallon, aboveground, storage tanks (day tanks). A small portion of the product vapor would be used to regenerate the other of the two molecular sieve beds by stripping the water absorbed in it and recycling back to the distillation column.

The ethanol in the day tanks would be tested for conformance to product specifications. If the ethanol meets specification, it would be pumped to a 150,000-gallon, aboveground, product storage tank and mixed with denaturant (commonly gasoline at 2-5%). Ethanol product that does not meet specifications would be transferred to one of two 30,000 gallon recycle tanks for reprocessing in the dehydration step.

Non-condensable gases from the distillation system and associated processes would contain VOCs and HAPs. These gases would be vented to the fermentation wet scrubber and then combusted in the CFB. The CFB would control VOCs and HAPs from the gases and vent the combustion products to atmosphere with the rest of the CFB fluegas.

2.2.3.11 Yeast Propagation

Still bottoms from the distillation process would be pumped to a sugar reclamation process. Xylose (C5) sugars not converted in the anaerobic (without air) fermentation would be reclaimed from the still bottoms and concentrated by reverse osmosis (RO). The recovered sugars would be pumped to the aerobic (air added) yeast propagation train. The yeast is pumped to the fermenters to maintain a constant yeast concentration and the excess yeast cream would be sold as animal protein supplement.

Non-condensable gases from the yeast propagation system would contain some VOCs and HAPs. These gases would be vented to the fermentation wet scrubber and combusted in the CFB. The control device would remove most of the ethanol and other VOCs from the gases, which would be vented to atmosphere.

2.2.3.12 Ethanol Storage and Loading

Ethanol and denaturant would be stored in the following aboveground storage tanks:

Tag #	Description	Type	Volume (gal)	Dia (ft)	Shell Height (ft)
T-1301A	Ethanol Day Tank	Fixed roof	30,000	14	28
T-1301B	Ethanol Day Tank	Fixed roof	30,000	14	28
T-1302A	Ethanol Recycle Tank	Fixed roof	30,000	14	28
T-1302B	Ethanol Recycle Tank	Fixed roof	30,000	14	28
T-1401	Denatured Ethanol (Product) Tank	Internal floating roof	150,000	27	36
T-1402	Denaturant (Gasoline) Tank	Fixed roof	15,000	10	25

Denatured ethanol would be pumped to a truck and/or rail loading system for off-site transport and sale. Ethanol vapors expelled from the load out process would be vented to a flare for pollution control.

2.2.3.13 Biomass Circulating Fluidized Bed (CFB) Boiler

The oversize material from the biomass screening system and residual lignin from the biomass processing system would be conveyed to the CFB boiler fuel feed silo. The biomass fuel would be combusted in a CFB boiler. The CFB would use coarse sand as the circulating bed material. The sand would absorb heat from combustion until it glows white hot, quickly vaporizing incoming fuel to allow complete combustion. Initial and cold startups of the CFB boiler would be accomplished with natural gas combustion until the bed temperature reaches biomass combustion temperature. Biomass would be fed into the CFB boiler to produce approximately 260,000 lbs of (250 pound per square inch pressure) steam per hour for the process.

Sand and limestone would be purchased from off-site vendors and trucked to the proposed Fulton Project site. The sand and limestone would be mechanically conveyed to individual storage silos and from the silos to the CFB boiler. Particulate matter from the silos would be controlled by fabric filters.

The CFB boiler would utilize a selective non-catalytic reduction (SNCR) system to reduce NO_X emissions. The exhaust gases would be ducted to the biomass dryer and through a dry scrubber and baghouse prior to release to atmosphere through the exhaust stack.

2.2.3.14 Support Operations and Facilities

The proposed facility would require support operations and facilities including:

- Utilities: Water, Gas, Electric, Sewer, Air, Fire Water
- Cooling towers
- Emergency diesel fire pump and diesel aboveground storage tank
- Maintenance shop
- Aboveground storage tanks for process chemicals
- Clean in place (CIP) systems for fermentation equipment
- Administrative offices
- Laboratory

- Truck weighing scales
- Central control room
- Power distribution centers or Machine Control Centers
- Custody transfer station
- CO_2 plant (future installation)

2.2.3.15 Supporting Infrastructure

The Fulton Project would require supporting infrastructure including process water, potable water, electricity, natural gas, non-contact cooling water discharge systems and sanitary wastewater treatment systems.

BlueFire would contract with the City of Fulton to supply the Fulton Project with water via connection with the Northeast Mississippi Regional Water District's (NEMRWD's) water system. BlueFire would require an average of approximately 110 gallons per minute (gpm) (approximately 58 mgy) for utility and process operations. Water use would increase during summer months due primarily to an increased requirement for water in the evaporative cooling towers. Maximum, short term, water use during period of high temperature would be 600 gpm. BlueFire would be served by the City of Fulton from water it receives from the NEMRWD (the "District"). Water would be provided to the Fulton Project via an interconnection to the District's 14 inch water main that runs alongside the Mississippian Railroad (east of the site) from Pumping Station No. 1 to Hwy 25 S.

The District's current water withdrawal permit is for 30 mgd and they have a current finished water production capacity of 18 mgd (+/-). In 2008, the District delivered an average of 10 mgd (+/-) to their customers . The City of Fulton system is currently able to receive and distribute up to 4 mgd of supply from the District. The most recent high usage month was June 2009 with 43 mg being used (1.43 mgd average). (Personal Communication - Tim Roberts) The City of Fulton would be able to meet the Fulton Project's maximum water needs of approximately 600 gpm (0.86 mgd) without system or permit modification. .

BlueFire would require approximately 7 megawatts (MW) of power for facility operations. BlueFire would construct a new substation on-site. The electricity would be supplied from an existing substation owned by the Tombigbee Electric Power Association located about ½ mile from the site. The substation has approximately 15 MW of excess capacity. No new transmission lines are expected to be required. (Personnel communication - David Kelso)

For start up and shutdown operation of the solid fuel boiler, the Fulton Project would require a supplemental natural gas supply. BlueFire would connect to an existing four inch high pressure natural gas line located along the west side of the proposed site to provide this backup natural gas supply. The location of the proposed natural gas line is shown on Figure 2.

Non-contact cooling water and sanitary wastewater would be discharged to the City of Fulton's Wastewater Treatment Facility through a new interconnection with an existing discharge line located at the south end of the proposed site. The average discharge rate would be approximately 100 gpm. The location of the proposed non-contact cooling water and sanitary wastewater discharge line is shown on Figure 2.

2.2.3.16 Start up, Shutdown, Maintenance, and Emergency Conditions

The Fulton Project would normally operate 24 hours per day, seven days per week. On an annual basis, it is expected that the facility would operate approximately 330 days per year. Minor maintenance activities would be regularly scheduled throughout the operating year with an additional plant-wide shutdown scheduled each year for major maintenance activities that require the entire plant to be off-line. This would limit the number of times the facility goes through a complete start up and shut down cycle.

Standard Operating Procedures (SOPs) would be developed for each operating system and the associated pollution control systems. SOPs would need to be developed for:

- Wood receiving and handling;
- Decrystallization and hydrolysis;
- Filtration;
- Separation;
- Neutralization;
- Acid Reclamation;
- Fermentation, and distillation systems;
- Ethanol and denaturant loading and storage; and
- The solid fuel boiler and ash handling systems.

The Fulton Project would shut down under emergency conditions such as power or process water loss. The Fulton Project would have emergency fire pumps in the event of a fire.

The pollution control systems (fabric filters) associated with wood receiving, handling, and storage would be interconnected with the motor controls on the process equipment. Shutdown of the pollution control device would automatically shut down the associated process.

The Fulton Project fermentation and distillation systems would have a thermal oxidizer to remove ethanol and VOC from the vapor stream.

The lignin from the Fulton Project would normally be combusted in the solid fuel boiler. Operation of the solid fuel boiler would require the use of pollution control systems for PM, NO_X and SO_X control. In the event of a control device failure, a Startup Shutdown and Maintenance plan created specifically for the boiler control devices would be followed. In the event that the solid fuel boiler is not operational, the ethanol process would be shut down. The residual lignin would be temporarily stored on-site for use after restart of the solid fuel boiler. In rare cases the lignin could be disposed in a licensed landfill. Because lignin would be the primary fuel for the CFB boiler, long-term, on-site storage of the lignin would not be likely to occur. Odors from lignin storage would only be anticipated to occur if the material was stored for extended periods of time, i.e. greater than 3 days.

2.2.4 Construction

2.2.4.1 Preconstruction Surveying and Geotechnical Analysis

The site where the Fulton Project would be constructed is well documented. Information regarding the topography, geotechnical conditions, and underground utilities has been developed during the planning phases of the proposed Fulton Project. This information would be used to guide the preconstruction activities for the Fulton Project.

BlueFire has completed preconstruction surveys and geotechnical analysis for the site including soil borings and compression testing. BlueFire has completed a rough grading plan. A topographical survey of the proposed site would be completed prior to preparation of a final grading plan.

A wetland delineation of the entire Fulton Project site has been completed with approximately 12.06 acres of jurisdictional wetlands and other waters of the United States identified on the Fulton Project site. BlueFire does not anticipate the need for any access roads or other site disturbances to complete the topographical survey. BlueFire does anticipate impacting a portion of the identified wetlands during the construction of the Fulton Project. A detailed discussion of wetlands is provided in Section 3.5 of this EA.

2.2.4.2 Grading and Earthworks

The site grading design would be completed to minimize the impact to the surrounding environment. The amount of land that would be cleared, graded, or otherwise disturbed for the construction of the Fulton Project is approximately 14 acres. This includes construction laydown areas, new roads, and process areas. After completion of construction, the disturbed areas that would not be used for the Fulton Project operations would be seeded with native grasses.

BlueFire would obtain authorization from the MDEQ for a Large Construction Storm Water General National Pollutant Discharge Elimination System (NPDES) Permit for storm water discharge associated with construction before initiating any construction. An Erosion and Sedimentation Control Plan, and SWPPP would be developed prior to starting construction as required by the Large Construction Storm Water NPDES Permit. BlueFire would utilize engineering and construction Best Management Practices (BMPs) to control the amount of sedimentation and erosion created by the construction process. The BMPs would include, but not be limited to:

- minimizing traffic and activity outside the construction area;
- temporary seeding, mulching, using silt fencing, hay bales, rip rap; and/or
- sedimentation ponds.

In accordance with MDEQ storm water regulations and the SWPPP, BlueFire would routinely inspect the BMPs to ensure implementation and to evaluate whether additional measures would be required to prevent unnecessary impacts.

2.2.4.3 Roads and Facility Access

Access to the Fulton Project site would be via South Access Road. South Access Road is a two lane asphalt paved road with a 40 ton weight limit. As shown on Figure 3, 2005-2007 Average Annual Daily Traffic Map in Appendix A, South Access Road connects to the southeast to State Highway 25, a four lane divided multiple-access highway that is the major access point to the City of Fulton from State Highway 78 (the future I-22). Highway 78 is a divided four lane limited access highway. Highway 78 is located less than ½ mile from the Fulton Project site. South Access Road connects to North Access Road north of the proposed Fulton Project site. BlueFire anticipates that a majority of traffic to the site would exit Highway 78 onto Highway 25 north and turn left onto South Access Road.

BlueFire would construct access roads on the Fulton Project site for employee vehicles and various trucks. As shown on Figure 2, employee vehicles would enter the site directly into the employee parking lot on the south end of the Fulton Project site from South Access Road. Up to 65 vehicles for employees and other service providers are expected to arrive at the site daily in multiple shifts.

Trucks bringing chemicals to the site, hauling ash off-site from the facility boiler and making general deliveries would use a short loop road located on the southwest corner of the Fulton Project site off of South Access Road. Approximately 5 chemical trucks, five to ten general delivery trucks, and twenty seven ash trucks will arrive and leave on-site per week.

Denaturant would be brought to the site by truck. Denatured ethanol would be hauled off-site by truck and/or rail. Trucks hauling denatured ethanol and denaturant would use a loop road on the west side of the Fulton Project site off of South Access Road. Approximately two denaturant trucks and fifty denatured ethanol trucks would use the loop road per week.

In the event that an opportunity biomass supply is identified, haul trucks would use the west loop road to bring the biomass on-site. The availability of opportunity biomass supplies is expected to be infrequent. The substantial majority of the biomass would come from contracted suppliers. Thus, the number and distribution of trucks is not known but would not be expected to exceed 50 per day for a limited number of days per year.

The Mississippian Railroad Cooperative, Inc. (MRC) operates a Class III local rail line that runs adjacent to the northeast corner of the site. BlueFire would construct approximately 1,000 track feet of new rail siding on the proposed plant site. Prior to the shutdown of the American Cellulose Company wood chipping plant located south of the Fulton Project site, the MRC ran between 50 and 120 trains per month. Rail traffic required to support the Fulton Project, including wood receiving and ethanol haul out would not be expected to exceed these historic levels.

2.2.4.4 Major Buildings and Structures

Fulton Project would include the construction of new buildings and exterior tanks, similar in size and configuration to those typically located at an ethanol plant. The table below outlines the major buildings and equipment that would be added to the site as a result of Fulton Project.

Table 2-2 Summary of the Major Fulton Project Structures

Structure	Description	Structure Size
Uncovered Biomass Day Pile	Temporary green biomass storage pile	120 ft x 100 ft x 20 ft
Boiler Day Pile	Temporary storage pile for boiler fuel (lignin, wood, wood waste, and bark)	140 ft x 100 ft x 20 ft
Dry Biomass Storage Building	Open sided building for storage of dried biomass for process use.	~40,000 square feet
Biomass Receiving Storage Pile	Storage area for opportunity biomass supplies	375 ft x 375 ft x 20 ft
Maintenance Warehouse	Storage of maintenance equipment and supplies	10,000 square feet
SMB PLC Control Building	Simulated Moving Bed chromatography units	~150 square feet
Utilities Building	Includes electric grid connection	~20,000 square feet

Structure	Description	Structure Size
Control Building	Control Room, Lunch Room, Lockers and Showers	~5,000 square feet
Office Building	Plant offices	~10,000 square feet
Decrystallizer PLC Control Building	Decrystallizer and Hydrolysis equipment	~150 square feet
Lignin Filtration Roof Structure	Lignin Filter Press	~3,000 square feet
Distillation PLC Control Building	Distillation and Dehydration equipment	~150 square feet
ARU PLC Control Building	Acid Recovery Unit	~150 square feet
Boiler PLC Control Building	Circulating Fluidized Bed Solid fuel boiler	~150 square feet
Pollution Control Area	Dry Lime Scrubber, Fabric Filter	~4,000 square feet
Fermentation Area	Beer Well, Three fermentation tanks, piping and support equipment	Beer Well = ~200,000 gallons, 60 feet tall Fermenter 1 = ~145,000 gallons, 82 feet tall Fermenter 2 = ~102,000 gallons, 82 feet tall Fermenter 3 = ~73,000 gallons, 82 feet tall Fermentation PLC Building ~ 150 square feet
Gypsum and Lime Area	Gypsum Filter, Lime Silo and Slaker	~13,000 square feet
Gypsum Filtration Roof Structure	Gypsum Filter Press	~3,000 square feet
Ethanol Storage Tanks	1 Denaturant Tank, 2 200-Proof (100%) Day Tanks 1 Product Recycle Tank 1 Denatured Ethanol Product Tank	15,000 gallons 30,000 gallons 50,000 gallons 150,000 gallons
Cooling Towers	Structure to cool water by evaporation	5,000 ft^2
Potable Water Storage Tank	Potable Water Storage	100,000 gallons
CO_2 Processing Station (future)	CO_2 compression	~10,000 square feet

Pending final design and configuration requirements, gravel storage areas, concrete pads, steel structures, or tanks may be installed in conjunction with the major buildings and equipment listed above.

2.2.4.5 Construction Schedule

Once the appropriate environmental and building permits have been obtained, construction of the Fulton Project from facility construction to initial startup would be approximately 18-24 months. Once the civil contractor has prepared the site for the required infrastructure the topsoil would be stripped, ditches and ponds established, and erosion control devices installed. Underground utilities would be installed in preparation for concrete foundations. The construction of the facility would then follow.

2.2.4.6 Construction Staffing

BlueFire would have full time construction management on-site throughout the entire duration of the construction activities. Over the duration of the construction activity, the labor force would average around 250 employees, with a short term peak of nearly 500. This workforce would be derived from a combination of existing local and regional resources. The regional and local construction activities of the last five years for Toyota and other companies have developed a significant available workforce with experience in facility construction.

2.2.5 Operations

2.2.5.1 Material Balance and Logistics

Table 2-3 summarizes resources and products that Fulton Project would require for the production of ~18 mgy of denatured cellulosic ethanol. Additional details are presented in the following paragraphs.

Table 2-3 – Summary of Fulton Project Material Balance

Input Description	BlueFire
Cellulosic material (wood chips)	1,296 tpd at 24% moisture content
Process Water	0.864 mgd
Potable Water	2,500 gpd
Acid Makeup	3,100 gpd
Lime/Limestone	17,500 tpy
Yeast	Initial loading for yeast train only
Fermentation Nutrient	~3,500 gpd
Denaturant (gasoline or natural gas liquids)	0.9 mgy
Natural gas usage	6.4 MMSCF/year Boiler Cold Start Ups and Building Heating
Fuel for Solid Fuel Boiler	790 tpd lignin cake @ 50% moisture, bark, wood and or wood waste
Boiler Bed Material Makeup	1 tpd
19% Aqueous Ammonia for SNCR system	8 tpd
SMB Resins	~3,300 ft^3/yr
Electricity	~7.0 MWh/hour

Input Description	BlueFire
Output Description	Facility Products
Ethanol @ 5% Denaturant	18.8 mgy
Yeast Protein	~13 tpd (Dry Basis)
Gypsum	9830 tpy
Waste Material Description	Annual Production
Cooling tower and boiler water discharge	63,000 gal/day
Non-hazardous solid waste	25 tons/week
Hazardous Waste	<220 lb/month
Boiler Ash	100 tpd
Air Potential Emissions	
PM	132.7 tpy
PM10	115.7 tpy
NOx	221.4 tpy
CO	202.7 tpy
VOCs	200.6 tpy
SO2	246.9 tpy
Hazardous Air Pollutants • Highest Single HAP • Total HAPs	 9.4 tpy Methanol 24.3 tpy
GHGs	
CO_2 Carbon Neutral CO_2 Biogenic CO_2 Anthropogenic CO_2	 338,000 tpy boiler emissions 60,000 tpy fermentation 0 tpy

2.2.5.2 Biomass Availability

The plant would require 427,680 tpy of prepared woody biomass chips at 24% moisture to produce 18 mgy of anhydrous fuel-grade ethanol (18.8 mgy denatured). Assuming approximately 14% bark content of the biomass and approximately 42% moisture content as-harvested, total as-harvested biomass requirements would be approximately 651,638 green tpy.

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

Biomass would be purchased through local timber suppliers working under contract to BlueFire. The exact mix and origin of biomass used at any given time would vary, based on market conditions. Because merchantable timber would likely be more expensive than unmerchantable timber and logging residues, use of this source would be minimized. Unmerchantable timber would be acquired from an area within approximately 60 miles of the Fulton Project. Merchantable timber would be obtained primarily from an area within approximately 75 miles of the Fulton Project. The difference in biomass source radii is due to existing infrastructure for transporting the different biomass materials. However, feedstock sources would not be limited to this area and feedstock would be obtained from any commercially viable source, as needed.

The site provides a good opportunity for a biomass-based operation. Biomass is plentiful and infrastructure is available for tri-modal delivery access (rail, truck, or barge). Timberland comprises approximately 63.3% of the total land within a 75 mile radius of the Fulton Project site (Ward Consulting, 2008; Appendix C). Land ownership of the timber lands are predominantly private, 89.8%, with 8.0% federal land and 2.3% state lands.

In 2007-2008, within a 75-mile radius of the proposed Fulton Project site, growth (increase in inventory) vs. drain (harvest) of merchantable timber, trees measuring 5.0 to 8.9 inches in diameter only, is summarized on Table 2-4.

Table 2-4– Summary of Growth vs. Drain (Harvest) of Merchantable Timber (Ward Consulting, 2008)

	Growth Tpy	Drain (Harvest) Tpy	Increase in Inventory Tpy	Growth/Drain Ratio
Softwood	3,133,751	2,383,664	750,087	1.31
Hardwood	1,709,627	1,424,998	284,629	1.2
Total	4,843,378	3,808,662	1,034,716	1.27

In 2007-2008, within a 75-mile radius of the proposed Fulton Project site, 21,844 acres of hardwoods and 48,440 acres of pine were harvested. Table 2-5 summarizes the harvested and residual biomass from the harvested area. This includes both merchantable and non-merchantable biomass. Residual biomass is the biomass left on the harvested land. (Ward Consulting, 2008 and MIFI).

Table 2-5 – Summary of 2007-2008 Timber Harvest and Residual Biomass Availability

	Total Biomass Tons	Harvested Biomass Tons	Residual Biomass Tons
Softwood	3,395,946	2,682,311	713,635
Hardwood	1,739008	1,321,938	417,070
Total	5,134,954	2,814,509	1,130,705

Based on the above information, the excess biomass available from the acreage within 75 miles is 1,034,716 tons of merchantable timber annually with another 1,130,750 tons of biomass residuals left post harvest that may be recovered for beneficial use. The total excess biomass supply of 2,165,421 tpy is >3.3 times the 651,638 green tpy required by the Fulton Project. The Fulton Project site's easy access to barge and rail would also allow for procurement of feedstock from outside the 75 mile radius.

All inbound trucks carrying feedstock would access the former American Cellulose chip mill or the Fulton Project site from Highway 25/South Adam Street from the east, and then turn onto South Access Road going west and into the Fulton Project site or the chipping area at the American Cellulose facility. No roadway improvements are planned for truck traffic into the area. The chip mill has a rail spur that connects to the MRC and would allow for feedstock to be delivered by rail. The rail spur for the Fulton Project could also provide feedstock delivery to the site. The chip mill and the site are also situated along the Tennessee-Tombigbee Waterway and the Itawamba Port with barge access either from the chip mill or the Itawamba Port for barge delivery of feedstock for the Fulton Project.

Although the Fulton Project design would be based on using wood as the primary biomass, the BlueFire cellulosic ethanol process would accommodate a wide range of cellulosic feedstocks. Other biomass from agricultural (residues) or urban (cellulosic MSW) sources may be also be used in the Fulton Project as the volumes and infrastructure for these sources become more economical. These would provide supplemental biomass for long term operations.

2.2.5.3 Permits, Approvals, and Plans

The Fulton Project would require a number of environmental permits, approvals, and plans for construction and operation. The permits, plans, and approvals are included in Table 2-4 below:

Table 2-4 – Fulton Project Potentially Applicable Permits and Approvals

Need For	Permit Name	Agency	Complete By	Notes
Air Emissions	Authority to Construct (ATC)	Mississippi DEQ	Construction	To be filed. Mississippi is in attainment for all criteria pollutants. Mississippi has adopted Federal Standards (New Source Performance Standards, National Emissions Standards for Hazardous Air Pollutants, etc.) by reference.
Grading Plan	Grading Permit	City of Fulton	Construction	
Building Permits	For Construction activities	City of Fulton		Issued throughout construction as inspections are completed

Need For	Permit Name	Agency	Complete By	Notes
Deliveries to Site	Overload Limit Permits - Construction deliveries	County and MSDOT as applicable.	Construction	Prior to start of construction & operations as necessary.
Fire Protection	Hazardous Material Inventory and Emergency Response Plan	Port Itawamba/City of Fulton	Operations	Consultation during design. Inspections during construction and operations.
Hazardous Material/Waste	Hazardous Waste Generator ID	EPA	Operations	TBD (for soiled rags, used oil, etc.)
Land Use Entitlement	For planned use	Itawamba County	Construction	Property currently zoned commercial/industrial.
Safety	Building Permits	OSHA	Construction	File during construction
Surface Water Resources	Stormwater Permit for General Construction	MDEQ under NPDES	Construction	Filing under General Permit. Submit Notice of Intent, Stormwater Pollution Prevention Plan, and fees 2 days prior to start of construction.
Water Supply	Will Serve Letter	City of Fulton	Construction	Approximately 600 gallons per minute of water will be provided to the facility by the City of Fulton.
Alcohol Fuel Permit	For production and sale of fuel ethanol	Bureau of Alcohol, Tobacco & Firearms	Operations	
Wetlands	USACE Section 404 Permit	USACE-Mobile District	Construction	Wetland impacts will be mitigated by purchasing wetland credits from an existing wetland mitigation bank.
Air Emissions	Title V Operating Permit	EPA	Construction	

The above permits and revisions would be completed in approximately the same timeframes as discussed in Section 2.2.4.5.

2.2.5.4 Operational Workforce

The Fulton Project workforce for site operations, would be approximately 45 to 50 people. The workforce for other services such as biomass delivery and handling, would be approximately 15 to 20 people. The total workforce of approximately 65 to 70 could be supported by the surrounding area's population and skilled personnel such that BlueFire expects to hire the necessary people from existing local and/or regional resources.

2.2.5.5 Project Design Features to Minimize Threat from Intentional Destructive Activities

The Fulton Project would be designed to include measures to minimize potential threats or damages from intentional destructive acts (i.e. acts of sabotage or terrorism). The facility design would include security fences, security lighting, and communication procedures with the local 911 emergency response system. In addition, the facility would be manned 24 hours per day and equipped with automation that allows remote emergency shutdown and cutoff of process units and loading racks.

3.0 Affected Environment and Environmental Consequences of the Alternatives

3.1 Safety and Occupational Health

3.1.1 Affected Environment

The Fulton Project would be located in the southwest portion of the City of Fulton. Emergency services are provided by the City of Fulton Police Department, Fire Department and the Itawamba County Fire Department. The City of Fulton Fire Department is located at 604 South Adams Street, Fulton, Mississippi and the Itawamba County Fire Department is located at 607 Highway 25 South, Fulton, Mississippi. Both are within 5 miles of the proposed Fulton Project site.

The fire protection systems for the Fulton Project would be designed to limit personal injury, loss of life, property loss, and plant downtime from fire or explosion. The Fulton Project would have the following fire protection systems:

- Fire Hydrant/Hose Stations - Adequate numbers of fire hydrants and hose stations would be provided throughout the facility to ensure sufficient coverage of the process areas. Water would be supplied from an aboveground fire fighting water system with a full capacity electric driven fire water pump and a full capacity diesel driven fire water pump serving as a backup. BlueFire would also incorporate provisions for a fire fighting foam system in the facility design. The following would be protected with the foam system in case of a fire:

    1. Distillation facilities
    2. Ethanol dehydration facilities
    3. Ethanol Loading Station

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

- Plant Fire Brigade - Operating and maintenance personnel would be 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.

- Local Fire Protection Service - The Fulton Project would also rely upon the county and 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 ethanol 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 Fulton Project information necessary to ensure that safe and effective fire fighting measures are used at the plant.

In addition to the fire hydrants and foam systems, the plant will be equipped with hand held fire extinguishers, temperature detectors, smoke detectors, and other fire detection devices as required by fire codes and the Itawamba County or the Office of the State Fire Marshal.

Occupational health services are provided by the North Mississippi Medical Center located in Tupelo, Mississippi approximately 17 miles from Fulton. The North Mississippi Medical Center has:

- Advanced Wound Care and Hyperbaric Clinic
- Critical Care Unit
- Operates a Level II Trauma Center
- North Mississippi Air provides medical helicopter transport. Helicopter contains advanced life support equipment (North Mississippi Medical Center website, 2009)

Itawamba County has an Emergency Management Agency. The Emergency Management Agency's role is to coordinate 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.

The Fulton Project would develop appropriate spill control, pollution prevention, and Emergency Response Plans (ERPs) for the facility that 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.

BlueFire would also establish 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.

3.1.2 Environmental Consequences of the No Action Alternative

The No Action Alternative would have no affect on existing emergency response capabilities of the City of Fulton and/or Itawamba County.

3.1.3 Environmental Consequences of the Proposed Action Alternative

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 3.7. However, 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 reactive, i.e. acids or bases.

BlueFire would develop appropriate spill response, pollution prevention, and ERPs to address the medical and environmental hazards associated with the Fulton Project. The plans would include, at a minimum, a Spill Prevention, Control and Countermeasure (SPCC) Plan, a Storm Water Pollution Prevention Plan (SWPPP), and an ERP. The plans would be completed in accordance with federal and Mississippi Occupational Safety and Health Administration (OSHA) and USEPA and MDEQ regulations and guidance.

BlueFire would also establish 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.

The existing emergency response capabilities of the City of Fulton and Itawamba County are expected to remain in place and available to the Fulton Project, if needed.

3.2 Meteorology

3.2.1 Affected Environment

Meteorology for the Fulton 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 thunder storms, are common in summer. Itawamba County historical area-adjusted tornado activity is slightly above the Mississippi state average. It is 175 percent greater than the overall U.S. average (City Data.com, 2009).

Climate data for the City of Fulton and surrounding area shows that average monthly mean temperature ranges from 40 degrees Fahrenheit (°F) to 80°F. Winter months (December through February) are the coldest with average monthly low temperatures ranging from 46°F to 47°F and high temperatures ranging from 55°F to 58°F. The warmest months are the summer months of June through August. During those months, the average monthly temperature ranges from 78°F to 80°F and high temperatures range from 89°F to 92°F. Average annual precipitation is approximately 60 inches. August through October have the lowest precipitation rate with an average of 3.60, 4.11, and 3.49 inches, respectively, most of which is in the form of rainfall (Mississippi State University, 2009). The wind is predominantly from the north during the winter months and south during the summer months (Figure 4 – Tupelo Wind Rose).

3.2.2 Environmental Consequences of the No Action Alternative

No aspect of the No Action Alternative would affect the climate or weather of the region.

3.2.3 Environmental Consequences of the Proposed Action

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

Similar to the No Action Alternative, severe weather, such as thunderstorms or hurricanes, may temporarily impact operations by limiting delivery of supplies, impeding shipments of ethanol, 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 allow for normal operations to resume with minimal impacts. BlueFire would modify its ERP, as necessary, to protect their employees and the public in the event of severe weather.

3.3 Air Quality

3.3.1 Affected Environment

3.3.1.1 Ambient Air Quality

The Clean Air Act required the USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS include two types of air quality standards. Primary standards protect public, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (USEPA, 2009a). USEPA has established and Mississippi has adopted NAAQS for seven principal pollutants, which are called "criteria pollutants".

Table 3-1 - National Ambient Air Quality Standards

Pollutant	Primary Standards	Averaging Times	Secondary Standards
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None
	35 ppm (40 mg/m^3)	1-hour(1)	None
Lead	1.5 µg/m^3(2)	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
PM_{10}	150 µg/m^3	24-hour(3)	Same as Primary
$PM_{2.5}$	15.0 µg/m^3	Annual(4) (Arithmetic Mean)	Same as Primary
	35 µg/m^3	24-hour(5)	Same as Primary
Ozone	0.075 ppm (2008 std)	8-hour(6)	Same as Primary
	0.08 ppm (1997 std)	8-hour (7)	Same as Primary
	0.12 ppm	1-hour(8) (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arithmetic Mean)	-------
	0.14 ppm	24-hour(1)	-------
	-------	3-hour(1)	0.5 ppm (1300 µg/m^3)

Table obtained from USEPA, 2009a.

(1) Not to be exceeded more than once per year.

(2) Final rule signed October 15, 2008.

(3) Not to be exceeded more than once per year on average over 3 years.

(4) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

(7) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(8) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.
(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

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. Itawamba County is in attainment for all criteria air pollutants (USEPA 2009b). The USEPA maintains a database of selected ambient air quality data. According to the USEPA Air data County Air Quality Report, no data is available for Itawamba County, Mississippi. Therefore, Lee County, which is the county west of Itawamba County was reviewed. The air quality data for selected pollutants was:

Table 3-2 – Lee County Ambient Air Quality Data

Pollutant	Averaging Period	Lee County Ambient Air Quality Data			
		2006	2007	2008	
Ozone	1-hour	0.087 ppm	0.086 ppm	0.075 ppm	Below U.S. average
	8-hour	0.076 ppm	0.073 ppm	0.068 ppm	Below U.S. average
$PM_{2.5}$	24-hour	30.1 μg/m^3	30.8 μg/m^3	27.8 μg/m^3	Near U.S. average
	Annual	12.08 μg/m^3	13.22 μg/m^3	12.23 μg/m^3	Near U.S. average

3.3.1.2 Odor

The Fulton Project would be constructed in an existing industrial area. Nearby sources of emissions would include the wood chipping mill (formerly American Cellulose Corporation), Mueller Copper Tube Company, Mueller Casting Company and Hickory Hill Furniture Corporation. With the exception of the chipping mill, these facilities are expected to generate a minimal amount of odor associated with their operations. The chipping mill historically produced a distinct odor of fresh cut wood.

3.3.1.3 Greenhouse Gases

Direct (Point Source) GHG Emissions

Existing businesses and residences utilize fossil fuels, primarily natural gas, for process operations and space heat. A GHG inventory has not been developed for the City of Fulton or Itawamba County.

3.3.2 Environmental Consequences of the No Action Alternative

3.3.2.1 Ambient Air Quality

The proposed property would remain undeveloped and the beneficial production of cellulosic ethanol would not occur. No changes in air quality would occur.

3.3.2.2 Odor

The proposed property would remain undeveloped, and the beneficial production of cellulosic ethanol would not occur. No changes in odor would occur.

3.3.2.3 Greenhouse Gases

The proposed property would remain undeveloped, and the beneficial production of cellulosic ethanol would not occur. The expected reduction of CO_2 emissions from the Fulton Project of 107,612 tpy would continue to be emitted.

3.3.3 Environmental Consequences of the Proposed Action

The environmental impacts as a result of the Proposed Action due to the construction and operation of BlueFire would be an increase in the amount of air pollutants emitted.

Emissions during construction would consist primarily of fugitive dust generated by site grading and vehicles moving on the site and exhaust emissions from construction equipment and trucks. 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. Dust emissions would be minimized by using appropriate fugitive dust control measures, such as road watering, temporary vegetative cover, or dust suppressants, as needed. Therefore, impacts to air quality during the construction phase of the Fulton Project would be minor and temporary.

Potential emissions during operations would come from several sources.

Fugitive dust would be generated by vehicle traffic hauling raw materials and finished products to and from the site. These emissions would be minimized by paving, enforcing a 10 mile per hour speed limit, and by maintaining the roads as needed. Fugitive dust, would also be generated from the wood chip receiving, and ash loadout operations and would be reduced by best operating practices.

The fermentation and ethanol distillation systems would generate emissions of VOC and HAPs, including acetaldehyde, formaldehyde, and methanol. These pollutants would be controlled by venting the exhaust gases from these processes through a wet scrubber that would remove approximately 95% of the VOC and 75% of the HAPs. Ethanol storage and loadout operations would also generate emissions of VOC and HAPs. Storage tank emission would be controlled by use of floating roof design or nitrogen blanketing of the tanks. Loadout emissions would be controlled by a flare.

The solid fuel boiler would generate PM, PM_{10}, NO_X, SO_X, CO, VOC, and HAPs from combustion of the spent lignin, bark, wood, and wood waste. Emissions of NO_X would be controlled by a SNCR system. The wood chip dryer would generate PM, PM_{10}, CO, VOC, and HAPs from the drying operations. Emissions from the wood dryer would be reduced by using the hot exhaust gas from the boiler instead of a fossil fuel to heat the dryer. SO_X emissions from the dryer and boiler exhaust would be controlled by a dry lime scrubber. Particulate matter emissions would be controlled by a fabric filter. Table 3-4 summarizes the potential to emit from the Fulton Project.

Although pre-processing of the biomass is expected to occur at the chip mills, for completeness purposes, emissions from pre-processing have been included in the table below.

Table 3-3 - Summary of the Fulton Project Potential to Emit

Input Description	Chipping Operations	BlueFire Fulton Renewable Energy, Inc.	Cumulative[1]
PM	23.9 tpy	108.8 tpy	132.7 tpy
PM_{10}	13.2 tpy	102.4 tpy	115.7 tpy
$PM_{2.5}$	2.7 tpy	66.0 tpy	68.8 tpy
NO_x	0 tpy	221.4 tpy	221.4 tpy
CO	0 tpy	202.6 tpy	202.6 tpy
VOCs	0.80 tpy	199.8 tpy	200.6 tpy
SO_2	0 tpy	246.9 tpy	246.9 tpy
Acetaldehyde	0.1 tpy	1.1 tpy	1.3 tpy
Methanol	0.2 tpy	9.2 tpy	9.4 tpy
Total HAPs	0.8 tpy	23.4 tpy	24.3 tpy

[1] Cumulative emissions may not add up to exactly the sum of Chipping operations and BlueFire due to rounding off the significant digits

As noted in Section 3.3.1.1, the USEPA has established and the MDEQ has adopted the NAAQS for criteria air pollutants. The NAAQS include two types of air quality standards. Primary standards protect 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 (USEPA, 2009A). The MDEQ requires new facilities that would have significant air emissions to acquire an air permit to construct prior to beginning construction. As part of the permitting process, the MDEQ does not require that an ambient air quality modeling analysis be completed.

BlueFire has completed a screening level evaluation of the potential impacts to the ambient air from the maximum potential emissions from the Fulton Project. As shown on Table 3-5 the analysis demonstrates that the Fulton Project would not cause or contribute to an exceedance of the NAAQS. VOC and HAP analysis are not included in this analysis because NAAQS have not been established for these pollutants.

Table 3-4 – Summary of Ambient Air Quality Impacts from the Fulton Project

Pollutant	Primary Standards	Averaging Times	Fulton Project Results
Carbon Monoxide	10 mg/m^3	8-hour	0.024 mg/m^3
	40 mg/m^3	1-hour	0.034 mg/m^3
Nitrogen Dioxide	100 $\mu g/m^3$	Annual (Arithmetic Mean)	2.3 $\mu g/m^3$
PM_{10}	150 $\mu g/m^3$	24-hour	6.0 $\mu g/m^3$
$PM_{2.5}$	15.0 $\mu g/m^3$	Annual (Arithmetic Mean)	1.2 $\mu g/m^3$

Pollutant	Primary Standards	Averaging Times	Fulton Project Results
	35 μg/m^3	24-hour	6.0 μg/m^3
Sulfur Oxides	78 μg/m^3	Annual (Arithmetic Mean)	2.2 μg/m^3
	364 μg/m^3	24-hour	11.2 μg/m^3
	1300 μg/m^3	3-hour	25.1 μg/m^3

3.3.3.1 Odor

The wood processing would be expected to produce a distinct odor of fresh cut wood. The odor from the process and chip piles would be identical to the odor from historic operations of the American Cellulose Corporation at this location.

The Fulton Project would have potential odor sources including green biomass storage, lignin storage, and the fermentation system. The potential odors from green biomass storage would be from the degradation of the wood due to moisture and bacterial/fungal action. The Fulton Project would control these odors by minimizing the amount and duration of green wood chip storage. Under normal operations, green wood chips would be stored for less than 3 days which is not enough time for degradation to become significant.

Odors from wet lignin storage would also be from the degradation of the wood due to moisture and bacterial/fungal action. The lignin would be the primary fuel supply to the solid fuel boiler, thus limiting the storage duration and limiting the opportunity for degradation.

The potential odors from the fermentation system are VOCs. These compounds would be controlled using a wet scrubber similar to a conventional ethanol facility. The control system assures that VOCs and the associated odors would not be released into the atmosphere during normal operations.

The combination of pollution control equipment operation, operating procedures, and the distance to the nearest residence (over 0.5 mile) would effectively manage odors from the facility.

3.3.3.2 Greenhouse Gases

The Fulton Project would generate GHG primarily from two sources, the fuel combustion equipment (biogenic sources and anthropogenic sources) and the fermentation process (biogenic sources). The facility boiler would be fueled by lignin, wood waste, bark, and wood, all biogenic sources. The CFB boiler would use natural gas for combustion only during startup and shutdown, so anthropogenic GHG emissions would be minimal. Fermentation CO_2 emissions are a biogenic source of CO_2 emissions. Biogenic sources are natural sources of CO_2 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 3-3 summarizes the potential emissions of GHGs from the Fulton Project.

Table 3-5 - Summary of Current Potential to Emit for Greenhouse Gases

Greenhouse Gases	Lignin and Biomass Combustion (Carbon Neutral)	Fermentation (Biogenic)	Total
CO_2	322,850 tpy	56,368 tpy	379,218 tpy
Methane	34 tpy	0 tpy	34 tpy
N_2O	21 tpy	0 tpy	21.tpy

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 ethanol produced. Therefore, emissions of GHGs are not expected to be higher during start up or shutdown conditions than during normal operations.

Life Cycle GHG Analysis

All of the fuel inputs for the facility, except minimal amounts of natural gas for building heat and boiler startup and shutdown use, would come from the spent lignin from the ethanol process, bark and waste wood from the chipping operations, and wood from opportunity biomass supplies. As such, the GHG emissions from the boiler are considered to be “carbon neutral”. A plant is said to be carbon neutral if the carbon dioxide (CO_2) that it absorbs while alive is the same as the CO_2 it emits when burned as a fuel. The use of the solid fuel boiler would off-set up to 198,676 tpy of anthropogenic CO_2, 1.0 tpy of anthropogenic N_2O and 3.8 tpy of anthropogenic methane that would be produced if a natural gas fired boiler was used for steam production.

Currently, the latest consensus data of a “well-to-wheels” life-cycle analysis performed by Michael Wang of the Argonne National Laboratory (Argonne 2007) indicates that cellulosic ethanol yields an 86% reduction in GHG when compared to gasoline use. This life-cycle analysis takes into account refining of gasoline, growing and harvesting of the cellulose feedstock, transportation of both crude oil and cellulose and then gasoline and ethanol, and the tailpipe emissions from the use of these fuels.

Production of 18 mgy of lignocellulose ethanol would displace approximately 12.9 mgy of gasoline based on a simple energy balance of ethanol and gasoline which uses the accepted standard gasoline displacement ratio of 1.4. Based on an emission factor of 19.4 pounds of CO_2/gallon of gasoline (EPA420-F-05-001), 12.9 mgy of gasoline results in 125,130 tpy of CO_2 emissions. Therefore, the fuel replacement reduction in CO_2 emissions from the Fulton Project would be 107,612 tpy (86% x 125,130 tpy).

Total reduction in anthropogenic GHG emissions would be 306,288 tpy of anthropogenic CO_2, 1.0 tpy of anthropogenic N_2O and 3.8 tpy.

3.4 Geology and Soils

3.4.1 Affected Environment

Itawamba County is located within the East Gulf Coast Plain Physiographic Area of the Atlantic Plain Physiographic Province (USGS 2003). This physiographic area is characterized by level to rolling topography which is broken by several streams and river bottoms (BLM, 2009). The Fulton Project site is located within the floodplain of the Tombigbee River with an elevation ranging from approximately 255 to 280 feet above mean sea level (AMSL), see Figure 5 - Fulton Topographic Map in Appendix A.

3.4.1.1 Geology

The Fulton Project site would be located in the Tombigbee River floodplain. The surficial soils on the site consist of alluvial materials. These alluvial soils overlay the Eutaw formation which formed in the Cretaceous Age. The primary lithologies of the Eutaw formation consist of cross-bedded and thinly laminated glauconitic sand and clay or mud (MSGS, 1947). The thickness of the Eutaw formation at the site is approximately 120-150 feet (MSGS, 1969). The Eutaw formation is underlain by the Tuscaloosa formation which also formed in the Cretaceous Age. The primary lithologies of the Tuscaloosa formation consist of sand, gravel, clay, silt, lignite, etc. (MSGS, 1947). The thickness of the Tuscaloosa formation at the Fulton Project site is approximately 100 feet (TVA). Paleozoic rocks underlie the Tuscaloosa formation (TVA).

A total of seven soil borings were advanced on the Fulton Project site as part of a geotechnical investigation by Aquaterra Engineering in June, 2009 (Aquaterra, 2009). The soils in the upper 30 feet encountered in the aforementioned borings were described as highly variable by Aquaterra. These soils consisted of alternating layers of sandy clay, clayey sand, silty sand and clayey silt. Very stiff or hard clays were generally encountered in the borings below 30 feet and extended to the terminus of the borings (50 feet). The location of the borings is shown on Figure 6 – Fulton Project Site Soil Boring Locations in Appendix A. The complete boring logs are attached in Appendix D.

3.4.1.2 USDA Mapped Soil Conditions

Mantachie, Savannah and Ora soil series are found within the site boundaries according to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey (NRCS, 2009). A copy of the USDA-NRCS map depicting the soils on the site is attached, see Figure 7 – Fulton Project Site USDA-NRCS Soil Map in Appendix A. Detailed descriptions of the above mentioned soil series are provided below.

Mantachie loam (Ma) comprises the majority of the surficial soils on the site (generally the western portion of the site). Mantachie loam is characterized by slopes of 0 to 2%, somewhat poorly drained, and is found in flood plains. Mantachie loam parent material consists of loamy alluvium. Mantachie loam has a moderately high to high capacity to transmit water and a high available water capacity. The frequency of flooding is described as occasional with no frequency of ponding by the NRCS (NRCS, 2009).

Savannah loam (SbB) comprises the eastern portions of the surficial soils on the site. Savannah loam is characterized by slopes of 2 to 5%, somewhat poorly drained, and is found in coastal plains. Savannah loam parent material consists of loamy alluvium deposits. Savannah loam has a moderately high capacity to transmit water and a low available water capacity. The frequency of flooding and ponding are described as none by the NRCS (NRCS, 2009).

Ora fine sandy loam (OaC2) comprises the south-central portion of the surficial soils on the site. The OaC2 designation of Ora fine sandy loam is characterized by slopes of 5 to 8% (eroded) and is moderately well drained. Ora fine sandy loam parent material consists of loamy fluviomarine deposits. Ora fine sandy loam has a moderately high capacity to transmit water and a low available water capacity. The frequency of flooding and ponding are described as none by the NRCS (NRCS, 2009).

Ora fine sandy loam (OaD2) comprises portions of the north-central and northeastern part of the surficial soils on the site. The OaD2 designation of Ora fine sandy loam is characterized by slopes of 8 to 12% (eroded) and is moderately well drained. Ora fine sandy loam parent material consists of loamy fluviomarine deposits. Ora fine sandy loam has a moderately high capacity to transmit water and a low available water capacity. The frequency of flooding and ponding are described as none by the NRCS (NRCS, 2009).

3.4.1.3 Hydrogeology

Shallow groundwater was encountered in the alluvial materials at depths ranging from 6 to 11 feet in Borings B-1 through B-7 performed by Aquaterra. No groundwater was encountered in Boring B-7. The shallow groundwater table likely fluctuates based on the shallow soil conditions. Aquaterra noted that the groundwater rose in borings B-1 through B-6 after a period of 15 minutes to depths ranging from 4.5 feet to 9.5 feet.

The City of Fulton is served by municipal water. The water supply to the City of Fulton is treated surface water from the NEMRWD. The City also has a network of five wells with screened depths ranging from 274-300 feet BGS (MDEQ, 2009). The screened depths of city wells are located in the Gordo aquifer (Tuscaloosa formation) (TVA).

A detailed discussion of hydrogeology is provided in Section 3.6.1.1 of this EA.

3.4.1.4 Earthquake Hazard

Earthquake hazard is defined with respect to two ground motion parameters specified by the USGS based on a probability of exceedances of 2% in 50 years (USGS, 2007a). Typically, these two parameters are combined and expressed as a single value, peak ground acceleration (PGA) in units of gravity (g) (USGS, 2009a). In Itawamba County, there is only a 0.01 probability of a magnitude 4.75 or greater earthquake over a 100-year period (USGS, 2009b). The peak ground acceleration (PGA) for Itawamba County is 0.2 g (USGS, 2009c). Based on the information that the site has a low potential for seismic activity, there is no need for special consideration of earthquakes as a source of potential accidents.

3.4.2 Environmental Consequences of the No Action Alternative

The No Action Alternative would have no impact on geology or soils.

3.4.3 Environmental Consequences of the Proposed Action

The Proposed Action would include development of approximately 38 acres of land that is currently vacant. The site would require grading, excavation, and site development activities associated with construction of the Fulton Project. BlueFire would develop an Erosion Control Plan and a SWPPP to prevent excess erosion or degradation of the site. The areas disturbed during construction, such as equipment laydown areas that are not part of the active facility, would be seeded with appropriate grasses and vegetation as part of the erosion control plans and SWPPP for the facility.

3.5 Biological Resources

3.5.1 Affected Environment

The proposed Fulton Project site consists of approximately 38 acres of land. The proposed Fulton Project site is located in the Port Itawamba Industrial Park, which is zoned Commercial/Industrial. The Fulton Project would be located on vacant land that is not currently in use.

The proposed Fulton Project site is a predominantly forested tract with open fallow fields located in the southern portion of the site. The eastern portion of the property can be characterized as uplands while the western portion of the property lies within the historical floodplain of the Tombigbee River. Figure 8 – Fulton Project Site FEMA Flood Plain Map Appendix A shows the extent of the floodplain. The land use of the property appears to have been utilized for row crop and cattle production through time until the construction of the Tennessee -Tombigbee Waterway. Based on the Phase I Environmental Site Assessment (ESA), no other known land use has been associated with the proposed site, other than for agriculture and limited rural residential use. Currently, J&J Appliance and Furniture is the only structure found on the property.

A wetland delineation and determination of the 38 acre proposed Fulton Project site has been completed. A copy of the wetland delineation report is located in Appendix E.

The wetland delineation methodology was completed in accordance with the USACE Wetland Delineation Manual (1987) which requires investigation of three wetland parameters:

- hydrophytic vegetation,
- hydric soils, and
- hydrological characteristics at selected sampling points within a study area.

These points are positioned to ascertain upland/wetland boundaries and to record significant spatial changes in wetland plant communities. For an area to be classified as a wetland, positive indicators of each of the three parameters above must be present.

In terms of suspected jurisdictional areas, the wetland delineation revealed the presence of one (1) ephemeral drain or Non Relatively Permanent Water (RPW), one (1) wetland drain, one (1) forested wetland, one (1) isolated open water impoundment and two (2) isolated wetland depressions (Wildlife Technical Services, Inc., 2009b). Figure 9 – Fulton Project Site Wetland Location Map in Appendix A shows the location and configuration of the wetland areas within the property boundary and wetland data points.

3.5.1.1 Isolated Scrub Shrub and Forested Wetland Depressions

One scrub shrub wetland (approximately 0.12 acre) and one forested wetland depression (approximately 0.02 acre) were encountered in specific locations in the central portion of the proposed Fulton Project site. It was determined that both the scrub shrub wetland depression and forested wetland depression were created and likely utilized as borrow areas and also as livestock water supplies. These wetland depressions have no connection to jurisdictional waters and would therefore be considered isolated for the purposes of this report. Vegetation found within these two habitats was dominated by black willow, willow oak, red maple, sweetgum, lizards tail and *Juncus* species (Wildlife Technical Services, Inc., 2009b).

Typical soil coloration at a minimum depth of 12 inches within these wetlands was observed as a 10YR 5/1 on the Munsell Color Chart. Additionally, these soils were saturated in the upper 12 inches and inundation was present (Wildlife Technical Services, Inc., 2009b).

3.5.1.2 Forested Wetland

The forested wetland habitat encountered on the proposed Fulton Project site is approximately 12.00 acres in size. The forested wetland is located within a forested area in the northwest portion of the property. It was determined that this area receives runoff from adjacent uplands to the east. Since the construction of South Access Road which adjoins the property to the west, upland runoff has outlet and essentially pools along the roadside. As opposed to this system serving as a flow through forested habitat, South Access Road serves as an impediment and has thus created the hydric conditions over time. Given that an overflow non-RPW is located across the northern boundary that ultimately connects to the Tenn-Tom Waterway; this area will be considered jurisdictional (Wildlife Technical Services, Inc., 2009b).

Vegetation found within this habitat was dominated by red maple, willow oak, water oak, sweetgum, sycamore, and American elm (Wildlife Technical Services, Inc., 2009b).

Typical soils coloration at a minimum depth of 12 inches within these wetlands was observed as a 10YR 5/2 to a 10YR 7/2 on the Munsell Color Chart. Additionally, these soils were characterized by a limited amount of mottling and were saturated in the upper 12 inches (Wildlife Technical Services, Inc., 2009b).

The forested wetland does provide a degree of water quality, wildlife and groundwater recharge benefits. However, this wetland is not a component of an overall ecosystem that contributes to a significant ecological complex. The Fulton Project area is located within the City Limits of Fulton and has been subjected to numerous activities over the years. While a degree of water quality and groundwater recharge functions do occur, the overall quality of the on-site wetlands would be considered medium to low in terms of function and value (Wildlife Technical Services, Inc., 2009b).

3.5.1.3 Non Relatively Permanent Waterway

One Non RPW was located on proposed Fulton Project site. The Non RPW was approximately 0.02 acre in size. This drainage feature is characterized as a relatively small channel (approximately two feet wide), and an overall lack of any significant vegetative components within the stream channel. The drainage feature was not inundated at the time of the site visit, however saturation was observed from a recent rainfall (within 48 hours). Sediment deposits and debris were also observed within the channel which indicates storm water runoff is provided as a source of hydrology during rain events (Wildlife Technical Services, Inc., 2009b).

Vegetative components along the top banks of the stream consisted of sweetgum, water oak, loblolly pine, and eastern red cedar. Given the downstream connection to regulated waters, this Non RPW will be considered “Other Waters of the United States” (Wildlife Technical Services, Inc., 2009b).

3.5.1.4 Wetland Drain

One wetland drain was located on the proposed Fulton Project site that was approximately 0.04 acre in size. The wetland drain is located in the southern portion of the property along and generally follows the topography of the land catching runoff from the adjacent maintained open field. Attributed to the surrounding developed parcels, this wetland drain primarily serves as an outlet to relieve storm water during rainfall events (Wildlife Technical Services, Inc., 2009b).

3.5.1.5 Isolated Open Water Pond

One open water pond approximately 0.23 acre in size is located in the central portion of the proposed Fulton Project site within the non-wetland and open field habitats. Given the historical use of the property, the pond appears to have been excavated and has no upstream or downstream connection to jurisdictional waters. The pond was excavated in uplands and was historically utilized as a livestock water supply (Wildlife Technical Services, Inc., 2009b).

3.5.1.6 Non-Wetland and Forested Uplands

The non-wetland and forested upland habitat encountered on the proposed Fulton Project site was found in specific locations within a forested area on the northeast portion of the proposed site. This portion of the proposed site was the highest part of the property in elevation. Vegetation found within this habitat includes sweetbay magnolia, red maple, water oak, eastern red cedar, loblolly pine, American hornbeam, cane, Vitis, and Smilax species (Wildlife Technical Services, Inc., 2009b).

The soil matrix colors throughout the forested upland habitat areas range from a 4/3 to 5/4 on the 10YR chart. No hydrology indicators were noted (Wildlife Technical Services, Inc., 2009b).

3.5.1.7 Non-Wetland and Open Fields

The non-wetland and open-field habitat encountered on the proposed Fulton Project site was found in specific locations within the southern portion of the proposed site. The open field habitats were not being maintained at the time of the site inspection with the exception of one which was in the extreme southern portion of the property along South Access Road. Multiple random samples were collected from the open fields. During the data collection and sampling activities, it was apparent that the drainage alterations as a result of the Tenn–Tom Waterway construction have eliminated the hydrologic influence that was once associated with the Tombigbee River (Wildlife Technical Services, Inc., 2009b).

According to Itawamba County Natural Resource Conservation Service (NRCS), the property is located in an area that has had hydrology changed due to the construction of the Tennessee-Tombigbee waterway levee. The construction of the levee along the waterway now prevents the frequent flooding that once occurred in this area from the Tombigbee River (Wildlife Technical Services, Inc., 2009b).

3.5.1.8 Farmed Wetland Determination

An independent evaluation of the potential presence of farmed wetlands was not completed on the proposed Fulton Project site. A letter from the NRCS dated June 29, 2009, stated that the construction of the levy along the Tenn-Tom Waterway now prevents the frequent flooding that once occurred in this area and the previously mapped hydric soil Mantachie Loam is no longer considered to be hydric. An official wetland determination was conducted on the area in 1993 by a NRCS soil scientist documenting these findings. In addition, no land within the proposed Fulton Project site is currently being utilized for agricultural purposes.

3.5.1.9 Protected Species

In order to comply with Section 7 of the Endangered Species Act, the United States Fish and Wildlife Service (USFWS) was contacted to determine if federally protected species may exist on or in the vicinity of the proposed Fulton Project site.

In a letter dated June 18, 2009, the USFWS revealed that the federally protected bald eagle (*Haliaeetus leucocephalus*) is known to nest along the Tenn-Tom Waterway. The USFWS stated that although the bald eagle is no longer on the list of threatened and endangered species; it continues to be protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). During the wetland delineation and determination, no presence of bald eagle nesting sites or potential nesting trees were identified on the proposed site. The USFWS recommends that if any evidence of a bald eagle is found on the proposed site, no work activities should commence until the USFWS is notified (Wildlife Technical Services, Inc., 2009a). A copy of the USFWS letter is located in Appendix F.

In addition, the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) was contacted regarding any state listed threatened, endangered, and/or species of special concern or critical habitat that may exist on the proposed site (Wildlife Technical Services, Inc., 2009a). In a letter dated June 19, 2009, the MDWFP stated that two state listed species of special concern are known to occur within two miles of the proposed site. The MDWFP letter stated that if best management practices (BMPs) were implemented, the proposed Fulton Project would likely pose no adverse threat to the Freckled Darter and/or Rock Darter or their habitat (Wildlife Technical Services, Inc., 2009a). A copy of the MDWFP letter is located in Appendix F.

3.5.2 Environmental Consequences of the No Action Alternative

The No Action Alternative would not impact any wetlands, state or federally listed threatened, endangered, or special concern plant or animal species.

3.5.3 Environmental Consequences of the Proposed Action

The Fulton Project would impact approximately 13.5 acres of wetlands on-site. Approximately 12 acres of wetlands would be cleared and approximately 1.48 acres of wetlands would be filled. The proposed Fulton Project layout was revised to avoid wetland impacts where possible , including relocating roads, buildings, and process areas. The Itawamba County Board of Supervisors has filed an application under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act with the USACE Mobile District to allow clearing and filling of wetlands on-site. Itawamba County completed Wetland Rapid Assessment Procedure (WRAP) to determine the amount of wetland mitigation that would be required. Based on a the WRAP, Itawamba County has determined that a total of 7.5 acres of mitigation wetlands would be required. The mitigation wetlands would consist of restored former bottomland hardwood forested wetlands located in Monroe County, Mississippi. The USACE Mobile District placed the draft permit on public notice on January 25th, 2010.

The Fulton Project would not impact any state or federally listed threatened, endangered, or special concern plant or animal species.

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

3.6 Water Resources

3.6.1 Affected Environment

3.6.1.1 Groundwater

Most aquifers in the Mississippi embayment contain freshwater down-gradient of the area where they outcrop and are exposed at the ground surface. The aquifer units in the Fulton Project vicinity are comprised predominantly of poorly consolidated to unconsolidated clastic sediments. In general, the most permeable aquifers consist of sand and some gravel and are separated by silt, clay, marl, or chalk confining units. As these aquifers extend down-dip, most grade to less permeable facies, such as clay or marl, that are part of adjoining confining units. The principal aquifers in Itawamba County are (in descending order): the Holocene aquifer consisting of alluvial material along the Tennessee-Tombigbee Waterway, Eutaw-McShan Aquifer (EMA), Gordo, Coker, Massive Sand, Lower Cretaceous, and Paleozoic system. The Tuscaloosa aquifer system includes the group of aquifers below the Eutaw-McShan and above the Paleozoic system (TVA, 2000).

Sand and gravel alluvial deposits along the Tennessee-Tombigbee Waterway serve as a source of groundwater to some wells in the Fulton Project vicinity (USGS (d), 2009).

The sands of the Eutaw and McShan formations are combined to form the lower part of the EMA since sands of the two units are hydraulically connected in Mississippi. However, intervening beds of clay and silt may result in localized vertical hydraulic gradients. The upper part of the EMA, the Tombigbee Sand Member, is finer-grained and has a higher silt content than the rest of the aquifer and produces little water. The remainder of the EMA consists of thin beds of fine to medium glauconitic sand. The EMA outcrops primarily in the northeastern part of Mississippi and northwestern Alabama. The aquifer dips 35 to 40 feet per mile westward in the northern part of the region and dips southwestward in the southern part. The thickness of the EMA increases down-dip, ranging from about 1 foot in the eastern outcrop area to more than 300 ft in the southwestern part of the region. The EMA receives recharge from precipitation in the outcrop area, and to a lesser extent, from overlying and underlying aquifers (TVA, 2000). To the west (locally along the western boundary of Lafayette County), southwest, and south, water becomes increasingly mineralized in the down-dip direction.

The Tuscaloosa Aquifer System (TAS) represents an important regional aquifer system in northern Mississippi. The TAS consists of the Gordo, Coker, and Massive Sand aquifers of the Tuscaloosa Group, along with deeper undifferentiated Lower Cretaceous sediments (TVA, 2000). These aquifers are confined by intervening clays and silts, but regionally maintain hydraulic continuity and, therefore, constitute a system (TVA, 2000). The TAS outcrops in northeastern Mississippi and western Alabama. The sediments that comprise the TAS dip westward and southwestward toward the axis of the Mississippi embayment at about 35 to 40 feet per mile and generally tend to become thicker in the down-dip direction. Recharge to the Gordo and Coker aquifers occurs in their outcrop areas. These units may also receive recharge by leakage from vertically adjacent aquifers in areas further down-dip. The Massive Sand aquifer is not exposed at land surface and is assumed to receive recharge from the overlying Coker aquifer. Similarly, the Lower Cretaceous aquifer does not outcrop, and recharge is assumed to occur by leakage from the Massive Sand in up-dip areas (TVA, 2000). Regionally, the horizontal direction of groundwater movement within the TAS ranges from westerly to southerly away from the outcrop areas.

The Paleozoic Aquifer Systems (PAS) in Mississippi have generally been treated as undifferentiated in the literature due to lack of data. Recent investigations (TVA, 2000) have identified two distinct water-bearing units in the PAS. These lithologic units include the Iowa and Devonian aquifers. The Iowa aquifer comprises a permeable zone in the Fort Payne and Tuscumbia formations that is generally coincident with the upper part of the subcrop of those formations beneath Cretaceous sediments (TVA, 2000). The Iowa aquifer outcrops in a very small area in northeastern Mississippi. To the northwest, the aquifer is limited by its erosional extent and to the southeast by the extent of its permeable zone.

The Iowa aquifer is generally about 100 ft thick, but thins to the northwest until absent at its pre-Cretaceous erosional limit. This boundary occurs just southeast of Union County, such that the Iowa aquifer may not be present in the study area. The Iowa aquifer is expected to receive recharge through a relatively thin interval of unconsolidated Cretaceous sediments in topographically high areas of Tishomingo County (TVA, 2000). The Devonian aquifer of the PAS comprises a permeable zone in an undifferentiated interval of Devonian age rocks underlying the Chattanooga Shale that is commonly referred to as the “Devonian Chert”. The Devonian aquifer is not considered to crop out in the region (TVA, 2000). To the northeast and east, the aquifer is limited by the pinch-out of permeable rocks. To the southeast and southwest, the aquifer contains water with increasing dissolved-solids concentrations (TVA, 2000).

3.6.1.2 Surface Water

The Fulton Project would be located within the Cummings-Mill Creeks watershed which is part of the Upper Tombigbee River Basin (Mississippi Automated Resource Information System (MARIS), 2009). The Cumming-Mill Creeks watershed is approximately 117 square miles in size (MARIS, 2009). There are no streams within the Fulton Project site (Figure 9 – Fulton Project Site Wetland Location Map in Appendix A). However, there are two unnamed streams shown on the USGS 7.5 Minute Beans Ferry Quadrangle map. One unnamed stream is located approximately 940 feet north of the site and one unnamed stream is located south of site on the south side of South Access Road. The two streams are tributaries of the Tennessee-Tombigbee Waterway, which is a tributary to the Tombigbee River. The Tennessee-Tombigbee Waterway is located approximately 1,450 feet directly west of the Fulton site. The primary surface flows from the Fulton site are in the form of overland sheet flow to the southwest ultimately draining to the Tennessee-Tombigbee Waterway.

There are forested and isolated scrub-shrub wetlands on the Fulton Project site. In addition, there is an isolated open water pond and a non-relatively permanent waterway within the site (Figure 9 – Fulton Project Site Wetland Location Map in Appendix A). The wetlands, isolated open water pond, and Non-RPW are discussed in detail in Section 3.5.

A review of the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) mapping from the Mississippi Automated Resource Information System (MARIS) indicated that the Fulton Project site is located outside the 100-year floodplain but within Zone X500. Zone X500 is defined as an area protected by levees from 100-year flooding. (Figure 8 – Fulton Project Site FEMA Flood Plain Map). The FEMA NFIP map provided a notation stating "This area protected from the one percent annual chance (100-year) flood of the Tennessee Tombigbee Waterway by levee, dike or other structure subject to possible failure or overtopping during larger floods" (Wildlife Technical Services, Inc., 2009a).

BlueFire would contract with the City of Fulton to supply the Fulton Project with water via connection with the NEMRWD's water system. BlueFire would require an average of approximately 110 gallons per minute (gpm) (approximately 58 mgy) for utility and process operations. Water use would increase during summer months due primarily to an increased requirement for water in the evaporative cooling towers. Maximum, short term, water use during period of high temperature would be 600 gpm. BlueFire would be served by the City of Fulton from water it receives from the District. Water would be provided to the Fulton Project via an interconnection to the District's 14 inch water main that runs alongside the Mississippian Railroad (east of the site) from Pumping Station No. 1 to Hwy 25 S.

The District's current water withdrawal permit is for 30 mgd and they have a current finished water production capacity of 18 mgd (+/-). In 2008, the District delivered an average of 10 mgd (+/-) to their customers. The City of Fulton system is currently able to receive and distribute up to 4 mgd of supply from the District. The most recent high usage month was June 2009 with 43 MG being used (1.43 mgd average). (Personal Communication - Tim Roberts) The City of Fulton would be able to meet the Fulton Project's maximum water needs of approximately 600 gpm (0.86 mgd) without system or permit modification.

3.6.1.3 Wastewater

Waste water would be generated from the Fulton Project including:

- Cooling tower blowdown;
- Boiler blowdown;

- Process waste water;
- CIP waste water and floor drains;
- Laboratory waste water; and
- Sanitary waste water

Wastewater from the Fulton Project would tie-in to the existing 8” gravity line located just south of the site. The Fulton Project would generate an average of 100 gpm (144,000 gpd) of combined process and sanitary waste water consisting primarily of cooling tower and boiler blowdown. The sanitary sewage would consist of approximately 1,200 gallon per day (gpd).

The 8" gravity line is connected to the City of Fulton waste water treatment lagoon via an existing 6" PVC force main from the Port of Itawamba pump station to the lagoon. The current excess capacity on this line is 350,000 gpd. (TennTom.org, 2009).

The City of Fulton waste water treatment lagoon is permitted to discharge 840,000 gpd (306 mgy). In 2008 the City of Fulton discharged an average of 237,000 gpd (86.5 mgy) from the waste water treatment lagoon which is approximately 30% of permitted discharge allowance (Personal communication, Tim Roberts).

3.6.1.4 Stormwater

Stormwater from the proposed Fulton Project site predominantly infiltrates the soil. Stormwater also serves as the recharge mechanism for the on-site Isolated Open Water Pond discussed in Section 3.5.1.5.

As noted in Sections 3.5.1.3 and 3.5.1.4, two drainage features are present on-site. These are the Non RPW and the wetland drain. Both features allow excess stormwater to drain from the site. The discharge location for all stormwater is to South Access Road, the City of Fulton stormwater drain system and ultimately to the Tennessee-Tombigbee Waterway.

3.6.2 Environmental Consequences of the No Action Alternative

The No Action Alternative would have no impact on water resources.

3.6.3 Environmental Consequences of the Proposed Action

3.6.3.1 Groundwater

The Fulton Project would not utilize groundwater resources as a source of potable water. Therefore, no impacts are anticipated.

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

Additional mitigation measures for preventing soil and ground water contamination include the development of both a construction SWPPP and an operational SWPPP, for construction and operation of the Fulton Project.

3.6.3.2 Surface Water

The Fulton Project would be served by the City of Fulton with treated surface water via a connection with the existing NEMSRWSD line located on the east boundary of the site. The permitted and physical capacity of the NEMSRWSD and City of Fulton systems capacity are sufficient to provide the volume of potable water that would be required by BlueFire without modification or re-permitting. As a result, impacts to the potable water system from construction and operation of the facility would be minor.

The Proposed Action would result in the conversion of approximately 38 acres of vacant vegetated land to gravel or pavement surfaces. Construction activities would result in soil disturbance and loss of vegetative cover. These activities could result in modified surface water runoff patterns from the site. Impacts on hydrology could result from land clearing, loss of vegetation, and associated accelerated runoff from impervious surfaces following precipitation events. Water quality could be affected by erosion. However, the use of construction and post-construction BMPs, as described in Section 2.2.4.2, would prevent a significant increase in runoff following implementation of the Proposed Action. As a result, impacts to surface water hydrology from construction and operation of the facility would be minor.

3.6.3.3 Wastewater

The Fulton Project would generate approximately 144,000 gallon per day of wastewater. The waste water would be discharged to the City of Fulton waste water treatment lagoon via a tie-in to an existing 8" gravity line and an existing 6" force main. The gravity line, force main, and waste water treatment lagoon have sufficient permitted capacity for the proposed discharge without modification.

As a result, impacts to the waste water treatment plant from construction and operation of the facility would be minor.

3.6.3.4 Stormwater

Construction activities would require grading and excavation on approximately 20 acres of the proposed Fulton Project site. These construction activities would expose the soil to stormwater and have the potential to cause sedimentation in the Non RPW and the wetland drain and onto South Access Road. An erosion control plan and SWPPP for construction would detail the BMPs necessary to prevent impacts to these features. These BMPs may include:

- Installation of silt fencing;
- Installation of hay bales for sediment control;
- Construction of temporary stormwater retention ponds;
- Retention of vegetative cover where practical.

During operation, the wood storage pile, haul roads, lignin storage pile and product load-out areas would be potential sources of contaminants to the surface and stormwater. Haul roads on the site would be paved with concrete or asphalt to minimize potential for sediment generation. Road cleaning would be completed as necessary. Stormwater control systems would be designed to control stormwater run-off, allow sediments to settle out, and to eliminate soil erosion. The stormwater ponds, such as stormwater retention ponds would be equipped with manual overflow valves that are normally closed. This would allow inspection of the stormwater before allowing discharge to occur. It would also allow the ponds to function as a final spill control measure in the event of a catastrophic release of ethanol or other hazardous material on-site. BlueFire would manually open the valves during overflow conditions and discharge from the stormwater ponds would flow to the City of Fulton stormwater drain system.

3.7 Waste Management and Hazardous Materials

3.7.1 Affected Environment

3.7.1.1 Solid and Hazardous Waste

The City of Fulton is within Three Rivers Solid Waste Management Authority (TRSWMA). The Three Rivers Planning and Development District (TRPDD) is the administrative arm of the TRSWMA, organized as a solution to the pressing problem of solid waste disposal in the region, and is composed of counties and cities in the District. The Authority owns and operates one regional landfill which all entities use. A uniform tipping fee is charged for transporting from strategically located transfer stations to the regional landfill. The Solid Waste Authority includes the counties of Calhoun, Itawamba, Lafayette, Lee, Monroe, Pontotoc, and Union. Non-hazardous solid waste from the Fulton Project would be managed by the TRPDD because they exercise flow control in Itawamba County.

A copy of the Waste Connection landfill permit is in Appendix G. The Waste Connection permit has expired but they have an extension from the MDEQ which allows continued operation until the new permit is issued.

Because the site is currently vacant, no solid non-hazardous or hazardous waste is generated at the proposed Fulton Project site.

3.7.2 Environmental Consequences of No Action Alternative

Under the No Action Alternative, no new waste materials would be generated and no hazardous materials would be stored on-site.

3.7.3 Environmental Consequences of Proposed Action

The Fulton Project would generate a maximum of approximately 98 tons of boiler ash per day. The remaining non-hazardous solid waste, approximately 25 tons per week would include paper waste from office operations and non-hazardous solid wastes including scrap metal, wood, plastic products, paper from plant operations, and empty containers (i.e., drums, totes, and boxes). BlueFire would recycle their non-hazardous waste products to the extent practical.

Boiler ash, if no market is identified, and other non-hazardous solid waste would be trucked to Waste Connections, Inc. in Pontotoc, MS (1904 Pontotoc Parkway West, Pontotoc, MS 38863). Waste Connections is located approximately 45 miles from the proposed Fulton Project site. Waste Connections has 500 acres of existing capacity. Waste Connections also has another facility located 65 miles north of the proposed Fulton Project site, if needed.

The Fulton Project would be a small quantity generator of hazardous waste. The hazardous waste consists primarily of flammable liquids and laboratory chemicals. The hazardous wastes would be transported off-site by a licensed hazardous waste transportation company to a licensed hazardous waste treatment, storage, and disposal facility. Spent acids and acidic waste that could not be reused on-site would be neutralized on-site. Neutralized solid waste would be disposed off-site with other non-hazardous waste. Neutralized liquid waste would be discharged with other waste water to the City of Fulton WWTP.

The facility would generate universal wastes including used oil, fluorescent and high intensity discharge (HID) light bulbs, and batteries. The universal wastes would be transported off-site by a licensed universal waste transportation company to a licensed disposal facility.

3.7.3.1 Hazardous Materials

The Fulton Project would store and use various hazardous materials. The storage tanks located outside would be designed and constructed with secondary containment structures sufficient to hold the contents of the largest tanks plus sufficient additional volume for rain fall. Tanks located inside the buildings may also be located in secondary containment if determined to be necessary for employee safety or protection of the environment. Each storage tank would be constructed using materials compatible with the chemical being stored.

BlueFire would develop appropriate spill response, pollution prevention, and ERPs to address the medical and environmental hazards associated with the Fulton Project. The plans would include, at a minimum, a Spill Prevention, Control and Countermeasure (SPCC) Plan, a Storm Water Pollution Prevention Plan (SWPPP), and an ERP. The plans would be completed in accordance with federal and Mississippi Occupational Safety and Health Administration (OSHA) and USEPA and MDEQ regulations and guidance. Spill equipment kits would be acquired as needed. Spill response training would be provided to employees working with the hazardous materials stored and used on-site. These measures would prevent impacts from spills of hazardous materials.

Therefore, no impacts are expected as a result of the Proposed Action.

Table 3-6 summarizes the hazardous chemicals that would be present on-site in significant quantities.

The Fulton Project will use and store an ethanologen (yeast). The yeast will be dry and stored in boxes on pallets. A minimal quantity of yeast will be stored on-site as BlueFire will be instituting a yeast propagation system.

Table 3-6 - Summary of Hazardous Materials Stored On-Site

Chemical	Use	Use Category	Stored on Site Quantity	Stored on Site Units	Form/Type
Alumina Silicate ($ALSiO_3$)	Mole sieve desiccant	Catalyst	193	ton	1-3" balls
Alumina Silicate ($ALSiO_3$)	Air Dryer Desiccant	Catalyst	241	Cubic Feet (CuFt)	Small Pellets
Anion & Cation Exchange Resin	Demineralizer Water Treatment	Catalyst	135	CuFt	Granular, sacks or drums
Anion & Cation Exchange Resin	SMB Chromatographic Separator	Catalyst	23,327	CuFt	Fine 300-micron pellets
Boiler Sand	Circulating Bed makeup material	Catalyst	220	ton	Granules
Carbon Absorbent	Vapor Recovery Carbon Bed	Catalyst	2,410	lbs.	granules
Diesel Fuel	Mobile equipment and fixed firefighting fuel	Consumable	4,000	gal	Liquid
Fire Foam Detergent	Firefighting foam dispersant	Consumable	1,000	gal	Liquid
Laboratory Reagents	QA/QC Product Test Analysis, Plant analysis	Consumable	50	gal	Small Reagent containers 0.5-1 L
Lubrication Oil	Rotating Equipment Lubricant	Consumable	3,200	gal	Liquid, Drums
Mineral Insulating Oil	Transformers Coil Insulator	Consumable	2,410	gal	Liquid, Drums
Sodium Hypochlorite (NaOCl)	Disinfectant for potable water system	Consumable	1	gal	Liquid, 10% NaOCl
Sucrose Sugar	Emergency Fermentation Food Source for Yeast	Consumable	143,169	lbs.	Granular, sacks or drums
Unleaded Gasoline	Ethanol Product Denaturant	Consumable	16,400	gal	Liquid, Flammable Fuel
Fermentation Beer	Sugars in process or product of fermentation	In-Process	637,300	gal	Liquid, ~8% ethanol, some sugar, water
Hydrolysate	Biomass conversion product in process	In-Process	69,500	gal	High Solids Liquid acid and sugar mixture

Chemical	Use	Use Category	Stored on Site Quantity	Units	Form/Type
Mixed sugars raffinate	Purified mixed sugar SMB product	In-Process	91,200	gal	Liquid, ~18% mixed sugars
Sulfuric Acid (H_2SO_4)	Diluted acid SMB extract or intermediate ARU product	In-Process	96,700	gal	Liquid, 18-20% H2SO4
Sulfuric Acid (H_2SO_4)	75% Reconcentrated acid ARU product	In-Process	70,900	gal	Liquid, 75% H_2SO_4
Ammonium Bifluoride (NH_4HF_2)	Boiler HRSG Chemical Cleaning	In-Process	1,000	lbs.	Granular, sacks or drums
Battery Electrolyte	Stationary and mobile batteries	In-Process	120	gal	Liquid, 5-gallon containers
Citric Acid	Boiler HRSG Chemical Cleaning	Maintenance Chem.	0	lbs.	Granular, sacks or drums
Formic Acid	Boiler HRSG Chemical Cleaning Feedwater system	Maintenance Chem.	0	gal	Liquid
Hydrochloric acid (HCl)	Boiler HRSG Chemical Cleaning	Maintenance Chem.	500	gal	Liquid, 90% HCl
Hydroxyacetic acid	Boiler HRSG Chemical Cleaning Feedwater system	Maintenance Chem.	1,000	lbs.	Granular, sacks or drums
Sodium Carbonate (Na_2CO_3)	Boiler HRSG Chemical Cleaning	Maintenance Chem.	1,000	lbs.	Granular, sacks or drums
Sodium Nitrate (NaNO3)	Boiler HRSG Chemical Cleaning	Maintenance Chem.	1,000	lbs.	Granular, sacks or drums
Carbon Dioxide	Recovered Fermenter Industrial Gas	Maintenance Chem.	10,400	gal	Liquid CO_2 under pressure
Ethanol	Product and dehydrated ethanol	Product	131,000	gal	Liquid, 99.5-95% ethanol flammable
Gypsum ($CaSO_3$)	Gypsum Product	Product	90	ton	Chunks of fine agglomerated particles 50% moisture
Lignin	Boiler Fuel, soil amendment	Product	350	ton	Chunks of fine agglomerated particles 50% moisture
Ammonia (NH_3OH)	Selective Non-Catalytic Reduction (SNCR) Boiler Emissions	Product	4,500	gal	Liquid, 30% NH_3
Cyclohexylamine ($C_6H_{11}NH_2$)	Boiler Feedwater pH control	Product	0	gal	Liquid
Hydrazine (N_2H_4)	Boiler Feedwater Oxygen scavenger	Reagent	0	gal	Liquid, 35% N_2H_4

Chemical	Use	Use Category	Stored on Site Quantity	Units	Form/Type
Limestone ($CaCO_3$)	Boiler Combustion Sulfur Reagent	Reagent	-580	ton	Rocks of 1-3" size
Phosphoric Acid (H_3PO_4)	Nutrient and pH Adjustment for Sugar Fermentation	Reagent	23,300	gal	Liquid, 90% H_3PO_4
Potassium Hydroxide (KOH)	Nutrient and pH Adjustment for Sugar Fermentation	Reagent	1,400	gal	Granular, sacks or drums
Scale Inhibitor	Circulating Water scale control	Reagent	775	gal	Liquid
Slaked Lime ($Ca(OH)_2$)	Neutralizer Feedstock for Residual Sulfuric Acid	Reagent	1,775	ton	Powder, Truck Delivery
Sodium Hydroxide (NaOH)	5% CIP Sterilization Circulating Fluid	Reagent	20,000	gal	Liquid, 5% NaOH
Sulfuric Acid (H_2SO_4)	Demineralizer resin regeneration and neutralization	Reagent	1,000	gal	Liquid, 93% (H_2SO_4)
Sulfuric Acid (H_2SO_4)	Circulating Water pH and Alkalinity control	Reagent	0	gal	Liquid, 93% (H_2SO_4)
Sulfuric Acid (H_2SO_4)	Acid Hydrolysis Process Makeup Catalyst	Reagent	21,300	gal	Liquid, 93% (H_2SO_4)
Trisodium Phosphate (Na_3PO_4)	Boiler feedwater water pH and scale control	Reagent	165	gal	Granular, sacks or drums
Urea (H_2NCONH_2)	Nutrient for Sugar Fermentation	Reagent	500	gal	Granular, sacks or drums
Sodium Hydroxide (NaOH)	5% CIP Sterilization Circulating Fluid	Reagent	10,000	gal	Liquid, up to 50% NaOH

3.8 Hazard Review and Accident and Risk Analysis

3.8.1 Affected Environment

BlueFire has designed a commercial demonstration scale plant to be constructed in Lancaster, California. As part of the design process, BlueFire completed a Process Hazard Analysis (PHA) for the SMB, Acid Recovery, and Distillation/Dehydration processes. Each PHA was completed using the hazard and operability (HAZOP) study technique. The HAZOP methodology identifies potential deviations from design intent of a portion (study section) of the process.

The study was initiated to identify potential safety and operability issues associated with operation of the production units. The primary hazards of concern were those that could result in injury either onsite and offsite, or cause significant environmental impact, or equipment damage. The PHA was conducted to analyze the preliminary design of each unit. During each PHA, the team addressed the following:

- Hazards of the process
- Previous incidents
- Engineering and administrative controls and their interrelationships
- Consequences of failure of these controls
- Facility siting
- Human factors
- A range of the possible safety and health effects to employees at the workplace, as well as offsite consequences to the public and the environment.

Deviations which could lead to the consequences listed below were postulated:

- Personnel injury;
- Exceed regulatory environmental limits;
- Property or equipment damage (PD); and
- Business Interruption (BI).

The causes of these deviations and the mechanisms for indication or protection against these consequences were documented.

3.8.2 Environmental Consequences of No Action Alternative

The No Action Alternative would have no impact on hazards at the property.

3.8.3 Environmental Consequences of Proposed Action

BlueFire would use the information developed during the PHAs for the Lancaster facility in the design of the proposed Fulton Project, as appropriate. In addition, BlueFire would complete a site and process specific analysis of the design of the Fulton Project prior to initiating construction.

BlueFire would develop appropriate contingency plans for the proposed Fulton Project that would:

- Analyze the potential for spills or releases of ethanol, petroleum products, and other hazardous materials. This analysis includes spills or releases from equipment failures, human error, natural disasters, and intentional destructive acts;
- 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.

The plans would include, at a minimum, a SPCC Plan, a SWPPP, and an ERP. BlueFire would provide training to their personnel on the site specific spill prevention and response measures contained in the contingency plans. BlueFire would meet with the local fire and emergency response providers to discuss potential emergencies, determine capabilities, and establish communication protocols and responsibilities.

3.9 Infrastructure

3.9.1 Affected Environment

The Fulton Project consists of the construction and operation of a biorefinery which will produce ethanol and other co-products from biomass. The components of the infrastructure supporting the above-mentioned operation are as follows:

- Water will be obtained from the City of Fulton water supply at a proposed rate of 600 gallons per minute via a connection with the existing NEMSRWSD water main located to the east and adjacent to the proposed Fulton Project site, see Figure 2 in Appendix A.
- Wastewater disposal will be through the City of Fulton’s lagoon located approximately ½ mile northwest of the site. An 8-inch force main sewer is located west and adjacent to the proposed Fulton Project site along the access road, see Figure 2 in Appendix A. The system has recently been expanded and upgraded with additional lines and pumping stations.
- Natural gas is available via a 2-inch high pressure on site for supply via the City of Fulton. The gas line is located west and adjacent to the proposed Fulton Project site along the access road, see Figure 2 in Appendix A.
- Electricity will be supplied from an existing substation owned by the Tombigbee Electric Power Association. The aforementioned substation is located about ½ mile from the site with 15MW of excess capacity that will accommodate the approximately 7MW expected plant requirement.

3.9.2 Environmental Consequences of No Action Alternative

The No Action Alternative would have no affect on the infrastructure of the City of Fulton and/or Itawamba County.

3.9.3 Environmental Consequences of Proposed Action

No environmental consequences are expected relative to the Proposed Action at this time.

3.10 Cultural Resources

3.10.1 Affected Environment

Cultural resources include sites, buildings, structures, or areas that are of historic, cultural, archeological, and/or architectural significance. Since the DOE is providing funding for a portion of proposed Fulton Project, the proposed Fulton Project will be subject to the provisions of Section 106 of the 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.

A Cultural Resource Survey (CRS) has been completed for the Fulton Project site. There are eight recorded archaeological sites within ¾ mile of the Fulton Project site (22It611, 22It612, 22It613, 22It614, 22It615, 22It616, 22It617, and 22It618). None of these sites will be impacted by the Fulton Project (Johnson, 2009).

Two new sites were discovered during the CRS for the Fulton Project site. Fulton Site 1 (22It709) located in Section 1, Township 10 South, Range 8 East, Itawamba County, Mississippi. Fulton Site 1 was a historic house site that is marked by a chimney fall and roofing tin. A nearby pit may be the remains of a cistern although there is no evidence of a lining. A bottle dump containing mostly mid 20th century artifacts (screw top bottles, steel, tab top beer cans, instant coffee jars, and soft drink bottles) was also located (Johnson, 2009).

Two rows of five shovel tests running north-south on either side of the chimney falls and spaced 10 paces (about 8 meters) apart produced only brick fragments. The house structure shows on the Beans Ferry USGS quad sheet as a closed rectangle, indicating that it was occupied in 1960, the date for the aerial photographs upon which the map was based. This site appears to date to the 20th century. It is not considered to be significant (Johnson, 2009).

Fulton Site 2 (22It710) located in Section 1, Township 10 South, Range 8 East, Itawamba County, Mississippi. Fulton Site 2 was located on a low bluff overlooking the Tombigbee floodplain. Following a positive shovel test, lines of shovel tests spaced 10 paces apart were extended in each of the cardinal directions and continued until two negative shovel tests were dug. Thirteen shovel tests were dug. Only three produced artifacts. This included two flakes with single faceted platforms, lacking cortex and one piece of thermal shatter. The flakes and thermal shatter were made from heat treated Tuscaloosa gravel. Fulton Site 2 was not considered significant (Johnson, 2009).

Neither of the two sites that were found can be considered eligible for nomination to the National Register of Historic Places (Johnson, 2009). A copy of the CRS report is included in Appendix H.

The MDAH has reviewed the CRS report and concurred with the conclusion that the Fulton Project site does not contain historic or archeological resources of significance. A copy of the MDAH concurrence letter is included in Appendix H.

3.10.2 Environmental Consequences of the No Action Alternative

The CRS above indicated that no significant cultural resources were identified on-site. The MDAH has concurred with the conclusion in the CRS report.

3.10.3 Environmental Consequences of the Proposed Action

The CRS above indicated that no significant cultural resources were identified on-site. The MDAH has concurred with the conclusion in the CRS report.

3.11 Land Use

3.11.1 Affected Land Use

The proposed Fulton Project would be located in the City of Fulton, Itawamba County, Mississippi. The City of Fulton is located in the northeast corner of the state. Fulton is approximately 18 miles from Tupelo, Mississippi just off Highway 78, which is the direct route between Memphis, Tennessee and Birmingham, Alabama. The county population is 22,977 covering 541 square miles of land with a population density of 42 people per square mile. Approximately 22 percent of Itawamba County's population lives within the three municipalities of Fulton, Mantachie and Tremont. The majority of the county's land is made up of forest land with about 72 percent of its land in commercial forests.

The county is home to Itawamba Community College (ICC) in Fulton which had a Fall 2009 enrollment of approximately 8,000 students at Fulton and Tupelo. The Tennessee-Tombigbee Waterway extends the entire length of the county from north to south.

The proposed Fulton Project site is currently a forested tract interspersed with open fallow fields. Dating back to 1951, the entire site consisted of open fields and was likely utilized for row crop or cattle production. Based on the Phase I Environmental Site Assessment (ESA), no other historic known land use has been associated with the subject property. Currently, one metal structure is located on the site. In addition, J & J Appliance and Furniture is on site. Several residences are adjacent to the site (Wildlife Technical Services, Inc., 2009a).

The geographic area in which the property is located has been historically rural in nature with commercial and urban development occurring since the construction of the Tennessee-Tombigbee Waterway in the early 1980's. South Access Road forms the southern and western boundaries of the property while the residential dwellings are adjacent to the north and east. Three separate parcels adjoin the northern property boundary. The Mississippi Department of Transportation (MDOT) owns a parcel adjoining the northwestern corner of the subject property. MDOT utilizes this parcel as a maintenance facility for equipment and vehicles. Fulton Holdings, LLC, owns Max Home, a furniture manufacturing facility that also adjoins the northern property boundary. A residential dwelling occupies property adjacent to the northeastern portion of the property. The eastern adjoining properties include the Mississippian Railroad and multiple residential parcels. It is reported that the MCR is utilized and active approximately three days per week (Wildlife Technical Services, Inc., 2009a).

To promote industrial development and protect the surrounding community, Itawamba County has secured "cost certain" options to purchase the residential property located northeast of the proposed Fulton Project and also the multiple residential properties along the eastern side of proposed Fulton Project. A copy of a letter from Itawamba County is located in Appendix I.

American Cellulose Company, which is a wood chip mill, is located south of Access Road. The American Cellulose Company site is currently not operating its chip mill. The site is currently used for storing and staging wood products for American Cellulose's other business in the region. Previously mentioned, South Access Road also serves as the western property boundary. Properties beyond South Access Road to the west of the subject property include PSP Industries-Monotech of Mississippi Fulton that operates as a steel fabrication facility. Just north of the PSP facility, the City of Fulton owns a vacant parcel that is currently unoccupied. The remaining properties located within close proximity to the subject property include Mueller Casting Company and Mueller Copper Tube Company located approximately 1,200 feet northeast of the subject property, the Tennessee-Tombigbee Waterway located approximately 1,450 feet west of the subject property and the City of Fulton wastewater treatment facility located approximately 1,350 feet northwest of the subject property (Wildlife Technical Services, Inc., 2009a).

One overhead electrical transmission line dissects the northeastern portion of the property. This right-of-way alignment extends in a general northwest to southeast orientation and appears to serve as a distribution line providing service to residential dwellings in the vicinity of the property. Previously mentioned, the property contains one structure that can be described as a fabricated metal building located in the southeastern portion of the property. J & J Appliance and Furniture operates an appliance repair service from this location. No additional structures or improvements were noted on the property. Access into the subject property is provided from Access Road along the south boundary. Internal access throughout the property is primarily restricted to foot/ATV travel aside from the extreme southern portion of the property (Wildlife Technical Services, Inc., 2009a).

3.11.2 Environmental Consequences of No Action Alternative

The No Action Alternative would have no impact to land use.

3.11.3 Environmental Consequences of Proposed Action

Under the Proposed Action, construction and paving would convert approximately 38 acres of forest land and fallow fields to approximately 14 acres of impervious surface including buildings, industrial process components, parking, paved road, feedstock storage, and maintained landscaping. The Fulton Project would be located in an area already designated as an Industrial Park. While the land cover would be altered, the intended industrial use of the land would not change. This would be a negligible impact on land use in the county.

There are commercial, industrial, and residential properties that border the Fulton Project site. Construction of the facility would not change the current adjacent land uses with the exception of the residential properties. Itawamba County has secured options to purchase the residential properties that are adjacent to the proposed site along the east and one residence on the northeast. The residential properties are located within Port Itawamba Industrial Park. The purchase of the residential properties by Itawamba County would allow for additional industrial development while also protecting the surrounding community from being impacted by commercial and industrial type land uses.

The major cellulose feedstock for Fulton Project would be from biomass harvested within an approximately 75 mile radius of Fulton. As discussed in Section 2.2.5.2, the available supply of biomass, not already being used as merchantable timber, within 75 miles exceeds the amount needed by the Fulton Project at full production by more than 1,000,000 tpy. .

3.12 Noise

3.12.1 Affected Environment

Background noise levels in industrial areas typically range between 75 and 90 decibels (dB) and noise levels in wooded residential areas are approximately 50 dB (EPA 1978). The Fulton Project would be located in an existing industrial park.

3.12.2 Environmental Consequences of the No Action Alternative

The Fulton Project noise sources will be similar in size, location, and intensity as the existing facilities in the industrial park. Since the existing residences are closer to existing noise sources than the NSA would be following construction of the Fulton Project, the noise levels would to be higher under the No Action Alternative than after the proposed action.

3.12.3 Environmental Consequences of the Proposed Action

Noise would be generated continuously during normal operations related primarily to mechanical equipment operations. Much of the mechanical equipment at the site would be related to the raw material and product-handling operations, including feed stock conveyors; production activities, including the wood dryer, cooling equipment, and other equipment. Noise would also be generated by trucks and rail operations for the transport of raw materials and final product, as well as some industrial equipment (front-end loader, etc.) for on-site product movement.

BlueFire completed a noise impact analysis for a proposed cellulosic ethanol facility in Lancaster, California using a SoundPlan Model. The noise impact analysis modeled noise levels for truck unloading areas, material handling equipment, wood processing equipment, a lignin dryer, boilers, pumps, mixers, conveyors, a hammermill and a chiller. The noise analysis assumed a noise level of 85 dBA for each piece of stationary equipment located outside of building and assumed that truck unloading operations would consist of three sources, each modeled at 85 dBA. The analysis documented through actual measurements and literature research that actual noise levels for the above sources would be less than 85 dBA, yielding a conservative estimate of potential noise impacts on nearby nearest sensitive areas (NSAs). In the Lancaster analysis, the calculated noise level for a residence 1,350 feet from the facility was 39.8 dBA and was 37.8 dBA for a house located 2,100 feet from the facility. (Vista Environmental, 2007)

Noise studies at commercial ethanol plants (~120 mgy) in Minnesota have indicated that the equipment with the highest noise levels are the cooling towers (~80 dBA) and the conveyor systems (~78 dBA). (APEC 2007). The readings were taken at 11 feet from each of the above sources. Noise levels from the Fulton Project are expected to be similar to a conventional ethanol plant. Since the Lancaster study discussed above assumed a noise level of 85 dB for all sources, which is greater than actual noise measurements at existing ethanol plants, the noise analysis from the Lancaster facility represents a conservative approach to noise analysis for the Fulton Project.

Currently there are no residences on the Fulton Project site but there are residences adjacent to the property to the southeast. Itawamba County has obtained cost certain options to purchase all of the residential properties adjacent to the site. With this in mind, the NSA is a residence located approximately 2,090 feet northeast of the northern most property boundary. Using the assumption that the facility noise profile will be similar to existing commercial ethanol plants in Minnesota and less than or equal to the assumptions in the Lancaster model, the noise impact from the Fulton Project on the NSA would be expected to be approximately 37.8 dBA.

This noise level is within the normal background level for wooded residential areas. The Fulton Project noise sources will be similar in size, location, and intensity as the existing facilities in the industrial park. Therefore, the noise volume is not expected to change with respect to the NSA that would be present after the proposed action.

3.13 Aesthetics

3.13.1 Affected Environment

The Fulton Project would be located in an existing industrial park. The wood chipping mill (formerly American Cellulose Corporation) consists of several small process buildings, the chipping mill, log and chip storage piles, and conveyor systems. Mueller Copper Tube Company consists of an approximately 186,000 square foot metal building with multiple roof heights up to approximately 50 feet above grade and Hickory Hill Furniture Corporation consists of an approximately 112,000 square foot metal building with roof heights up to approximately 30 feet above grade.

Currently there are no residences present on the subject property but residences exist adjacent to the property to the southeast. Itawamba County has obtained cost certain options to purchase all of the residential properties adjacent to the site.

3.13.2 Environmental Consequences of the No Action Alternative

The proposed property would remain undeveloped, and the existing homes would continue to be adjacent to commercial property.

3.13.3 Environmental Consequences of Proposed Action

The proposed Fulton Project has three primary areas that have potential aesthetic affects:

- Biomass receiving and storage;
- ethanol production; and
- ethanol storage tanks.

The biomass receiving and storage area would include a dry biomass storage building, two biomass storage piles, associated handling equipment and a cyclone collector. The storage building would be approximately 275 feet long by 200 feet wide by 40 feet tall. The biomass storage piles would be approximately 175 feet long by 120 feet wide by 20 feet tall and approximately 80 feet long by 60 feet wide by 20 feet tall respectively. The peak height for the cyclone collector would be approximately 60 feet.

The ethanol production area includes the fermentation, distillation and dehydration operations. These operations will have the highest structures including fermenters, peak height 82’, scrubbers and vapor recovery, each with a peak height of 90’, beer column, peak height 100’, and condenser, peak height 120’.

The ethanol storage tank farm would contain one large ethanol AST and three smaller ASTs. The large AST will be approximately 30 feet in diameter and 50 feet tall. A large potable water tank of approximately the same size and the large ethanol storage tank would be constructed on-site.

A water vapor plume may be visible from the wood dryer stack from varying distances, depending on weather conditions. No other visible emissions are expected.

The proposed plant is expected to operate 24 hours per day, 7 days per week. Since production will be continuous, lighting will be required to support operations and to provide security. Lighting will consist of low-level lighting around exit areas and general outside areas, including ground-level operating areas, stairs, platforms, roadways, storage areas, and parking areas. The lighting will be provided for purposes of general operator access and safety under regular operating conditions.

Outdoor lights will be a combination of pole-mounted and structure-mounted lights. Spot lighting will be provided to illuminate operating equipment or access roadways where needed. This lighting is higher in intensity than general outside lighting, but will be both directional and limited to specific areas and usage as needed. This would limit the impact to neighboring properties.

The proposed Fulton Project would construct buildings and structures similar to the existing surrounding commercial and industrial property. Due to the similarity in commercial and industrial use of the surrounding area no significant change in appearance would occur as a result of the Proposed Action.

3.14 Traffic

3.14.1 Affected Environment

3.14.1.1 Roads

Vehicle Access to the Fulton Project site would be via South Access Road. South Access Road is a two lane asphalt paved road with a 40 ton weight limit. South Access Road connects to the southeast to State Highway 25, a four lane divided multiple-access highway that is the major access point to the City of Fulton from State Highway 78 (the future I-22). Highway 78 is a divided four lane limited access highway. Highway 78 is located less than ½ mile from the Fulton Project site. South Access Road connects to North Access Road north of the proposed Fulton Project site. BlueFire anticipates that a majority of traffic to the site would exit Highway 78 onto Highway 25 north and turn left onto South Access Road.

According to the Mississippi Department of Transportation (MDOT) Traffic Maps, from 2005 to 2007 the Annual Average Daily Traffic (AADT) on US Highway 78 west of Highway 25 ranged from 18,000 to 20,000 vehicles per day (vpd). The AADT on US Highway 78 east of Highway 25 was 14,000 vpd.

From 2005 to 2007 the AADT on Highway 25, north of US Highway 78 was 10,000 vpd and south of US Highway 78 was 4,000 vpd (MDOT, 2009).

3.14.1.2 Rail Lines

The Mississippian Railroad Cooperative, Inc. (MRC) operates a Class III local rail line that runs adjacent to the northeast corner of the site. The MRC runs from Fulton to Armory approximately 22 miles south of Fulton. A connection to the BNSF Railway is in Armory. The railroad serves the industrial park complex and typically operates on Monday, Wednesday and Friday. Prior to the shutdown of the American Cellulose Company wood chipping plant located south of the Fulton Project site, the MRC ran between 50 and 120 trains per month. (Baldwin, 2001).

3.14.1.3 Waterway

A third form of transportation is provided by Port Itawamba. The Tennessee-Tombigbee Waterway connects the lower Tennessee Valley to the Gulf of Mexico. The locks on the waterway are operated continuously (USACE). A barge dock is located at the site of the American Cellulose Company wood chipping plant and at the Itawamba County Port.

The tri-modal access to the site provides flexibility in reducing potential traffic impacts that may be associated with the construction and operations of the Fulton Plant. It also provides potential advantages in reducing transportation costs for delivery of materials and shipment of products.

3.14.2 Environmental Consequences of the No Action Alternative

3.14.2.1 Traffic

The facility would not be constructed and no increase in traffic would occur.

3.14.3 Environmental Consequences of the Proposed Action

The sub-contractor labor force for construction of the Fulton Project is expected average around average around 250 employees, with a peak of nearly 500. It is expected a maximum of approximately 500 cars per day and an average of 200 cars per day would be associated with construction staff. Truck traffic for deliveries is expected to be approximately 17 trucks per day with an average of 11 trucks per day. It is expected the traffic would use Highway 78 to highway 25 to the South Access Road. Construction would take approximately 12 to 14 months. This would be a maximum increase in daily traffic on Highway 25 of 5% and an average increase of 2%.

As a worst case scenario it is assumed all deliveries and shipments would occur by road. Due to the greater capacity of railcars and barges it is expected these modes of transportation would result in less impacts to the environment.

If all biomass was delivered by truck, operations would require an average of 79 trucks per day to deliver biomass during normal operations. The trucks would deliver biomass to either the Fulton Project site or to the chipping plant located at the site of the former American Cellulose Company. It is expected that the haul trucks would also use Highway 78 to Highway 25 to the South Access Road.

In addition, approximately 4 trucks per day would be used to loadout ash from the Fulton Project site. The remaining operations of denaturant delivery, lime delivery, ethanol shipments, dried yeast shipments, CO_2 shipments and gypsum shipments would require approximately 17 trucks per day. Therefore, the total additional truck traffic on use Highway 78 to highway 25 to the South Access Road would average 100 trucks per day and could reach 150 trucks per day under selected circumstances.

The facility will construct entrances to the facility off of the South Access Road. This access road serves the industrial area of Fulton, and allows for a bypass of the majority of Fulton from Highway 178 to just north of Highway 78. It is expected mostly commercial traffic will utilize the access road. The daily increase in traffic on Highway 25 north of Highway 78 would be less than 1% during facility operations.

It is expected the facility would be able to work with contractors to control both the routes and timing of delivery of materials to the facility to mitigate traffic concerns if they arise. The existing roads are capable of handling the increased traffic load with no projected impacts on traffic congestion. Deliveries to the facility, may choose to go through town; however, this is expected to be a secondary route. Given the availability and potentially lower costs of rail and barge transportation, use of these alternative means of delivery routes would reduce the potential impacts from truck deliveries.

3.15 Socioeconomics and Environmental Justice

3.15.1 Affected Environment

Itawamba County and the State of Mississippi have not been experiencing significant growth (compared to the growth of the City of Fulton and the United States) in recent years. The city is not within any defined metropolitan statistical area. The 2008 estimate of the population of the Itawamba County and the City of Fulton was 23,292 and 4,073 individuals, respectively. This represented a population increase of 1.8% for the county and 4.7% for the city from 2000 to 2008 (estimate). By comparison, the State of Mississippi and the United States have experienced population increases of 3.2% and 5.7%, respectively in the same time period (US Bureau of Census, 2009 and www.Itawamba.com).

Since 1980, Itawamba County has experienced a increase in population of 11.9% and the City of Fulton has increased the size of its population by 20.5% compared to 14.2% increase for the state of Mississippi as a whole. The United States has increased its’ population by 24.1% during the same time period. Table 3-8 (below) summarizes the population changes for Itawamba County, the City of Fulton, the State of Mississippi and the United States.

Table 3-7 - Population Changes for Itawamba County, Mississippi and the United States 1980-2008

Political Unit	1980 Population	1990 Population	1980-1990 % Change	2000 Population	1990-2000 % Change	2008 Population	2000-2008 % Change	1980-2008 % Change
Itawamba County	20,518	20,017	-2.5%	22,770	+12.1%	23,292	+2.2%	+11.9%
Fulton	3,238	3,387	+4.4%	3,882	+12.8%	4,073	+4.7%	+20.5%
Mississippi	2,520,638	2,573,216	+2.0%	2,844,658	+10.5	2,938,618	+3.2%	+14.2%
United States	226,545,805	248,709,873	+8.9	281,421,906	+11.6	298,362,973	+5.7%	+24.1%

Source: U.S. Bureau of Census; 2009

The home ownership rate of 82.4% for Itawamba County was above the State average of 72.3%. The home ownership rate of 66.2% for the City of Fulton was below the county and state averages. The property values for both the county were above the State average but the city property values were below the State average with median values of owner-occupied homes of $73,322 and $64,800 for Itawamba County and the City of Fulton, respectively compared to a State average of $71,400 (US Bureau of Census, 2009 (www.Itawamba.com).

The median household incomes for Itawamba County increased from $20,770 in 1989 to $36,274 in 2008. (www.Itawamba.com).

3.15.1.1 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 DOEs 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 of 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.

The racial make-up of Itawamba County is 92.5% white, 6.5% black, 0.1% American Indian and Alaska Native persons, 0.2% Asian, and 0.4% persons of more than one race (U.S. Bureau of Census, 2009 (2000 Census data)). In addition, 1.0% of the population also describe themselves as Latino decent.

The racial make-up of the City of Fulton is 83.7% white, 14.6% black, 0.2% American Indian and Alaska Native persons, 0.5% Asian, and 0.7% persons of more than one race (U.S. Bureau of Census, 2009 (2000 Census data). In addition, 1.3% of the population also describe themselves as Latino decent.

3.15.1.2 Socioeconomics

The poverty rates for individuals in Itawamba County and the City of Fulton are 10.1% and 16.9%, respectively. We note that the poverty rate for the City of Fulton exceeds the county, state and national poverty rates of 10.1%, 16.0% and 12.4%, respectively (U.S. Bureau of Census, 2009).

Itawamba County's labor force numbers approximately 17,826 persons. The employment rate for Itawamba County decreased from 62.7% in 1990 to 60.5% in 2000. The City of Fulton's labor force numbers approximately 3,171 persons. Employment rate has grown from 52.3% in 1990 to 59.7% in 2000.

While recent unemployment data for the City of Fulton was not available at the time of this assessment, the unemployment rate of 11.0% for Itawamba County exceeds the unemployment rates for the state and country of 9.8% and 9.7%, respectively (U.S. Bureau of Labor Statistics, 2009). Table 3-9 (below) summarizes the poverty, labor force, and unemployment status for the City, County, State, and Country.

Table 3-8 - Individual Poverty Status, Labor Force, and Unemployment for Itawamba County, Fulton, Mississippi, and the United States

Political Unit	Individual Poverty Status*	Labor Force* (percent)	Unemployment** (percent)
Itawamba County	10.1%	60.5%	11.0%
Fulton	16.9%	59.7%	Data not available
Mississippi	16.0%	59.4%	9.8%
United States	12.4%	63.9 %	9.7%

*Source: US Bureau of Census (2000 data)
**Source: US Bureau of Labor Statistics (June, 2009 data)

3.15.2 Consequences of No Action Alternative

The No Action Alternative would have no impact on socioeconomics and/or environmental justice.

3.15.3 Consequences of Proposed Action

The construction personnel and permanent employees for Fulton Project are expected to come from existing skilled workers in the region. At the peak of construction, the labor force would average around 250 employees, with a peak of nearly 500. This workforce would be derived from a combination of existing local and regional resources. The regional and local construction activities of the last five years for Toyota and other companies have developed a significant available workforce with experience in facility construction. The Fulton Project workforce for site operations, would be approximately 45 to 50 people. The workforce for other services such as biomass delivery and handling, would be approximately 15 to 20 people. The total workforce of approximately 65 to 70 could be supported by the surrounding area's population and skilled personnel such that BlueFire expects to hire the necessary people from existing local and/or regional resources.

Based on the minority populations for the City of Fulton, Itawamba County, and the State of Mississippi no disproportionately high percentage of minority residents would be directly impacted by construction and operation of the proposed Fulton Project. Additionally, the economic benefits of the facility to the county which were discussed above would likely also benefit the minority population of the area to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

Itawamba County and the City of Fulton have a meaningfully higher percentage of individuals below the poverty level than that of the general population of Mississippi. However, the Fulton Project would be located away from any concentration of residences, its construction and operation would not adversely affect any economic subgroup. Therefore, no disproportionately high percentage of low income residents would be impacted by the Proposed Action. As has been shown in previous sections, there are only minor adverse environmental impacts associated with the Proposed Action, and none of these impacts would disproportionately impact minority or low income populations. The economic benefits of the facility to the county, which were discussed above, would likely also benefit those currently living below the poverty level to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

Because the Fulton Project would be located away from any concentration of residences or any areas where children would congregate, its construction and operation would not pose direct environmental health and safety risks to children in Itawamba County or in the City of Fulton. There are only minor adverse environmental impacts associated with the Proposed Action and none of these minor impacts would create any environmental health and safety risks to children.

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

4.0 Cumulative Impacts

4.1 Existing and Reasonably Foreseeable Projects

The former American Cellulose Company chipping mill located south of the proposed Fulton Project site would likely be re-activated as a result of the Proposed Action. Biomass would be delivered to the former American Cellulose chip mill for processing. The former American Cellulose chip mill has infrastructure in place to receive feedstock by truck, rail, and/or barge. Processing would include debarking and chipping to a 3/4-inch to 3-inch nominal chip size. Once processed, all green wood chips larger than ¾-inch would be conveyed to the Fulton Project boiler fuel storage area for use as fuel in the solid fuel boiler. All green wood chips ¾-inch or smaller would be conveyed to a storage pile at the American Cellulose facility or conveyed to the Fulton Project site for use.

The American Cellulose Company facility would not be expanded or modified to receive or process the biomass for the Fulton Project. Production capacity at the mill exceeds a half a million tons of hardwood chips annually (http://www.homanindustries.com/acc.php). The re-activation would essentially be a return to historic conditions. Air emissions would occur from the facility. Based on the quantity of biomass required for the Fulton Project, the potential emissions from American Cellulose Company would be:

Table 4-1- Summary of American Cellulose Company Potential to Emit

Pollutant	ACC Potential to Emit Tpy
Total Suspended Particulate (PM)	23.9
PM_{10}	13.3
$PM_{2.5}$	2.7
NO_X	0
SO_X	0
CO	0
VOC	0
HAP	0.8
Lead	0

Consistent with their purpose to plan for the future and enhance the quality of life for county residents through industry and business, Itawamba County is working with BlueFire on certain improvements in the area that could benefit the County and the Fulton Project if adequate funding is secured. These include:

- A public access conveyor for the Port of Itawamba. This conveyor access would be located on Port property and would allow barge, rail and truck to unload and deliver biomass feedstock to the proposed Fulton Project in addition to the feedstock that may be supplied by American Cellulose.

- A turning lane at the juncture of the South Access Road and Hwy 25 to allow trucks leaving the Fulton Project or American Cellulose site easier entry south toward the Interstate and ease traffic flow.

- A marshalling area on Port property that would allow trucks to exit the South Access Road during times of possible congestion from trucks destined for American Cellulose Corporation, PSP Monotec, and the Port.

- An education and science center in the area in constructed and staffed conjunction with Itawamba Community College.

Other that those mentioned above, BlueFire is not aware of any other known or anticipated projects. Based on their own knowledge and the information received, no other industrial development is planned or anticipated in the Fulton Project area.

4.2 Environmental Consequences

4.2.1 Air Quality and Meteorology

As discussed in Section 3.2, ambient air quality modeling has been completed for the proposed Fulton Project to demonstrate that the facility will not significantly cause or contribute to an exceedance of the NAAQS. The modeling analysis shows that the proposed Fulton Project and the associate operation of the American Cellulose Company facility will not cause or contribute to an exceedance of the NAAQS.

Operation of the Fulton Project would result in the generation of point source GHG emissions but a net reduction in global GHG emissions. Additionally, steam generation at the Fulton Project will utilize a carbon neutral fuel source rather than non-renewable resource (natural gas) that generates anthropogenic GHGs.

Operation of the Fulton Project would have the potential to increase sources of odor, primarily from storage of biomass and lignin in outdoor storage piles and fermentation operations. Odors from biomass storage have historically been present in the area due to the operations of the American Cellulose Company facility. These odors are not normally considered to be objectionable. Odors from lignin storage would be minimized by limiting the duration of storage. Odors from fermentation operations are a function of the VOC produced during fermentation. The VOC emissions would be controlled by a wet scrubber as described in Section 2.2.3.9.

4.2.2 Geology and Soils

The Fulton Project would include development of approximately 38 acres of land that is currently vacant and consists of former agricultural land and wooded areas. Approximately 14 acres of land would be covered by impervious surfaces including buildings, roads, paved and gravel covered process and storage areas.

The re-activation of the former American Cellulose Company facility would not have an impact on geology or soils at that location.

No other projects are known or expected to be completed in the area.

4.2.3 Biological Resources

The Fulton Project would impact approximately 13.5 acres of wetlands on-site. Approximately 12 acres of wetlands would be cleared and approximately 1.48 acres of wetlands would be filled. The Itawamba County Board of Supervisors has filed an application under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act with the USACE Mobile District to allow clearing and filling of wetlands on-site. Itawamba County completed Wetland Rapid Assessment Procedure

(WRAP) to determine the amount of wetland mitigation that would be required. Based on the WRAP, Itawamba County has determined that a total of 7.5 acres of mitigation wetlands would be required. The mitigation wetlands would consist of restored former bottomland hardwood forested wetlands located in Monroe County, Mississippi. The USACE Mobile District placed the draft permit on public notice on January 25, 2010.

Fulton Project would not impact any state or federally listed threatened, endangered, or special concern plant or animal species.

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

The re-activation of the former American Cellulose Company facility would not have an impact on biological resources at that location.

No other projects are known or expected to be completed in the area.

4.2.4 Water Resources

The consumption of water is a primary avenue for cumulative impacts associated with the Fulton Project. Water used by BlueFire would not be available to other potential users and could constrain future development.

BlueFire would require an average of approximately 110 gallons per minute (gpm) (approximately 58 mgy) for utility and process operations. Water use would increase during summer months due primarily to an increased requirement for water in the evaporative cooling towers. Maximum, short term, water use during period of high temperature would be 600 gpm. The City of Fulton has the capacity to provide the necessary water needed by the Fulton Project.

No other projects are known or expected to be completed in the area served by the City of Fulton or NEMRWD.

4.2.5 Waste Water Resources

The Fulton Project would generate waste water that would utilize excess capacity of the existing gravity line and force main and City of Fulton waste water treatment lagoon. Capacity used by BlueFire would not be available to other potential users and could constrain future development in the industrial park served by the gravity main. The City of Fulton has the capacity to treat the waste water generated by the Fulton Project.

No other projects are known or expected to be completed in the area served by the City of Fulton.

4.2.6 Waste Management and Hazardous Materials

The Fulton Project would recycle as much of the construction debris and operational waste materials as possible. The Fulton Project would also investigate and beneficially reuse solid byproducts, such as boiler ash, from the facility to the degree possible.

The amount of waste disposed in local permitted industrial landfills would increase by approximately 40 tpd. The existing landfills are permitted to accept the wastes expected to be generated by the Fulton

Project and have sufficient capacity to accept the maximum projected amount of waste generated for at least 20 years before reaching their existing capacity.

The Fulton Project would result in storage and handling of hazardous materials on-site. Spill control measures, response plans, and employee training would be effective measures that would prevent impacts from spills of hazardous materials.

The quantities and types of waste materials generated by American Cellulose Company would not change from historic levels as a result of the Proposed Action.

No other projects are known or expected to be completed in the area.

4.2.7 Infrastructure

The Fulton Project would require installation of a new electric substation on site, and construction of new connections to an existing natural gas pipeline, existing water line, and existing sanitary sewer line. The existing off-site infrastructure is sufficient to support the proposed Fulton Project needs. Any impacts to on-site wetlands from interconnections would be reviewed and adequate mitigation would be provided. Mitigation acreage for impacted wetlands is available from the Black Swamp Mitigation Bank.

The existing infrastructure for natural gas, electricity, and sanitary waste disposal at the American Cellulose Company facility are sufficient to meet the requirements of that plant following re-activation.

No other projects are known or expected to be completed in the area.

4.2.8 Cultural Resources

No cultural or archeological resources or historic standing structures are known to be present in the areas where the Fulton Project would be constructed.

No other projects are known or expected to be completed in the area.

4.2.9 Land Use

The regional land use around is predominantly forested and agricultural. The regional land use will not change as a result of the Fulton Project. Harvesting of forest resources would not be significantly affected by construction or operation of the proposed Fulton Project or the associated American Cellulose Company facility.

No other projects are known or expected to be completed in the area.

4.2.10 Noise

General noise levels in rural areas ranges between 35 and 45 dBA with mechanical farming activities tending to be on the higher end of the scale. The noise levels from the Fulton Project are expected to be less than 45 dBA at the NSA.

Noise levels at the re-activated American Cellulose Company facility would not change from historic levels as a result of the Proposed Action.

No other projects are known or expected to be completed in the area.

4.2.11 Aesthetics

The proposed Fulton Project would be constructed in an existing industrial area. The Fulton Project would add similar structures to those already on-site and common in the area.

No new construction would occur at the American Cellulose Company facility. Therefore, no change is aesthetics would occur.

No other projects are known or expected to be completed in the area.

4.2.12 Traffic

Construction of the Fulton Project would temporarily increase the amount of auto and truck traffic for construction staff and deliveries to the facility. Operation of the Fulton Project would result in an increase in truck traffic to the site. BlueFire would construct three entrances to the facility off of South Access Road to all employees, deliveries, and ethanol transports. The number of trucks and cars that would travel to the proposed Fulton Project site would be an addition of less than 0.1% to the current total on Highway 25 north of Highway 78.

When it was in operation, the American Cellulose capacity was over 500,000 tons annually which is about equal to the Fulton Plant's annual feedstock requirements. Truck traffic levels would be similar to historic levels if all feedstock for the Fulton Plant was delivered by trucks. Rail and barge access would provide additional delivery systems easing road traffic impacts.

No other projects are known or expected to be completed in the area.

4.2.13 Socioeconomics and Environmental Justice

Unemployment in Itawamba County has historically been higher than the Mississippi state average.

Construction of the Fulton Project would use a sub-contractor labor force that would average around 450 employees, with a peak of nearly 500, for a construction schedule that would extend from late 2010 through early 2012. This workforce would be derived from a combination of existing local and regional resources. When completed, the Fulton Project would employ approximately 65 employees for plant operations and other service providers. It is expected that the majority of these employees would be derived from local resources.

The re-activated American Cellulose Company facility would be expected to hire an equivalent number of employees as historic operations.

Neither the Fulton Project nor the re-activated American Cellulose Company facility would be expected to adversely impact the minority low income population or children of the City of Fulton or Itawamba County.

No other projects are known or expected to be completed in the area.

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Appendix A

Figures

Appendix B

Scoping Letter, Scoping Letter Distribution List, and Scoping Letter Responses

Appendix C

Biomass Availability Reports

Appendix D

Report of Geotechnical Characterization – Fulton Port Site – Fulton, Mississippi

Appendix E

Wetland Delineation Report

Appendix F

Threatened and Endangered Species Agency Correspondence

Appendix G

Landfill Permit

Appendix H

Cultural Resources Site Survey and Agency Correspondence

Appendix I

Itawamba County Correspondence