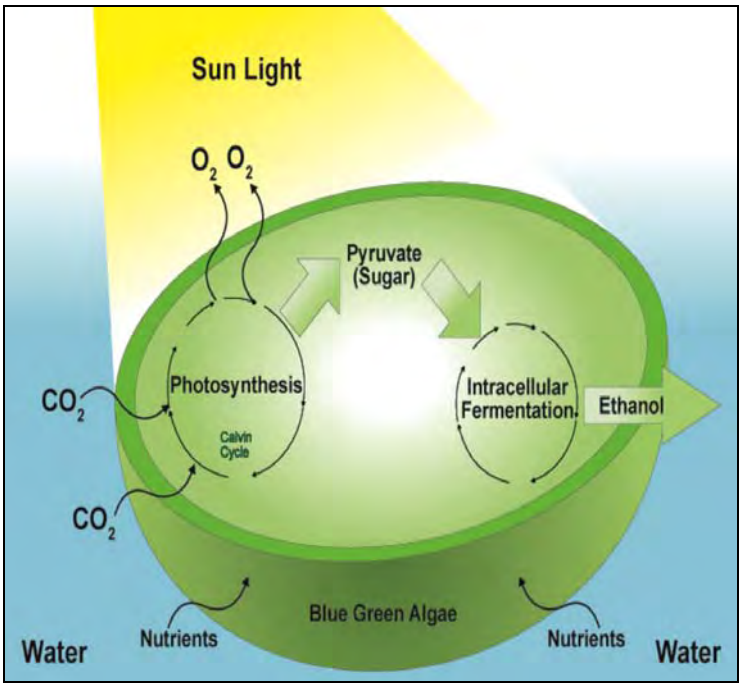
# ALGENOL INTEGRATED BIOREFINERY FOR PRODUCING ETHANOL FROM HYBRID ALGAE
## Freeport, Texas
## Fort Myers, Florida




# Final Environmental Assessment

## DOE/EA-1786

U.S. Department of Energy
Energy Efficiency and Renewable Energy

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| Algenol | Algenol Biofuels, Inc. |
| APE | Area of Potential Effect |
| APHIS | Animal and Plant Health Inspection Service |
| ASR | aquifer storage and recovery |
| AWWT | Advanced Wastewater Treatment |
| BMP | best management practice |
| CAA | Clean Air Act |
| CEQ | Council of Environmental Quality |
| CESQG | Conditionally Exempt Small Quantity Generator |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2$ | carbon dioxide equivalent |
| CWA | Clean Water Act |
| dBA | decibels, A-weighted scale |
| DOE | U.S. Department of Energy |
| Dow | Dow Chemical Company |
| EA | Environmental Assessment |
| EERE | Energy Efficiency and Renewable Energy |
| EH&S | Environmental, Health, and Safety |
| EISA | Energy Independence and Security Act of 2007 |
| EPA | U.S. Environmental Protection Agency |
| EPAct 2005 | Energy Policy Act of 2005 |
| FDEP | Florida Department of Environmental Protection |
| FDOT | Florida Department of Transportation |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FM | Farms-to-Market |
| FWCC | Fish and Wildlife Conservation Commission (for the state of Florida) |
| GHG | greenhouse gas |
| H-GAC | Houston-Galveston Area Council |
| LOS | level of service |

| | |
|---|---|
| MJ | megajoule |
| $MJ_{EtOH}$ | megajoule ethanol |
| NAAQS | National Ambient Air Quality Standards |
| NAGPRA | Native American Graves Protection and Repatriation Act of 1990 |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| $NO_2$ | nitrogen dioxide |
| NOx | nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NRHP | National Register of Historic Places |
| NRCS | Natural Resource Conservation Service |
| NWI | National Wetlands Inventory |
| $O_2$ | oxygen |
| $O_3$ | ozone |
| OSHA | Occupational Safety and Health Administration |
| Pb | lead |
| PDU | Process Development Unit |
| $PM_{10}$ | particulate matter with an aerodynamic diameter of 10 micrometers or less |
| $PM_{2.5}$ | particulate matter with an aerodynamic diameter of 2.5 micrometers or less |
| POV | privately-owned vehicle |
| PPA | Plant Protection Act |
| PSD | Prevention of Significant Deterioration |
| psig | pounds per square inch gauge |
| RCRA | Resource Conservation and Recovery Act |
| Recovery Act | American Recovery and Reinvestment Act of 2009 |
| R&D | research and development |
| RIN | Renewable Identification Number |
| SCADA | Supervisory Control and Data Acquisition |
| SFWMD | South Florida Water Management District |
| SH | state highway |
| SHPO | State Historical Preservation Office |
| SIP | State Implementation Plan |
| $SO_2$ | sulfur dioxide |
| SPCC | Spill Prevention, Control and Countermeasure |

| | |
|---|---|
| SWPPP | Stormwater Pollution Prevention Plan |
| TCEQ | Texas Commission on Environmental Quality |
| TDS | total dissolved solids |
| TPDES | Texas Pollutant Discharge Elimination System |
| TPWD | Texas Parks and Wildlife Department |
| TSCA | Toxic Substances Control Act of 1976 |
| TXDOT | Texas Department of Transportation |
| UIC | Underground Injection Control |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USDW | Underground Source of Drinking Water |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VOC | volatile organic compound |

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# 1.0 INTRODUCTION AND PURPOSE AND NEED

The U.S. Department of Energy (DOE) is proposing to authorize the expenditure of up to $18 million in cost-shared federal funding to support the final design, construction, and start-up of a pilot-scale Direct to Ethanol® integrated biorefinery (hereafter referred to as biorefinery or proposed project). DOE has authorized Algenol Biofuels, Inc. (Algenol) to use a percentage of its federal funding for pilot-scale activities ($7 million), which include: research and development related to organism development, developing the flexible film photobioreactor, preliminary process engineering, construction planning, regulatory submissions and approval, a Phase 1 stage gate review and a National Environmental Policy Act (NEPA) review of all other activities. These activities are associated with the proposed project and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by DOE in advance of the conclusion of the Environmental Assessment (EA) for the proposed project. The proposed project would be located on Dow Chemical Company's (Dow) plastics and chemical manufacturing operations facility in Freeport, Texas or in Fort Myers, Florida. Both sites are addressed in this Environmental Assessment (EA).

DOE competitively selected the Algenol proposed project under its Funding Opportunity Announcement entitled Recovery Act – Demonstration of Integrated Biorefinery Operations FOA-0000096, which is funded by the *American Recovery and Reinvestment Act of 2009* (Recovery Act). The total anticipated cost of the project is approximately $59 million with a proposed federal cost share of up to $25 million. If DOE authorizes the full expenditure of up to $25 million of federal cost share, Algenol would be responsible for the remaining project costs. . Algenol has developed hybrid blue-green algae (hereafter referred to as hybrid algae) that are intergeneric genetically-engineered microorganisms for the purposes of the *Toxic Substances Control Act of 1976* (TSCA), 15 U.S.C. §§ 2601, *et seq*. Algenol's biofuel technology produces ethanol from carbon dioxide ($CO_2$) and seawater using the hybrid algae to actively carry out photosynthesis in sealed, clear-plastic photobioreactors (i.e., closed-system translucent containers). The ethanol is made inside the hybrid algae cell and diffuses through the cell wall into the seawater culture medium (a substance containing nutrients in which microorganisms are cultivated) and then evaporates, along with water into the empty space at the top of the photobioreactor. The ethanol-water vapor would be condensed, collected as a liquid, and distilled into ethanol. The biorefinery would consist of approximately 17 acres of plastic, fully enclosed 1,200-gallon specialized photobioreactors and supporting areas for testing, distillation, and storage.

The funding of projects under the Recovery Act requires compliance with the *National Environmental Policy Act of 1969*, as amended (NEPA; 42 U.S.C. §§ 4321, *et seq*.); Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500 to 1508); and DOE NEPA implementing procedures (10 CFR Part 1021). Thus, DOE prepared this EA to evaluate the potential environmental consequences of authorizing the expenditure of federal funds. In compliance with NEPA and its implementing procedures, this EA examines the potential environmental consequences of DOE's Proposed Action (that is, authorizing Algenol to expend federal funding), the project, and the No Action Alternative (under which it is assumed that, as a consequence of DOE's denial of financial assistance, Algenol would not proceed with the project).

At the time this EA was initiated, Algenol was considering two sites for construction of the biorefinery (one in Texas and one in Florida); therefore the EA evaluates impacts at both site options. On November 22, Algenol determined that the Texas site was no longer feasible, in part due to potential wetland impacts, and selected the Florida site. All information related to the analysis of the Texas site remains in the final EA to maintain the integrity of the NEPA decision-making process and the EA record.

## 1.1 PURPOSE AND NEED

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

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

As part of the Recovery Act, DOE's Office of Energy Efficiency and Renewable Energy (EERE) is providing up to $564 million in funds to accelerate the construction and operation of pilot, demonstration, and commercial-scale integrated biorefinery facilities. The projects would be designed to validate refining technologies and help lay the foundation for full commercial-scale development of the biomass industry in the United States. The projects would produce advanced biofuels, biopower, and bioproducts using biomass feedstock.

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

The purpose of the DOE Proposed Action is to support the objectives of the EPAct 2005, EISA, and the Recovery Act. Providing funding as part of the Recovery Act would partially satisfy the need of the program to accelerate the construction and operation of pilot biorefinery facilities. The proposed project would help to attain the Recovery Act's goal to:

- Accelerate the construction and operation of biorefinery facilities.

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

## 1.2 NATIONAL ENVIRONMENTAL POLICY ACT AND RELATED PROCEDURES

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

This EA evaluates the potential direct, indirect, and cumulative effects of the proposed project. For purposes of comparison, this EA also evaluates the impacts that would occur if DOE did not provide funding and the proposed project is not constructed (the No Action Alternative). While it is possible that the project could be implemented without DOE financial assistance, that scenario would not provide for a meaningful No Action Alternative analysis, as it would be identical to the Proposed Action.

## 1.3 PUBLIC INVOLVEMENT

In accordance with applicable regulations and policies, DOE sent scoping letters (provided in Appendix A) to potentially interested local, state and federal agencies and to other potentially interested individuals and organizations to solicit public comment – potentially interested parties include the following (see also the Distribution List in Appendix A):

- Texas Site Option
  - U.S. Environmental Protection Agency, Region 6
  - U.S. Department of the Interior, Regional Office, Albuquerque, New Mexico
  - U.S. Fish and Wildlife Service, Clear Lake Ecological Services Field Office
  - Texas Governor's Office of Budget, Planning, and Policy
  - Texas Commission on Environmental Quality
  - Texas Parks and Wildlife Department
  - Freeport Planning Commission and City Council
- Florida Site Option
  - U.S. Environmental Protection Agency, Region 4
  - Florida State Clearinghouse, Florida Department of Environmental Protection
  - U.S. Fish and Wildlife Service, South Florida Ecological Services Office

- U.S. Army Corps of Engineers, Jacksonville District, Regulatory Division, Fort Myers Permitting District
- Florida Fish and Wildlife Conservation Commission
- Southwest Florida Regional Planning Commission, Lee County

DOE also published the Notice of Scoping in the DOE Golden Field Office online reading room: http//www.eere.energy.gov/golden/Reading_Room.aspx. The scoping letter described the Proposed Action and requested assistance in identifying potential issues to be evaluated in the EA (see Appendix A). In addition to the Notice of Scoping, DOE also submitted individual consultation letters to the state historical preservation offices (SHPO), applicable U.S. Fish and Wildlife Service (USFWS) offices, and the state wildlife departments for each state, to receive feedback on potential impacts to cultural and biological resources. Additionally, consultation letters were sent to 11 tribes – nine of which were identified as potentially having interest in the Texas site's project area (Yselta del Sur Pueblo, Alabama-Coushatta Tribe of Texas, Comanche Nation of Oklahoma, Kiowa Tribe of Oklahoma, Tonkawa Tribe of Oklahoma, Kickapoo Tribe in Kansas, Kickapoo Tribe of Oklahoma, Kickapoo Traditional Tribe of Texas, and the Wichita and Affiliated Tribes) and two of which were identified as potentially having land claims in the Florida site's project area (Seminole Nation of Oklahoma and Seminole Indian Tribe of Florida). The consultation letters are provided in Appendix B.

In response to the scoping and consultation letters, DOE received 12 comment letters. The comment letters are provided in Appendices A and B and are summarized as follows:

- John Williams, Principal Researcher of Williams Researcher, representing "Concerned Citizens for Clean Air" – the letter (in Appendix A) outlines several environmental and economic concerns, including air emissions, wetland impacts, emergency handling, water use, and the economic impacts of the biorefinery. Air quality impacts are addressed in Section 3.4 of this EA; wetlands impacts are addressed in Section 3.8; water use impacts are addressed in Sections 3.6, 3.7, and 3.11; waste and hazardous materials impacts are addressed in Section 3.10; and emergency handling procedures and public protection are discussed in Section 3.13. The issue of the economic viability of this project in comparison to other types of ethanol plants is beyond the scope of this EA. As stated in Section 1.1, a large part of DOE's purpose of the Proposed Action is to fund cost-shared research and development projects to accelerate the construction and operation of pilot biorefinery facilities that, when deployed commercially, will enable the U.S. to reduce its reliance on foreign oil, increase the use of renewable energy sources, and reduce environmental impacts while spurring the creation of the domestic bio-industry and new jobs.
- Texas Parks and Wildlife Department (TPWD), Wildlife Division – the letter (in Appendix B) identifies several concerns pertaining to migratory birds; wetlands; and rare, threatened, and endangered species. For each of the concerns discussed, the letter also provides recommendations for mitigating those concerns. Section 3.9 addresses the comments of the letter and also discusses recent correspondence with TPWD.
- U.S. Army Corps of Engineers (USACE), Galveston District, Texas – this letter (in Appendix A) recommends that a jurisdictional wetlands delineation be conducted for the Texas site option. The Corps is currently in the process of reviewing a delineation report that was submitted by Dow's consultants. The delineation report and potential impacts to wetlands are discussed in Section 3.8.

- Texas Commission on Environmental Quality (TCEQ) – the letter (in Appendix A) acknowledges that the TCEQ has reviewed the project description and notes that a general conformity analysis will not be required for the project as the amount of volatile organic compounds (VOCs) and nitrogen oxides (NOx) emissions from the Biorefinery would be well below the 25 tons per year threshold limit. Potential impacts to air quality are discussed in Section 3.4. The letter also recommends that the EA address the prevention of groundwater and surface water contamination (potential impacts to these resource areas are discussed in Sections 3.6 and 3.7) and that ethanol would be subject to requirements listed in 30 Texas Administrative Code Chapter 335, *Industrial Solid Waste and Municipal Hazardous Waste*.
- Kickapoo Tribe in Kansas – the letter (in Appendix B) notes that no further Section 106 consultation is required and acknowledges concurrence with "no adverse effect" to historic structures or culturally significant sites with respect to the Texas site option. Potential impacts to cultural resources are discussed in Section 3.3.
- Tonkawa Tribe of Oklahoma – the letter (in Appendix B) notes that the Tonkawa Tribe has no specifically designated historical or cultural sites in the Texas site's project area, but would like to be contacted in the case that cultural resources are encountered. Potential impacts to cultural resources are discussed in Section 3.3.
- Yselta del Sur Pueblo – the letter (in Appendix B) states that due to the Texas site's location being outside of their area of concern, the tribal council does not have any concerns and do not require further consultation.
- State Historic Preservation Office (SHPO) – letters (in Appendix B) were received from the Texas Historical Commission and the Florida Division of Historical Resources acknowledging that the proposed project would not have an effect on historic properties at the respective site options. Potential impacts to cultural resources are discussed in Section 3.3.
- Florida Department of Environmental Protection (FDEP) – the letter (in Appendix A) notes that the agency finds the project is consistent with the Florida Coastal Management Program and has no objections with the proposed project. The letter also notes that the use of groundwater for process water would require a Water Use Permit from the South Florida Water Management District (SFWMD). Potential impacts to groundwater and surface water are discussed in Sections 3.6 and 3.7, respectively.
- Southwest Florida Regional Planning Council – the letter (in Appendix A) notes that the Biorefinery at the Florida site option would be a project of regional importance and appears to be consistent with regional planning goals and objectives pending review of the EA. This letter and potential impacts to land use are discussed in Section 3.1.
- Seminole Tribe of Florida – the letter (in Appendix B) notes that the Seminole Tribe of Florida Tribal Historic Preservation Office would like to review a Phase I archaeological survey before making any further comments. If DOE or Algenol receive any comments, they will be addressed accordingly. Potential impacts to cultural resources are discussed in Section 3.3.

DOE published the Draft EA on line at the Reading Room and sent Notices of Availability (NOA) to interested agencies and individuals. The NOA and the NOA distribution list are presented in Appendix A. No comments were received during the comment period.

## 1.4 REPORT CONTENT

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

- Section 2.0 - DOE Proposed Action and Alternatives
- Section 3.0 - Affected Environment and Environmental Consequences of the Alternatives
- Section 4.0 - Cumulative Impacts
- Section 5.0 - Short-Term Uses versus Long-Term Productivity; Irreversible and Irretrievable Commitments; and Unavoidable Adverse Impacts
- Section 5.0 - References

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# 2.0 PROPOSED ACTION AND NO ACTION ALTERNATIVES

## 2.1 INTRODUCTION

This chapter describes the Proposed Action and No Action Alternative analyzed in this EA. As described in Chapter 1, CEQ's regulations direct all federal agencies to use the NEPA process to identify and assess the reasonable alternatives to proposed actions that would avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1500.2(e)).

## 2.2 PROPOSED ACTION

Under the Proposed Action, DOE would authorize Algenol to expend federal funding to support the final design, construction, and start-up of a pilot-scale integrated biorefinery (which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid algae, which are intergeneric genetically-engineered microorganisms for the purposes of the *Toxic Substances Control Act of 1976* (TSCA), 15 U.S.C. §§ 2601, *et seq.*. This project would be located either near Freeport, Texas on 26 acres of property owned by the Dow Chemical Company (Dow) or in Fort Myers, Florida on approximately 40 acres of land in the Alico Business Park. The biorefinery would produce approximately 100,000 gallons of ethanol per year.

Funding of the proposed project would be consistent with DOE's goals under the objectives outlined in EPAct 2005, EISA, and the Recovery Act and would partially satisfy the need of the program to accelerate the construction and operation of pilot biorefinery facilities as discussed in Section 1.1.

## 2.3 PROJECT BACKGROUND

The project would accelerate the commercialization of Algenol's Direct to Ethanol® technology. This advanced third generation biofuel technology makes low-cost ethanol from $CO_2$ and seawater using hybrid algae in sealed, clear-plastic photobioreactors (i.e., closed-system translucent containers). The purpose of the proposed project is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization. The ultimate goal is to develop this technology for use in a commercial biorefinery.

Algenol's technology has culminated in hybrid algae that produce approximately 6,000 gallons of ethanol per acre per year. Algenol plans to bring its technology to commercial scale in under five years and intends to build commercial scale facilities that can produce ethanol for under $1.50 per gallon.

## 2.4 PROJECT TECHNOLOGY AND PROCESSES

### 2.4.1 Algenol's Hybrid Algae

Direct to Ethanol® technology involves hybrid algae that have been enhanced to over-express the genes (i.e., excessive expression of a gene by producing too much of its effect or product) for fermentation enzymes (i.e., protein catalysts in living cells that catalyze biochemical

reactions) found widely in nature. These enzymes are pyruvate decarboxylase and alcohol dehydrogenase. The resulting hybrid algae actively carry out photosynthesis and utilize $CO_2$ as the feedstock for making ethanol inside each algal cell as illustrated in Figure 2-1.

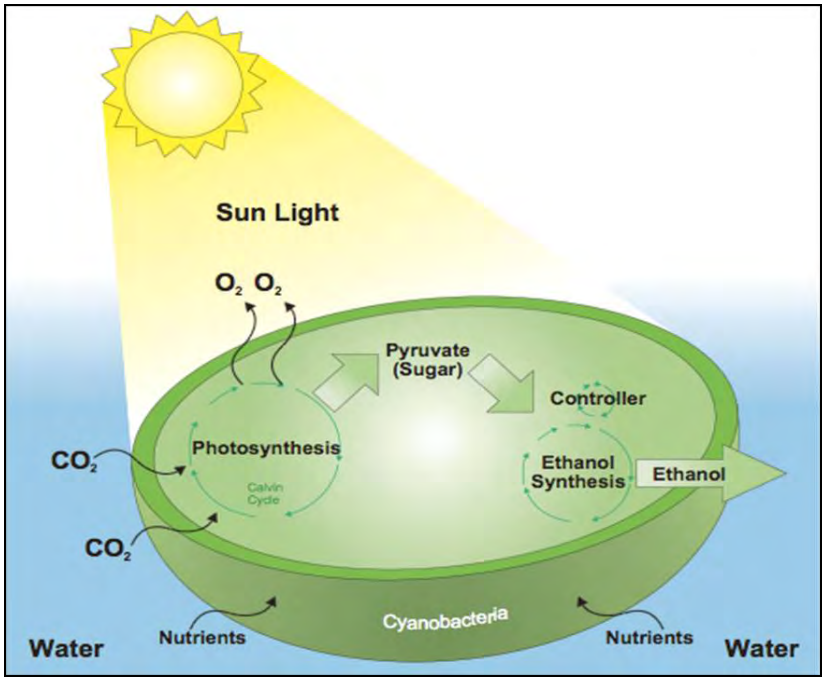


**Figure 2-1. Ethanol from Blue-Green Algae (Algenol, 2010)**

Blue-green algae use a photosynthetic process to convert $CO_2$ into inorganic compounds that is similar to the process used by plants; however, blue-green algae have higher growth rates and are very efficient at utilizing atmospheric $CO_2$. In addition to high $CO_2$ utilization abilities, they have simple growth requirements, grow to high densities, and use light and nutrients efficiently. Blue-green algae have a relatively small and well characterized genome and are relatively easy to culture.

Under the 1986 Coordinated Framework for Regulation of Biotechnology, the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) would be responsible for regulating the use and management of Algenol's hybrid algae. At USDA, the Animal and Plant Health Inspection Service (APHIS) regulates certain microorganisms under the Plant Protection Act (PPA), 7 U.S.C. §§ 7701, *et seq.*, and its implementing regulations (7 CFR Part 340). APHIS regulates organisms altered or produced by genetic engineering if APHIS has reason to believe the organism is a "plant pest." Algenol has consulted with APHIS to solicit their opinion on whether the hybrid algae would potentially be regulated under PPA. After reviewing details regarding Algenol's technology, including scientific studies and other data, APHIS provided a written determination that the specified strains of the hybrid algae would not be considered plant pests as the strains are non-pathogenic for plants, animals, and humans and the donor sequences used to modify the recipient strains are not known to confer any pest or pathogen characteristics on the recipient organisms (USDA, 2010a). Therefore, the hybrid algae would not be a regulated article under 7 CFR Part 340. Should requirements as stipulated under the PPA become applicable to the project, Algenol would ensure adherence to those requirements.

EPA would regulate the hybrid algae under TSCA and its implementing regulations (40 CFR Part 725) as microbial products of biotechnology. Under TSCA, Algenol's hybrid algae and the Direct to ethanol ® technology would fall under Subpart E, Section 735.234 which states " A person who manufactures, imports, or processes a microorganism is not subject to the reporting requirements under subpart D of this part if all of the following conditions are met: (a) all manufacturing, importing or processing would be for research and development (R&D) activities up to, and including, pilot scale; (b) all use would be by, or directly under, the supervision of a technically qualified individual, as defined by EPA; (c) there would be no intentional testing outside of a structure, as defined by EPA; (d) containment and/or inactivation controls would be in place, as prescribed by EPA; and (e) all persons engaged in experimentation, research, or analysis would be notified of any risk to health, which might be associated with the algae."

Algenol has met with the Office of Pollution Prevention and Toxics at EPA to solicit their opinion on whether the proposed project would be consistent with TSCA regulations. As a result of the meeting, EPA indicated that the project would fall under EPA's "contained structure" exemption provided under 40 CFR 725.234; thus, there would be no need to submit a TSCA application for the project to be conducted under those containment measures. DOE agrees that if Algenol's development, use, transportation, and disposal of hybrid algae would take place in contained facilities or vessels as planned, Algenol would qualify for EPA's "contained structure" exemption under 40 CFR 725.234 and would not need to submit a TSCA application for the proposed project.

With respect to state regulations, the Texas Parks and Wildlife Department (TPWD) held a public meeting in July 2010, to gather input regarding which non-native algae to consider for importation, possession, use, and sale in Texas (TPWD, 2010). In an effort to allow the use of some non-native algae while adhering to its mission of wildlife protection and conservation, the Texas Legislature has directed TPWD to create a list of approved exotic aquatic plants, which includes algae. The list of approved species is expected to be finalized by the end of the year. The use of a list of *approved* plant species is a departure from the TPWD's present use of a list of *prohibited* species to restrict the importation and sale of certain non-native plants. No algae are on the current prohibited list. Before inclusion on the approved list, species must pass a scientific risk analysis to ensure that it does not have the potential to negatively impact the state's aquatic resources. Possession of other non-native species is allowed with a permit. Algenol may require an Exotic Species Permit from TPWD and would adhere to the stipulations as required under in the permit.

### 2.4.2 Direct to Ethanol ® Process

Under Algenol's Direct to Ethanol ® process, ethanol is made inside the hybrid algae cell and diffuses through the cell wall into the seawater culture medium (i.e., a substance containing nutrients in which microorganisms are cultivated) and then evaporates, along with water into the empty space at the top of the photobioreactor (i.e., the "headspace"). The ethanol water vapor condenses on the inner surface of the photobioreactor headspace and is collected and concentrated.

A cornerstone of the Direct to Ethanol® process is the patented photobioreactor, the main physical structure of the process. Polyethylene plastic, which is commonly used for greenhouses and many other applications, is the primary construction material for the photobioreactors due to ease of manufacturing, versatility, imperviousness and resistance to degradation in water.

Enhanced with certain resins to provide substantial durability, the flexible film used to construct the photobioreactors is durable and resistant to damage. The photobioreactor assembly also contains a low-energy mixing system in order to distribute nutrients and consistently swirl mixes the culture to maximize photosynthetic light absorption. The photobioreactor effectively surrounds and encloses the algae and includes features to restrict the algae from unintentional release. Algenol's photobioreactors are in line with standards listed under TSCA and its implementing regulations (40 CFR Part 725), as they are impermeable, resistant to corrosion, and easy to clean and sterilize with all seams, fittings and process piping completely sealed.

The biorefinery would consist of approximately 3,100 horizontal photobioreactors. Each individual photobioreactor consists of a 5-foot wide by 50-foot long polyethylene plastic with special additives and coatings and would be capable of holding 1,200 gallons. The photobioreactor contains seawater with particulates and contaminants removed, nutrients added, and a large headspace above the seawater. The photobioreactor is inoculated with several gallons of a dense hybrid algae culture produced from stocks maintained in greenhouses onsite. Following inoculation, $CO_2$ is introduced into the photobioreactor. The outdoor photobioreactor is exposed to sunlight, which causes the hybrid algae to undergo photosynthesis, consume $CO_2$, and produce ethanol.

The solar heat accumulates in the photobioreactor and causes the ethanol, along with water, to evaporate into the headspace. Upon contact with the inside of the top of the photobioreactor, the vapor condenses and runs down the sides of the photobioreactor into troughs, which carry the ethanol-rich condensate into a collection system.

The ethanol-water mixture leaving the photobioreactor has an ethanol concentration suitable for further distillation. The mixture is then pumped to a steam stripper that increases the ethanol concentration to approximately 35 percent (called a "beer" ethanol enriched liquid), which can be processed into multiple products (e.g., ethylene). At the Florida site, the 35 percent ethanol mixture would be pumped into a conventional ethanol distillation tower that uses steam to distill the ethanol into higher concentration and then molecular sieves are used to bring the ethanol to a fuel-grade purity. At the Texas site, the intermediate "beer" would be distilled to an 85 percent ethanol concentration and shipped to a local distillation facility. A graphic depiction of the basic Direct to Ethanol® process is provided in Figure 2-2.

### 2.4.3 Upstream and Downstream Processes

Over recent years, Algenol has conducted a significant amount of research and development in the design and construction of a commercial-scale photobioreactor system and development of the process engineering to operate this system. The process engineering is divided into two phases – upstream and downstream processes (see Table 2-1). Upstream processes are processes used to supply the photobioreactor with water, $CO_2$, nutrients, electricity and any other raw materials necessary for ethanol production. Downstream processes are processes that are used to extract ethanol, oxygen ($O_2$), water, and waste from the photobioreactor.

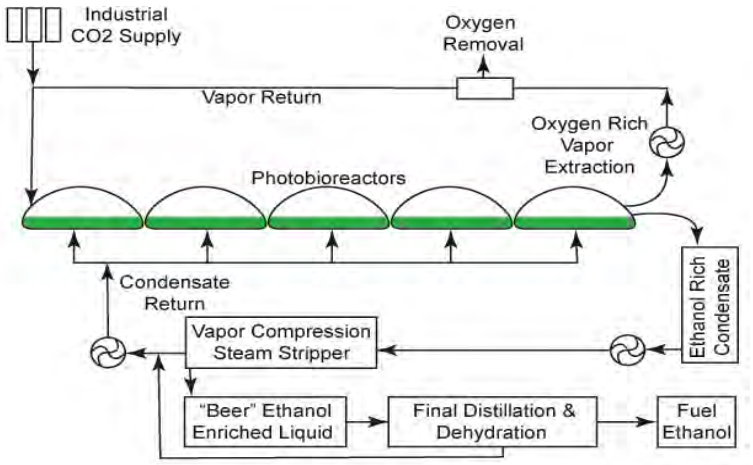


**Figure 2-2. Direct to Ethanol® Process**

**Table 2-1. Upstream and Downstream Processes at the Proposed Biorefinery**

| Process/Input/Output | Description |
|---|---|
| ***Upstream Processes***<br>Those processes used to treat and supply water, $CO_2$, and nutrients to the photobioreactors to make ethanol. | |
| Seawater | The seawater used as the primary culture medium would be treated prior to use in the photobioreactors by filtering out the biomass and microorganisms present. After filtration, the seawater would be sterilized using common chlorination and de-chlorination processes. |
| Freshwater | Freshwater would be supplied to the photobioreactors to replace seawater used in the photosynthesis process and water lost to leaks in the processing equipment. |
| $CO_2$ | $CO_2$ selective hollow-fiber membranes would be immersed in the photobioreactors' make-up water and the stream of return water from the ethanol separation system. |
| $O_2$ | $O_2$ would be removed from the vapor stream via scrubbers in the photobioreactors' headspace to avoid excessive accumulation. |
| Nutrients | Nitrogen and phosphorous would be supplied to the photobioreactors in granular form by being input into the return water system exiting the ethanol extraction system. |
| ***Downstream Processes***<br>Those processes that take place after the ethanol-containing medium, condensate, or vapor are removed from the photobioreactors for further enrichment of the ethanol concentration. | |
| Photobioreactor Condensate Pumping and Storage | The ethanol would be removed from the photobioreactors using either or both of two systems:<br>• Photobioreactor condensate collection system: The hybrid algae would excrete the ethanol they produce into the seawater growth medium; the culture ethanol would then vaporize in the headspace above the seawater growth medium and condense on the inner upper surfaces of the photobioreactors. The condensate would be collected in troughs inside the photobioreactors and drained to extraction units via gravity. Ethanol containing condensate would then be distilled and purified.<br>• Vapor stream condensation system: The condensed ethanol containing water would be fed into steam stripping columns to which steam is supplied by a vapor compression unit. Ethanol-rich steam would be removed from the steam stripper, condensed and stored for further processing. |

**Table 2-1. Upstream and Downstream Processes at the Proposed Biorefinery**

| Process/Input/Output | Description |
|---|---|
| Vapor Compression Steam Stripping Unit for Ethanol Purification | The ethanol separation unit would be based on a combination of vapor compression and steam stripping technologies. The vapor compression unit would be used to evaporate pure water to provide steam to the steam stripper. The steam stripper would be operated such that predominantly ethanol is evaporated. Once the ethanol has been removed from the condensate in the steam stripper, the condensate would be returned to the photobioreactors. This is necessary to maintain the salinity of the seawater culture medium and minimize the use of freshwater resources. |
| Fuel grade ethanol separation, storage, and transportation | For the Florida site option, a conventional on-site distillation tower that uses heat and molecular sieves to remove water would produce fuel-grade ethanol, which would be stored and shipped to local users. (Distillation would occur offsite for the Texas site option.) |

### 2.4.4 Supervisory Control and Data Acquisition System

The proposed project would include numerous sensors, valves, and controllers necessary to simultaneously monitor blocks of photobioreactors, as well as individual photobioreactors. The information collected from these sensors would help contribute to the development of commercial-scale control systems needed to control large blocks of photobioreactors efficiently, economically, and accurately. For this project, nutrient feed and $CO_2$ supplies to large blocks of photobioreactors (consisting of several 10s of photobioreactors) must be controlled by a central software system. Algenol has developed and is currently optimizing a Supervisory Control and Data Acquisition (SCADA) system to monitor and control facility functions. The overall intent is to control large photobioreactor blocks as single units; thus, decreasing the number of sensors necessary to provide cues for $CO_2$ and nutrient delivery. The SCADA system is designed to monitor the following parameters:

- Water: pH, temperature, $O_2$ concentration, and photosynthetically-active radiation.
- Vapor: temperature, relative humidity, $CO_2$ concentration, $O_2$ partial pressure, air pressure, and photosynthetically-active radiation.
- Ambient Conditions: temperature, photosynthetically-active radiation, and barometric pressure.

Ultimately, the SCADA system would be expanded to collect data from the ethanol extraction and oxygen removal systems in order to have a complete record of all major operating parameters of the biorefinery.

## 2.5 DESCRIPTION OF ALGENOL'S SITE OPTIONS AND PROPOSED FACILITIES

### 2.5.1 Algenol's Site Options

Algenol has developed two site options for the location of the biorefinery:

- Locating the biorefinery on 26 acres of land within Dow's Texas Operations in Freeport, Texas.
- Locating the biorefinery on approximately 40 acres of land within the Alico Business Park on Lee Road in Fort Myers, Florida.

The Texas site was chosen as an option because of Dow's existing relationship with Algenol through their work on the project and the availability of existing infrastructure, processes, and services that accompany Dow's land. The Florida site was selected as an option because it would be adjacent to Algenol's new R&D facility and Process Development Unit (PDU) – located in the Alico Business Park – and would be located in close proximity to the company's executive offices. The existing environmental conditions for each of the site options are described in the following sections and in greater detail throughout Chapter 3. On November 22, Algenol determined that the Texas site was no longer feasible, in part due to potential wetland impacts, and selected the Florida site.

#### *2.5.1.1 Freeport, Texas*

The Texas site option is located near Freeport, Brazoria County, Texas and is owned by Dow (see Figures 2-3 through 2-5). Freeport is located along the southeastern portion of Texas, approximately four miles inland from the Gulf Coast. Nearby communities include Oyster Creek, adjacent to the east of the proposed location, and the City of Clute, approximately four miles to the northwest. Galveston and Houston are located approximately 50 miles northeast and 60 miles north of the site, respectively. The site consists of 26 acres of undeveloped, grassy land north of State Highway (SH) 332, approximately 0.7 miles northwest of the intersection of SH 332 and Farms-to-Market (FM) 523. A private access road borders the western boundary of the project site and connects to SH 332. Currently, the entire site consists of coastal prairie that is periodically harvested to use as feed for cattle.

a) Looking northeast across site

b) Looking southeast across site

**Figure 2-3. Texas Site Option (near Freeport, Texas)**

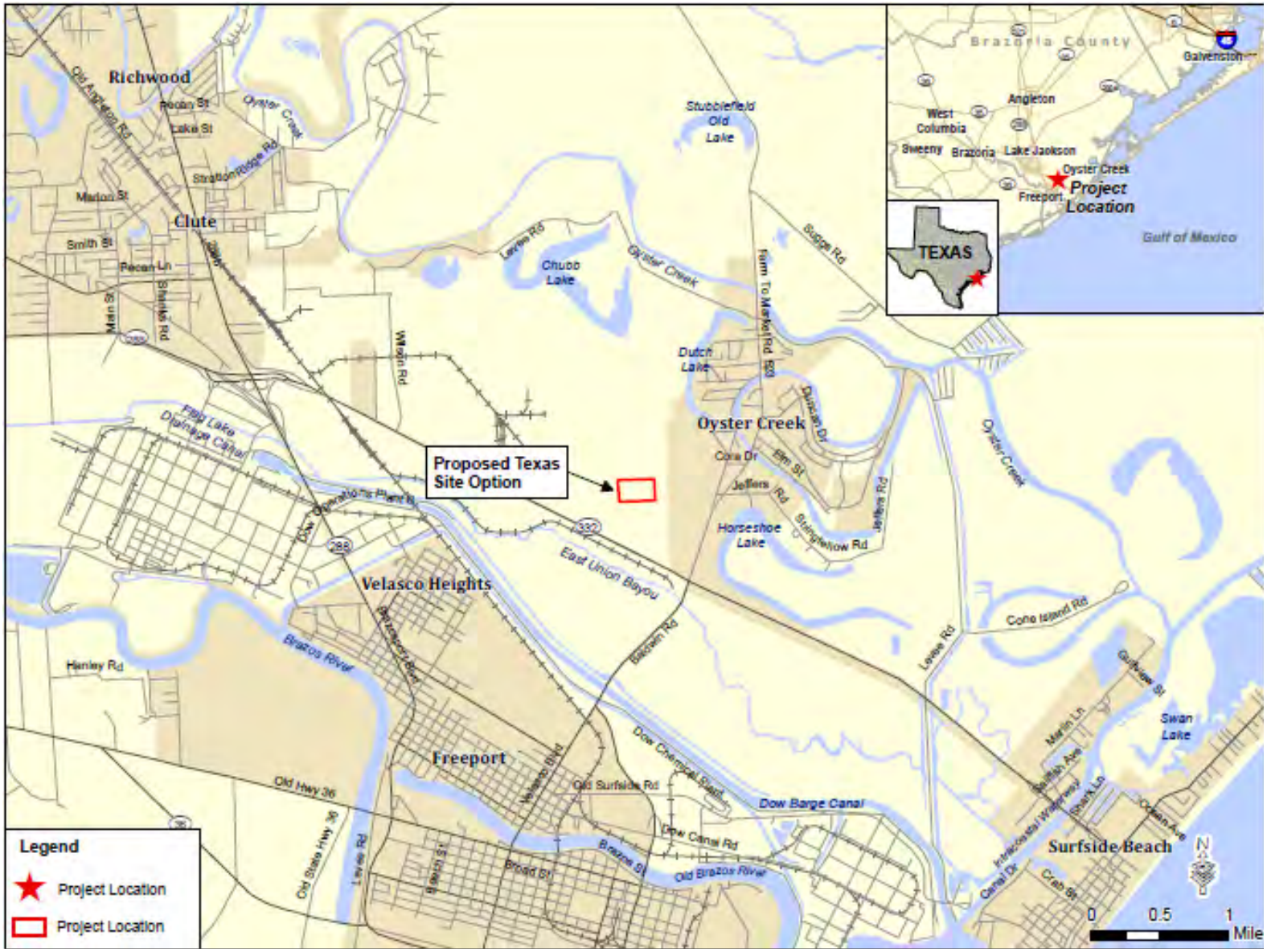


**Figure 2-4. General Location Map of Algenol's Site Option near Freeport, Texas**

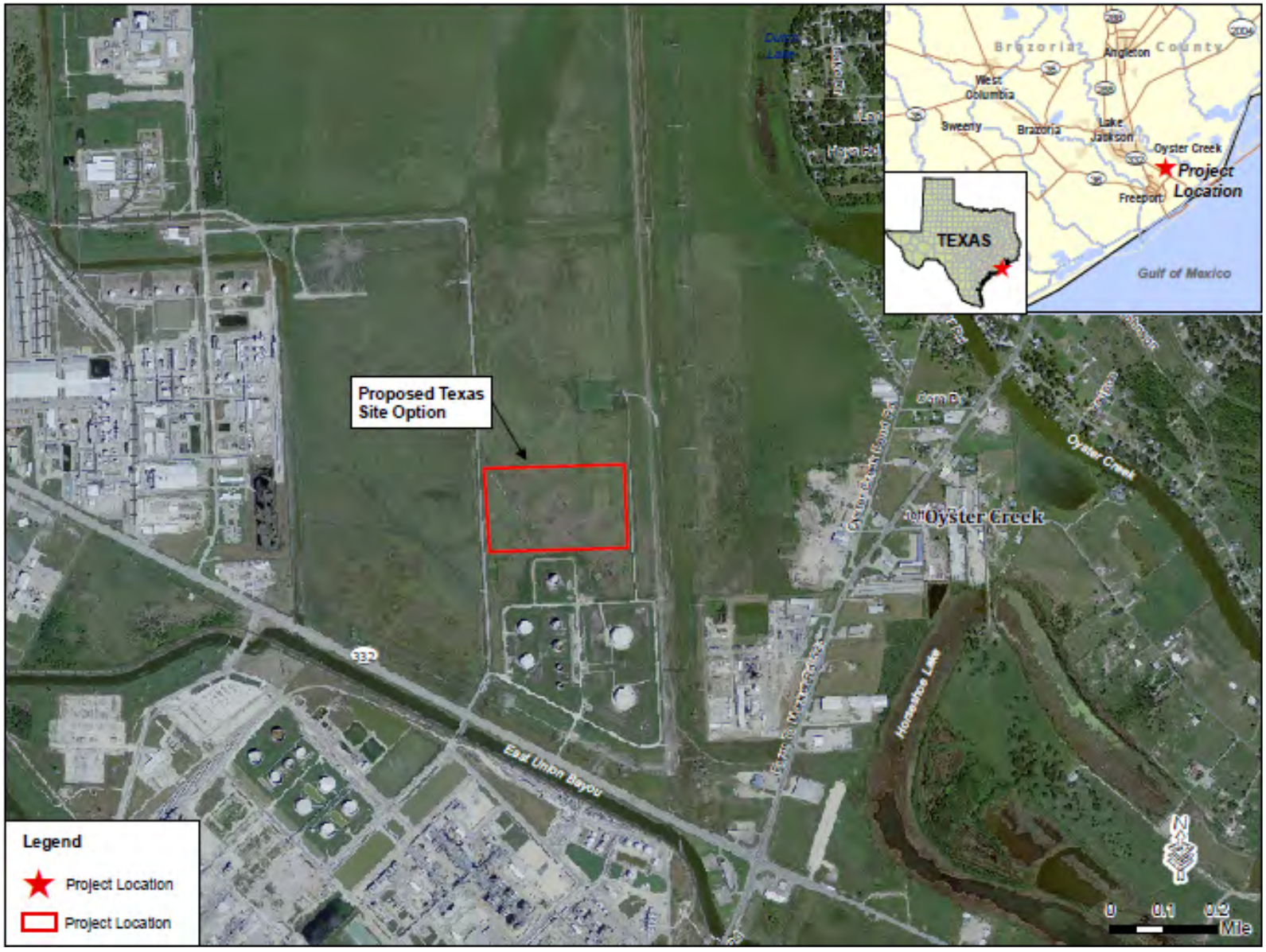


**Figure 2-5. Aerial Photograph of Algenol's Site Option near Freeport, Texas**

### 2.5.1.2 Fort Myers, Florida

The Florida option is located on Lee Road in Fort Myers, Lee County, Florida. The Florida site is located southeast of Fort Myers, approximately 10 miles south of the City of Fort Myer's downtown area and approximately three miles southwest of the Southwest Florida International Airport. Algenol has executed lease agreements with Alico Road Business Park, LP for the site (see Figures 2-6 and 2-8). The site consists of approximately 40 acres of land north of Alico Road, approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75. The property is fairly isolated from the general public as it is zoned for heavy industrial use and for chemical and allied products and manufacturing use. The closest residential area to the site is approximately 0.3 miles to the north on Fiddlesticks Boulevard and is separated from the business park and project area by a stormwater canal system and vegetation. Currently, the site consists of undeveloped land except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development. Several large soil piles are located on the site, which consist of soils excavated for the development of the canals.

a) Looking north across site (Alico Business Park in background)

b) Looking south across site (excavated soil from stormwater development in background)

**Figure 2-6. Florida Site Option (Fort Myers, Florida)**

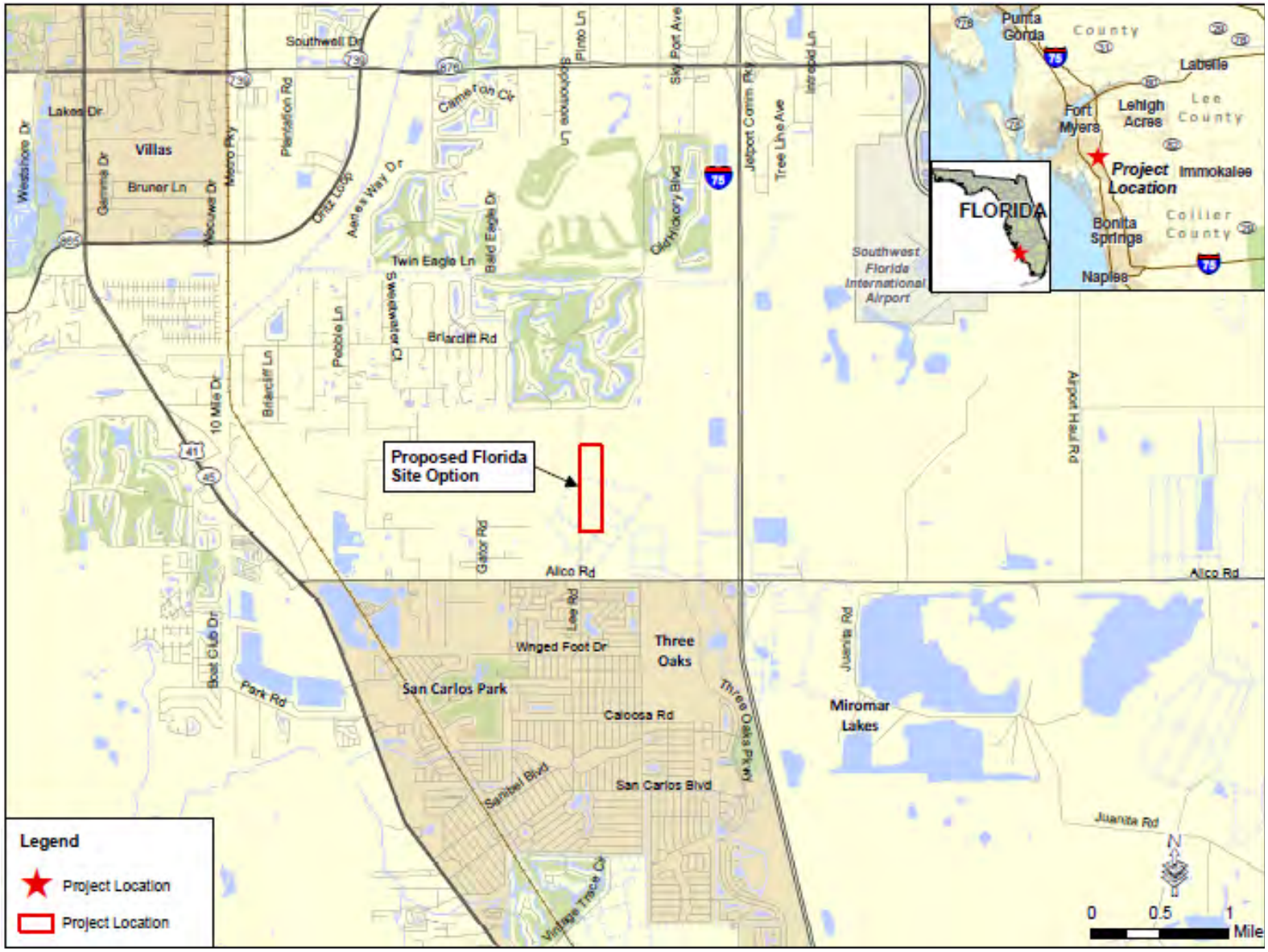


**Figure 2-7. General Location Map of Algenol's Site Option in Fort Myers, Florida**


**Figure 2-8. Aerial Photograph of Algenol's Site Option in Fort Myers, Florida**

### 2.5.2 Facility Description

The main component of the biorefinery would be the photobioreactors, each of which consists of a containment bag, collection rails, and mixing systems. Algenol plans for about 3,100 photobioreactors, each holding 1,200 gallons of hybrid algae in a seawater culture medium. The photobioreactors would be placed inside a water-tight containment area lined with a pond liner with material characteristics similar to those used to line landfills (i.e., the "geomembrane"). Stormwater over the geomembrane would be drained by gravity to sump pumps that would manage the stormwater consistent with the required stormwater management permit in place at either site. In the event of a spill of seawater culture medium, the drainage would be diverted to a water sterilization system that would remove the biomass and sterilize the water using chlorine bleach. All sterilized water would be stored for reuse in the photobioreactors or evaporated in evaporation tanks. Overall, the photobioreactor systems would cover approximately 17 acres of land.

These systems related specifically to the photobioreactors would be constructed in the same manner regardless of the site option that would ultimately be utilized. The following sections describe the other components of the biorefinery and highlight where there would be design differences due to the different locations of the site options. An important distinction between the two site options is that the Texas biorefinery would be temporary and, therefore, office buildings and storage/work areas would be constructed in a manner that would facilitate decommissioning after the demonstration of a three-year operational phase; such facilities at the Florida biorefinery would be constructed for 25-year operational use. Additionally, ethanol distillation would be conducted offsite for the Texas option and onsite for the Florida option. Figures 2-9 and 2-10 present the conceptual site layouts of the biorefinery at the Texas and Florida sites, respectively. Required facilities, in addition to the photobioreactor systems, for both site options would consist of the following components:

- **Site Infrastructure and Utilities:** The site would include a main parking lot and an access road. Stormwater management methods would be employed per stormwater permit. For security purposes, the entire perimeter of the biorefinery would be enclosed with a chainlink fence with a gate at the entrance. Under both of Algenol's site options, the site would connect to nearby existing utility systems for electrical, potable water, and telecommunication. At the Florida site, groundwater wells would be installed onsite to withdraw seawater for the biorefinery processes and a sanitary line would be constructed to an existing pipeline within the Lee Road right-of-way for sanitary wastewater.

- **Office Building/ Laboratory and Storage/Work Areas:** The site would include an office area that would be designed to house 25 people, bathrooms, a conference room, and a 720-square foot laboratory. For the Texas site, these structures would consist of two double-wide modular office trailers situated on concrete blocks and anchored with hurricane straps. There would be four storage and work trailers, which would consist of steel shipping containers anchored with hurricane straps. In addition, there would be an inoculation suite used as a climate controlled, lighted culture storage and grow up room, which would also consist of a steel shipping container. Each of the shipping containers would be placed upon compacted, crushed road base rock. For the Florida site, the office/laboratory building would be a permanent building constructed in accordance with local construction codes.

- **Greenhouse:** A greenhouse would be installed, which would be a cold frame structure with a polyethylene cover, drop down sidewalls, installed fans, and an evaporative cooling system. The greenhouse would have three sections, one with 75 percent sun block shade, one with 50

percent sun block shade, and one with no shade. This would allow the inoculation cultures to be acclimated to the ambient conditions gradually before entering full sunlight.

- **Covered Pavilions:** Covered pavilions would consist of open-sided tin roof structures, which would be used to provide shade and rain protection. The water treatment pavilion would consist of a roof used to cover the electrical components of the various water processing systems. The work pavilion would be used as a general workspace.
- **Water Processing Area Concrete Pad:** There would be a 4 inch x 70 foot x 70 foot reinforced concrete pad installed to contain the various water processing equipment, pumps, systems, and tanks. The concrete pad would have a curbed border and controlled drainage for spill containment.
- **Ethanol Separation System:** The ethanol separation system would consist of a vapor compression steam stripping ethanol separation system for primary ethanol concentration. This system would be shipped on a fully contained skid and would be mounted on the poured concrete slab. All piping and electrical connections would be hooked up to on-site supply lines.
- **Ethanol Distillation and Storage Area:** For the Florida biorefinery, the ethanol distillation and storage area would be a permanent building of approximately 15,000 square feet. Commercially available distillation towers would be installed to produce fuel-grade ethanol as well as appropriate storage infrastructure consisting of one 10,000 gallon tank. At full capacity the biorefinery would produce approximately 100,000 gallons of ethanol per year. There would be one truck per month to transport the fuel-grade ethanol to users. At the Texas site, distillation would take place offsite. The ethanol would be transported offsite, with approximately 10 trucks per month for further distillation (see Section 3.12 for transportation-related impacts).

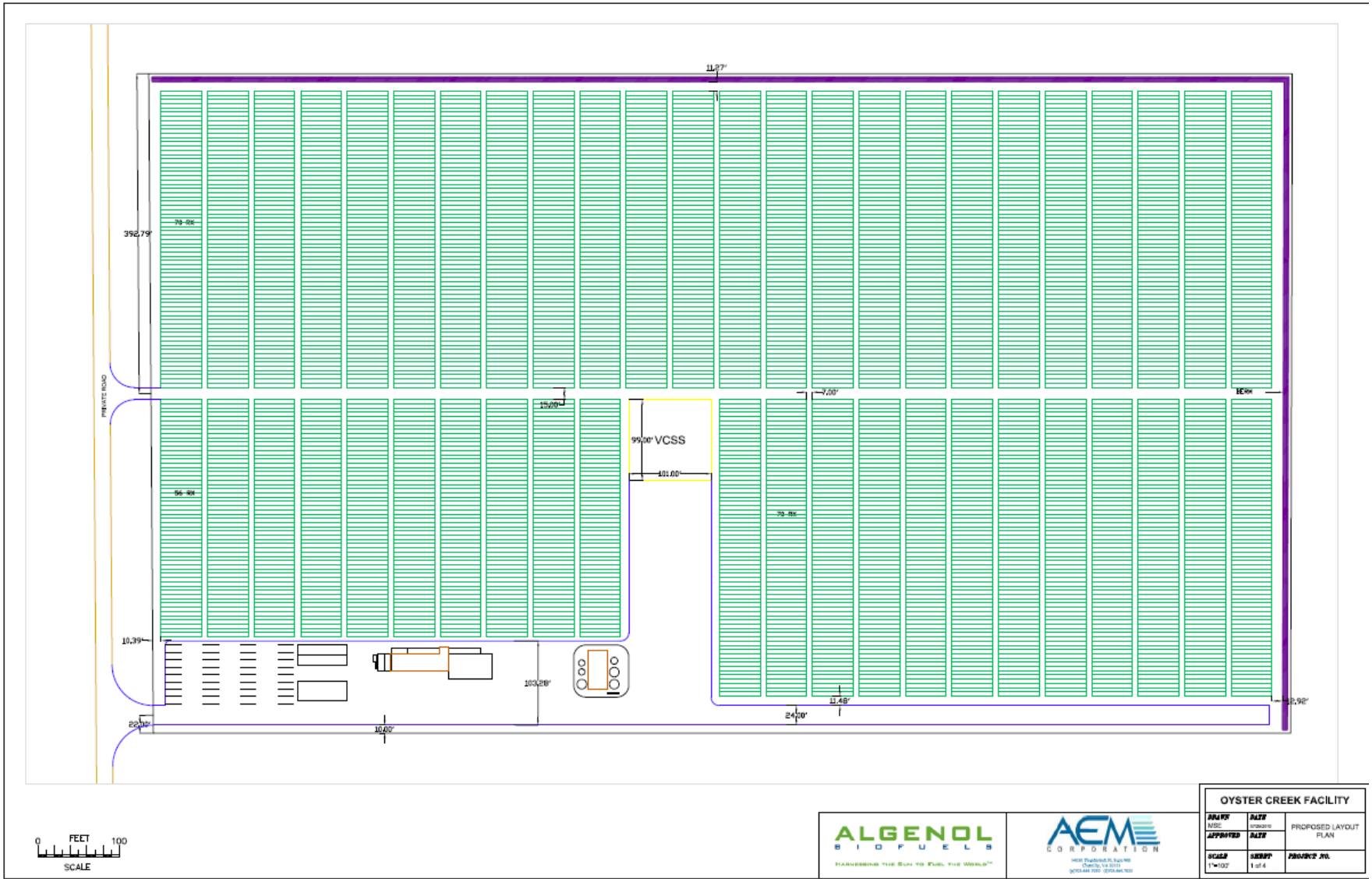


**Figure 2-9. Conceptual Site Layout of the Biorefinery for the Texas Site**

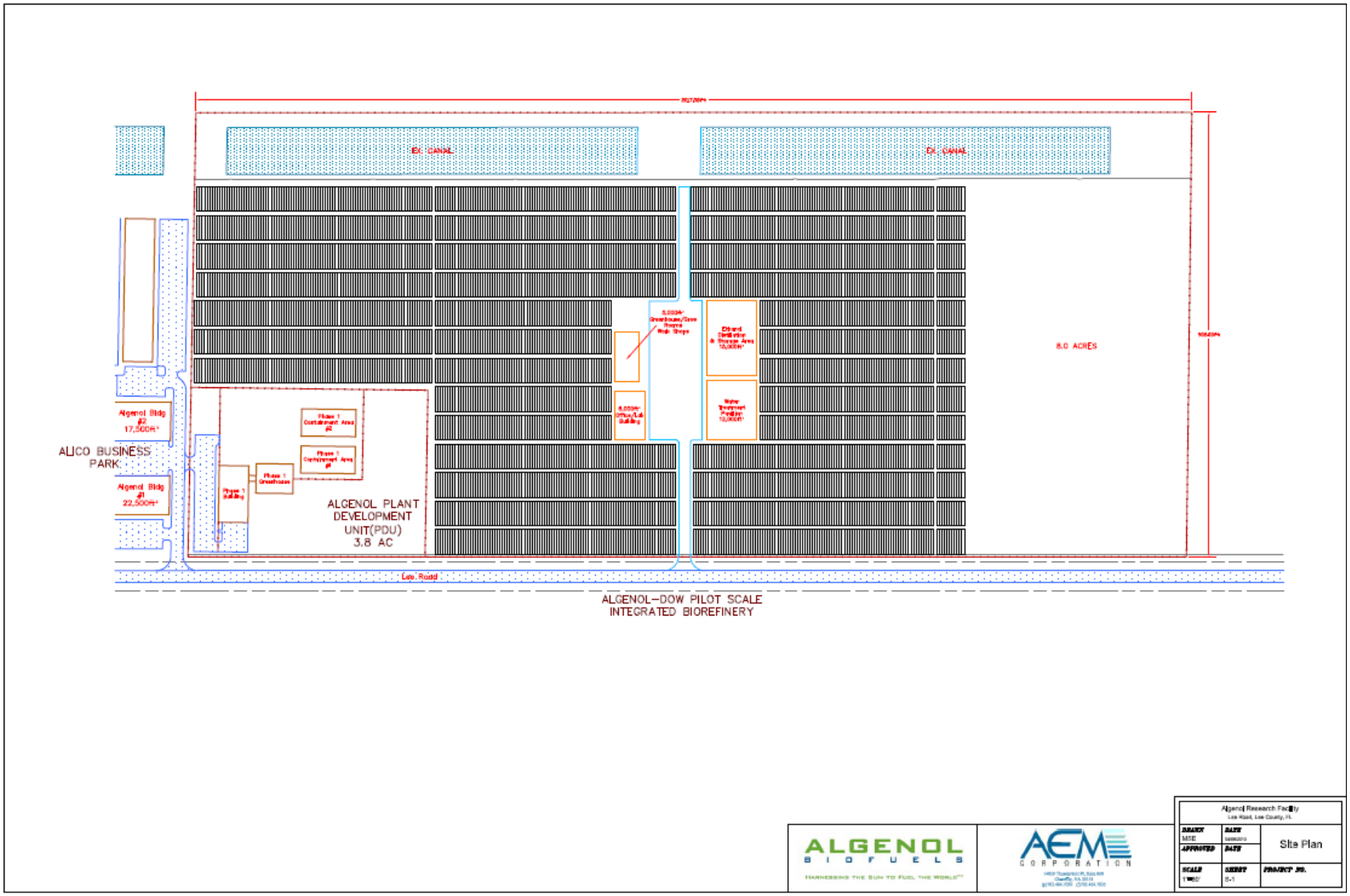


**Figure 2-10. Conceptual Site Layout of the Biorefinery for the Florida Site (with Planned Process Development Unit Shown)**

## 2.6 CONSTRUCTION

Construction of the biorefinery would take approximately six months beginning in March 2011. It is estimated that up to 25 construction workers would be required at the site at any given time. Prior to any land disturbing activities, a construction stormwater permit under the state's National Pollutant Discharge Elimination System (NPDES) program, including the development of a Stormwater Pollution Prevention Plan (SWPPP), would be required. At the site near Freeport, Texas a Texas Pollutant Discharge Elimination System (TPDES) General Permit to construct would be obtained from the Texas Commission on Environmental Quality (TCEQ). For the site in Fort Myers, Florida, protection of water resources is under the jurisdiction of the Florida Department of Environmental Protection (FDEP) and the South Florida Water Management District (SFWMD). Algenol would be required to obtain an Environmental Resource Permit from the SFWMD, which would address stormwater management measures to be implemented during construction. Specific stormwater control best management practices (BMPs) would be developed during final site design and could include BMPs such as temporarily seeding bare soil areas with appropriate native vegetation to reduce on-site soil erosion. Construction of the biorefinery would occur in the following sequence:

- Site clearing, installing the stormwater drainage system, setting the final elevation of the site, installing the gravel for the roads and parking lot, and installing the perimeter fence. The site would be graded so that the maximum slope would be 2 inches over 50 feet to ensure proper operation of the photobioreactors.
- Installation of the electrical system, the office building/lab, storage/work areas, greenhouse, covered pavilion, and water and ethanol processing areas.
- The manufacturing, assembly, and installation of the photobioreactor systems.
- The installation of the ethanol separation system.
- Performing a final installation check for all systems. This would consist of operating all equipment in the water treatment, nutrient supply, ethanol extraction, pumps, valves, and SCADA systems. Photobioreactors would be checked individually as they are assembled and installed. Each system would be checked for proper operation according to the design specifications.
- Performing "shakedown runs" at the biorefinery to bring all equipment online after final installation checks. Once the systems are online, blocks of photobioreactors would be brought online sequentially until all photobioreactor blocks are operational and producing ethanol at the target rate. Once this is complete, the biorefinery would enter operational mode.

## 2.7 OPERATION

Operation of the biorefinery would be expected to commence in September 2011. For the site in Freeport, Texas, operations would last for approximately three years, with decommissioning beginning in July 2014. For the site in Fort Myers, Florida, the biorefinery would be considered a permanent facility that would be operated for its entire useful lifespan (estimated to be approximately 25 years). During operations, all upstream, downstream, and photobioreactor operations would be performed on a continual basis as well as ethanol harvesting. It is anticipated that up to 25 employees would be working at the biorefinery at any

given time. Table 2-2 summarizes the feedstock, materials, and waste streams that would result from the biorefinery. The following sections discuss these components in greater detail.

**Table 2-2. Feedstock, Materials, and Waste Streams**

| Item | Texas Site | Florida Site |
|---|---|---|
| ***Feedstock and Material – Quantity and Source*** | | |
| Hybrid Algae | small volume transported via express carrier from Fort Myers R&D lab to biorefinery lab; transfer expected to occur only one time | adjacent R&D laboratory facility; thus, no transport required |
| $CO_2$ | 734 tons per year for all photobioreactors; liquid $CO_2$ transported from local industrial gas supplier | same as Texas site |
| Seawater | 3.6 million gallons per year; transported from Dow seawater canal system | 3.6 million gallons per year; pumped from on-site groundwater well(s) |
| Freshwater | 210,000 gallons per year; connect to public water system | same as Texas site |
| Nitrogen | Small amounts of commercially available nitrogen would be used to fertilize the culture; transported from local industrial supplier | same as Texas site |
| Phosphate | Small amounts of commercially available phosphates would be used to fertilize the culture; transported from local industrial supplier | same as Texas site |
| Electricity | 1.25 million kWh per year; connect to nearby local utility line | same as Texas site |
| Potable water | 65,000 gallons per year; connect to public water system | same as Texas site |
| Chlorine | Limited amounts of chlorine would be kept on site for sterilization activities; supplied by a commercial vendor and stored in accordance with safe handling procedures. | same as Texas site |
| ***Products and Wastes – Quantity and Method of Treatment*** | | |
| Ethanol | 100,000 gallons per year; transported by truck to local distillation facility | 100,000 gallons per year; distilled onsite to fuel-grade quality and transported offsite by truck to local users |
| Brine from seawater treatment | 1,200 gallons per day; separated via ultrafiltration and transported to Dow's wastewater treatment facility | 1,200 gallons per day; wastewater would be injected into on-site well per local regulations |
| Process wastewater and Biomass from photobioreactors | 10,000 gallons per day; process wastewater transported to Dow's wastewater facility; biomass would be disposed of at local landfill | 10,000 gallons per day; wastewater would be injected into on-site wells per local regulations; biomass would be disposed of at local landfill |
| Laboratory effluent | Minimal amounts of laboratory liquid effluent and process liquid effluent; disposed of at Dow's wastewater treatment facility | Minimal amounts of laboratory liquid effluent and process liquid effluent; disposed of through local sanitary sewer system per local regulations |
| Air emissions | Most notable emission would be of ethanol and is estimated to be less than 25 pounds per year. | same as Texas site |

**Table 2-2. Feedstock, Materials, and Waste Streams**

| Item | Texas Site | Florida Site |
|---|---|---|
| Sanitary wastewater | 97,500 gallons per year; transported off-site to Dow wastewater facility | 97,500 gallons per year; connect to public sanitary system |

### 2.7.1 Feedstock and Materials Required

The primary required feedstocks would include the hybrid algae, $CO_2$, and seawater. For the Freeport, Texas site, there would be one initial express carrier shipment of a laboratory-scale volume of hybrid algae from Algenol's laboratory at the planned PDU in Fort Myers, Florida. For the Fort Myers site, Florida, the biorefinery would be located adjacent to the PDU; therefore, a shipment would not be required. Following the initial transfer, future hybrid algae would be grown onsite from the transferred stock. The hybrid algae would be stored in the on-site greenhouse and transferred to the photobioreactors as necessary.

$CO_2$ would be obtained from local commercial sources and transported to the site via trucks; it is anticipated that there would be one truck shipment every four to six days. Overall, it is anticipated that approximately 734 tons of $CO_2$ would be required per year. The $CO_2$ would be stored onsite in a 14-ton capacity storage tank maintained at a pressure of 280 to 300 pounds per square inch gauge (psig) and zero degrees Fahrenheit.

Seawater would be required at a rate of approximately 3.6 million gallons per year. At the Texas site the seawater would be obtained from an existing permitted Dow seawater intake at a canal on Dow's property and trucked to the site at a rate of 1.5 trucks per day. Prior to use in the photobioreactors, the seawater would be treated via an ultra-filtration process and sterilized using common chlorination and de-chlorination processes.

At the Florida site, the same amount of seawater would be required for process water needs. Algenol plans on meeting requirements for the process water (and treated process wastewater disposal) by using groundwater sources at this site. A groundwater feasibility study was conducted for Algenol to provide appropriate design options for a process water supply and wastewater disposal well system (Entrix, 2010a). The FDEP would regulate the construction and operation of the well system. A well permit under the Underground Injection Control program would be required. The water use from the wells would also be under the jurisdiction of SFWMD and would require a water use permit. Based on water quality data, the study identified two potential zones below the Underground Source of Drinking Water (USDW)[1] for potential production (source water supply) and injection (disposal of process wastewater) wells – Zone 1 (1,600 and 1,800 feet below ground) and Zone 2 (2,500 and 2,700 feet below ground). As concluded in the study, Algenol would likely have the following four options for process water and wastewater disposal systems for the Florida site option (Entrix, 2010a) (for more details on the groundwater feasibility report, see Section 3.6, which addresses groundwater impacts that covers all options):

[1] An **Underground Source of Drinking Water (USDW)** is any aquifer which contains fewer than 10,000 milligrams per liter of TDS and is either currently used as a drinking water source or has the volume and capacity to supply drinking water in the future. These aquifers are regulated stringently by regulatory agencies and are not typically used for the disposal of saline water. The base of the USDW in the project area is estimated to be about 1,400 feet below surface level (Entrix, 2010a).

- **Option 1: One Aquifer Storage Recovery (ASR)[2] well (for production and disposal) completed in Zone 1; and one monitoring well.** The monitoring well would be completed above the USDW, between 1,100 and 1,200 feet below land surface.
- **Option 2, Variation 1: One ASR well (for production and disposal) completed in Zone 2; and one monitoring well.** If two flow zones are identified within the target interval, then one zone would be used for production, and the other for wastewater injection. The zones would be separated by a packer to minimize mixing. The monitoring well would be completed above the USDW, between 1,100 and 1,200 feet below land surface.
- **Option 2, Variation 2: One dual-zone well (for production and monitoring) completed in Zone 1 and between 1,100 and 1,200 feet; and one injection well (for disposal) completed in Zone 1.** A dual-zone well would be used for production and monitoring – the lower zone would be completed between 1,600 and 1,800 feet below land surface (Zone 1) for production and the upper zone would be completed between 1,100 and 1,200 feet below land surface for monitoring. The production and monitoring zones would be separated by a packer for the dual-zone well. A separate injection well would be used for disposal, completed in Zone 1.
- **Option 3: Two wells (one for production, one for disposal) completed in Zone 1; and one monitoring well.** The production and injection would be separated as far apart as possible. The monitoring well would be completed between 1,100 and 1,200 feet below land surface.
- **Option 4: One well (for disposal) completed in Zone 1; one well (for production) completed in Zone 2; and one monitoring well.** The monitoring well would be completed between 1,100 and 1,200 feet below land surface.

The photobioreactors would also require freshwater (for makeup water), which would be utilized at a rate of approximately 210,000 gallons per year. For both site options, freshwater would be obtained from the local public water supply.

Nutrients would be required for hybrid algae growth, which would be obtained from local commercial sources. Small amounts of phosphorous and nitrogen would be obtained in granular form via truck shipments. In addition, a relatively small amount of trace elements and vitamins would be required. Nutrient shipments would occur either weekly or monthly, depending on the size of the storage space at the biorefinery, which has not yet been determined.

The site would require public utility connections for electricity, and sanitary wastewater (for the Florida site), and potable water. The biorefinery would require approximately 1.25 million kWh of electricity per year. The 25 employees would require potable water, which – based on a water utilization rate for institutional employees of 10 gallons per day (DOE, 2009) – would result in an annual demand of approximately 65,000 gallons. The biorefinery would obtain these utilities by interconnecting with existing lines located along nearby roadways. For the site near Freeport, Texas, these existing utilities are located along Route 332 to the south of the site and for the site in Fort Myers, Florida, the existing utilities are located along Lee Road along the western site boundary.

[2] An **Aquifer Storage and Recovery (ASR)** well refers to a one-well system that is used for both production and disposal.

### 2.7.2 Products and Waste Generated

For the Texas site, the biorefinery would produce an ethanol-water mixture of 35 percent ethanol at a rate of approximately 100,000 gallons per year, which would be transported offsite. For the Florida site, ethanol would also be produced at a rate of approximately 100,000 gallons per year; however, the ethanol-water mixture would be distilled to fuel–grade quality onsite. Periodic shipments of fuel ethanol would be made to local end users (one truck per month).

Approximately 1,200 gallons per day of brine from treated seawater would be generated. At the Texas site, the seawater would be treated through an ultra-filtration process. The brine from the treatment of this seawater would be transported to Dow's wastewater treatment facility based on specifications and a defined sampling plan agreed upon between Dow and Algenol. At the Florida site, effluent from the treated seawater would be disposed of through an ASR well or injection well back into the groundwater, as discussed in Section 2.7.1.

Process wastewater and biomass waste would be generated by the photobioreactors. Process wastewater from the photobioreactors would be generated at 10,000 gallons per day. At the Texas site, the process wastewater would be treated with chlorine and trucked to Dow's existing wastewater treatment facility for further treatment. Use of Dow's wastewater facility would be based on specifications and a defined sampling plan agreed upon between Dow and Algenol. The biomass waste would be sterilized and disposed of at a local solid waste facility. At the Florida site, the photobioreactor waste would be centrifuged and the biomass waste would be treated with bleach and packaged in plastic bags for disposal at a landfill. The process wastewater would be centrifuged, filtered, and carbon-filtered then, along with the brine, would be disposed of through the production and disposal well system.

Minimal amounts of laboratory liquid effluent would be produced. For the Texas site, laboratory liquid effluents would be collected in a tank and transported to Dow's existing wastewater treatment plant. For the Florida site, laboratory liquid effluents would be collected, sterilized (if exposed to hybrid organisms), and then disposed of through the public sanitary wastewater system in accordance with local requirements

The biorefinery would be considered a minor source of air emissions and would qualify for a "permit-by-rule" under both Texas and Florida regulations (Title 30 Texas Administrative Code 106.262; Florida Administrative Code 62-210.310). The primary air emissions would be fugitive emissions of ethanol, estimated to be less than 25 pounds per year, which would be controlled by implementing a leak detection and repair program. The only other emission from the biorefinery would be oxygen. Greenhouse gas emissions (including $CO_2$), if any, would be minimal.

Sanitary wastewater would be generated by the employees of the biorefinery at a rate of approximately 97,500 gallons per year based on a standard rate of 15 gallons per employee per day. At the Texas site, sanitary wastewater would be collected onsite and transported to Dow's wastewater treatment facility. At the Florida site, wastewater would be disposed of through the local public sanitary sewer system via an existing pipeline located along Lee Road.

### 2.7.3 Stormwater Management

Stormwater would be managed onsite consistent with the stormwater management plan per local NPDES program requirements. Stormwater management at the Texas site would be authorized utilizing the TCEQ Multi-Sector General Permit (permit No. TXR050000); a Notice of Intent regarding project details would be filed with the permit, which would also include

stormwater pollution prevention procedures for the biorefinery. At the Florida site, Algenol would obtain an Environmental Resource Permit from SFWMD, which would address permanent stormwater management measures. The dry retention basin would be connected to an existing system of canals along the eastern site boundary. Should a storm event occur that causes the dry retention basin to overflow, the excess would overflow into the existing canal system, which is one continuous system that is segmented by a series of weirs to retain the stormwater in one portion of the canal unless it overflows into the next portion. The existing canal system is designed to retain stormwater in the area where it falls to assist in the recharge of local groundwater aquifers. Ultimately, the canal system outflows to an existing drainage ditch along Alico Road to the south of the site.

### 2.7.4 Environmental Health and Safety

An Environmental, Health, and Safety (EH&S) director would plan, direct and implement EH&S programs, procedures and policies at the biorefinery to ensure occupational health and environmental safety compliance. The EH&S management would address, among other issues, the Occupational Safety and Health Administration's (OSHA) Laboratory Safety Standard, requirements for preparation of Chemical Hygiene Plans, Hazard Communication Standard, Occupational Exposure to Hazardous Chemicals in Laboratories Standard, and limits on airborne contaminants such as $CO_2$ and ethanol. Also, in order to prevent or minimize the consequences stemming from an accidental release of photobioreactor contents, the director would consider OSHA's Process Safety Management standard when developing standard operating procedures. .

Prior to developing a written action plan in consultation with employees, the director would complete a compilation of process safety information to ensure a full understanding of the technology, materials, and equipment necessary to operate the biorefinery. A process hazard analysis would identify, evaluate, and control the potential hazards of the processes. Gases and chemicals would be handled, stored, and disposed of in accordance with EH&S standards. Ethanol would be stored onsite in commercially-available storage tanks that meet applicable codes for storage of hazardous materials.

At the Texas site a detailed EH&S plan would be drafted in collaboration with Dow's EH&S department. The EH&S protocols for the Texas biorefinery would be substantially similar to protocols used by Dow's Freeport site operations. Dow would collaborate with Algenol on the development of EH&S policies and procedures based on or that meet the intent of applicable Dow safety standards. Dow would provide various emergency response services – the biorefinery would be tied into Dow's site-wide alert system for notifications and Dow's on-site , 24-hour emergency response personnel and equipment would respond as needed for fire, medical, and other emergencies. Exact details would be established in the development of lease agreements between Algenol and Dow. In the event of an emergency, at the Florida site, local emergency services would be contacted consistent with established EH&S protocols.

### 2.7.5 Decommissioning

For the site option in Freeport, Texas, the biorefinery would be decommissioned after three years of operation, which would be expected to occur in July 2014; for the site option in Fort Myers, Florida decommissioning would occur after approximately 25 years of operation. Decommissioning would commence with the cessation of ethanol harvesting operations. Small blocks of photobioreactors would be taken offline at a single time and the seawater culture

medium would be processed through the distillation system to remove the ethanol. Once the ethanol has been removed and the water has been processed through the distillation system, it would be discharged to Dow's wastewater facility (Texas site) or to the sanitary wastewater treatment (Florida site) per applicable standards/agreements for discharge. Once a block of photobioreactors has been removed from service, they would be transported to a local solid waste facility for disposal. Plastic piping systems and the geomembrane would also be disposed of in this manner.

The water purification equipment, tanks, and pumping equipment, would be removed from the site and would either be sold for scrap, incinerated, or disposed of at a municipal landfill. The ethanol distillation, water pavilion, greenhouse, and workshop areas would be demolished and either sold for scrap or disposed of in a municipal landfill.

The office and lab trailers would be rented and portable, so these buildings would be emptied and returned to the leasing company. The lab equipment that is in good working order would be transferred to another Algenol facility or sold.

The last phase of the decommissioning process would involve removing the security fencing, gravel roads, and drainage piping from the site. This material would be disposed of at a local landfill.

### 2.7.6 Permits, Regulations, and Applicant-Committed Measures

Table 2-3 summarizes permits and agency approvals, potentially applicable regulations, and Algenol-committed measures for the proposed project.

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| **Federal** | | | |
| Hybrid Algae | Plant Protection Act (PPA) | Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA) | Algenol submitted a letter and other project materials to the Biotechnology Regulatory Services of APHIS, USDA to solicit the agency's opinion on whether the hybrid algae would be regulated under the PPA as codified in 7 CFR Part 340, "*Introduction of Organisms and Products Altered or Produced Through Genetic Engineering Which Are Plant Pests or Which There is Reason To Believe Are Plant Pests*." After reviewing details regarding Algenol's technology, including scientific studies and other data, APHIS determined that the specified strains of the hybrid algae are non-pathogenic to plants, animals, and humans and would not be considered plant pests; therefore, the hybrid algae would not be regulated under the PPA. Should requirements as stipulated under the PPA become applicable to the project, Algenol would ensure adherence to those requirements. |
| | Toxic Substance Control Act (TSCA) | U.S. Environmental Protection Agency (EPA) | Algenol conducted discussions with the EPA to solicit the agency's opinion on whether the project would be consistent with regulations under TSCA. As a result of the meeting, EPA indicated that the project would fall under EPA's "contained structure" exemption provided under 40 CFR 725.234; thus, there would be no need to submit a TSCA application for the project to be conducted under those containment measures. With respect to the hybrid algae: (a) all manufacturing, importing or processing would be solely for R&D activities up to, and including, pilot scale; (b) all use would be by, or directly under, the supervision of a technically qualified individual, as defined by EPA; (c) there would be no intentional testing outside of a structure, as defined by EPA; (d) containment and/or inactivation controls would be in place, as prescribed by EPA; and (e) all persons engaged in experimentation, research, or analysis would be notified of any risk to health, which might be associated with the algae. Algenol's development, use, transportation, and disposal of hybrid algae would, therefore, take place in contained facilities or vessels consistent with TSCA requirements. |
| Ethanol | Alcohol Fuel Producers Permit | Alcohol and Tobacco Tax and Trade Bureau | The Bureau would be responsible for collecting excise taxes and administering permitting requirements associated with the production of alcohol. Algenol would apply for the required Alcohol Fuel Producers Permit when the biorefinery is near completion. |
| | Renewable Identification Numbers (RIN) Program | EPA | Algenol would be compliant with labeling and reporting requirements of EPA's Renewable Identification Numbers (RIN) program – an administrative element of the Renewable Fuel Standard. |
| Air Emission | General Conformity | TCEQ / FDEP | A General Conformity Rule – Section 176(c) of the Clean Air Act (CAA) (42 U.S.C. 7506(c)) – requires federal agencies to perform conformity reviews to demonstrate that their actions do not impede State Implementation Plans (SIPs), plans that discuss local efforts to control air pollution. Because the Proposed Action would be sponsored and supported by DOE, the project must therefore be reviewed for general conformity. The potential air emissions from the project would be well below conformity threshold values established in 40 CFR |

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| | | | 93.153(b). DOE determined that the project would be acceptable with respect to the General Conformity Rule and that a full conformity analysis would not be required for either site option (see Section 3.4, Air Quality). |
| Wetlands and Floodplains | Section 404 Permit | U.S. Army Corps of Engineers (USACE) | See State-specific Permits, Regulations, and Applicant-Committed Measures |
| Biological Resources | Migratory Bird Treaty Act | U.S. Fish and Wildlife Service (USFWS) | If migratory birds or nests are detected prior to or during construction, Algenol would implement the appropriate measures, with consultation from USFWS to ensure that migratory birds are not adversely impacted. |
| Biological Resources | Endangered Species Act | USFWS | DOE submitted a consultation letter to the Florida and Texas regional offices of USFWS. The consultation letters are presented in Appendix B. Responses have not yet been received. |
| | Section 106 of the National Historic Preservation Act (NHPA) | Texas Historical Commission / Florida Division of Historical Resources | Section 106 of the NHPA requires federal agencies to take into account the effects that their federally funded activities and programs have on significant historic properties. "Significant historic properties" are those properties that are included in, or eligible for, the National Register of Historic Places. The National Register is administered by the National Park Service in conjunction with the state historic preservation offices (SHPOs). If potentially significant cultural artifacts are exposed by trenching or below-grade excavation during construction, Algenol would ensure that construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the artifacts and the SHPO was notified. |
| | Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) | | To meet its obligation under the NAGPRA, DOE submitted consultation letters to eleven tribal organizations.<br>If unmarked graves are exposed by trenching or below-grade excavation during construction, Algenol would ensure that construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the exposed grave(s) and the SHPO was notified. Tribes would be notified immediately if the grave(s) were determined to potentially contain American Indian remains. |
| **Florida** | | | |
| Air Emission | Permit-By-Rule | Florida Department of Environmental Protection (FDEP) | As a minor emitter for air pollutants (ethanol would be the primary emission with less than 25 pounds per year expected), the project would qualify for a permit-by-rule for the Florida site, which would be applied for at the state environmental agency responsible for issuing air permits. See Florida Administrative Code 62-210.310 |
| Stormwater | Environmental Resource Permit | South Florida Water Management District | For construction and operation of the biorefinery at the Florida site option, Algenol would obtain an Environmental Resource Permit (ERP) from SFWMD. This permit is required |

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| | (ERP) (construction and operation) | (SFWMD) | before beginning any land use or construction activity that could affect wetlands, alter surface water flows or contribute to water pollution. An ERP covers activities such as providing stormwater containment and treatment during and after construction. |
| Wetlands and Floodplains | Section 404 Permit | U.S. Army Corps of Engineers (USACE) | The Florida site does not contain any wetland areas and requires no wetlands determination (SFWMD, 2007 and 2010).<br>DOE reviewed Flood Insurance Rate Maps (FIRM) as provided by the Federal Emergency Management Agency (FEMA) and determined that the Florida site is located outside of the 100- and 500-year floodplains and does not require further analysis. |
| Groundwater | Water Use Permit | SWFMD | The biorefinery at the Florida site would require a Water Use Permit from the SWFMD for the withdrawal of groundwater for its process water supply. Wells in the site location are under the jurisdiction of the FDEP and SFWMD and Algenol would comply with all applicable requirements. |
| | Underground Injection Control (UIC) Well Permit | FDEP / SWFMD | The FDEP regulates injection wells and aquifer storage recovery (ASR) wells under its Underground Injection Control (UIC) Program. Based on preliminary discussions with the FDEP, ASR, injection, and monitoring wells would be covered under the Class I or Class V well rules and Algenol would comply with all applicable requirements. |
| Biological Resources | Migratory Bird Treaty Act | U.S. Fish and Wildlife Service (USFWS) / FDEP Florida Fish and Wildlife Conservation Commission (FWCC) | DOE submitted a consultation letter to the FWCC to solicit comments on the project and information regarding the potential presence of protected species or habitat in the area of the Florida site. To date, no responses have been received from any Florida agency regarding migratory birds. If migratory birds or nests are detected prior to or during construction or if FWCC or FDEP raises concerns regarding migratory birds, Algenol would implement the appropriate measures, with consultation from state agencies, to ensure that migratory birds are not adversely impacted. |
| | Endangered Species Act | FDEP / FWCC | DOE submitted a consultation letter to the FWCC to solicit comments on the project and information regarding the potential presence of protected species or habitat in the area of the Florida site. To date, no responses have been received from any Florida agency regarding endangered species. If endangered species are detected prior to or during construction or if FWCC or FDEP raises concerns regarding endangered species, Algenol would implement the appropriate measures, with consultation from state agencies, to ensure that endangered species are not adversely impacted. |
| Cultural Resources | Section 106 of the National Historic Preservation Act (NHPA) | Florida Division of Historical Resources | The National Register is administered by the National Park Service in conjunction with the state historic preservation offices (SHPOs). A letters from the SHPO of Florida acknowledges that the project would not affect historic properties (see Appendix B).<br>If potentially significant cultural artifacts are exposed by trenching or below-grade excavation during construction, Algenol would ensure that construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist |

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| | | | qualified under 36 CFR Part 61 could examine the artifacts and the SHPO was notified. |
| | Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) | | The Seminole Tribe of Florida deferred further commenting until a Phase I archaeological survey be conducted and reviewed. Algenol is committed to completing a Phase I archaeological survey prior to construction and further consultation if necessary. See Appendix B for consultation letters and responses.<br>If unmarked graves are exposed by trenching or below-grade excavation during construction, Algenol would ensure that construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the exposed grave(s) and the SHPO was notified. Tribes would be notified immediately if the grave(s) were determined to potentially contain American Indian remains. |
| **Texas** | | | |
| Hybrid Algae | Exotic Species Permit | Texas Parks and Wildlife Department (TPWD) | To restrict the importation and sale of certain non-native plants, the TPWD currently provides a list of prohibited species on which no algae are included (Texas Administrative Code Title 31, Part 2, Chapter 57, Subchapter A). Recently, however, the state of Texas has directed TPWD to create and finalize a list of *approved* exotic aquatic plants. Each species considered for the approved list must pass a scientific risk analysis before it can be added to the list to ensure that it does not have the potential to negatively impact the state's aquatic resources. Possession of other non-native species is allowed with a permit. Algenol may require an Exotic Species Permit from TPWD and would adhere to the requirements as listed in the permit. |
| Air Emission | Permit-By-Rule | Texas Commission on Environmental Quality (TCEQ) | As a minor emitter for air pollutants (ethanol would be the primary emission with less than 25 pounds per year expected), the project would qualify for a permit-by-rule for at the Texas site, which would be applied for at the state environmental agency responsible for issuing air permits. See Title 30 Texas Administrative Code 106.262 |
| Stormwater | General Permit (construction) | TCEQ | For construction of the biorefinery at the Texas site option, Algenol would file for authorization via TCEQ's construction General Permit to obtain stormwater management coverage and would adhere to TPDES regulations as required under this permit. |
| | Multi Sector General Permit | TCEQ | For operation of the biorefinery at the Texas site option, Algenol would file for authorization via the TCEQ Multi-Sector General Permit to obtain stormwater management coverage and would adhere to TPDES regulations as required under this permit. |
| Wetlands and Floodplains | Section 404 Permit | U.S. Army Corps of Engineers (USACE) | A wetlands delineation report conducted for the Texas site indicated that nearly the entire 35.51-acre area surveyed, including the 26-acre project site, consisted of an isolated wetland, which may be determined to be non-jurisdictional (see Appendix C for the report). The report was submitted to USACE for their review and assigned project number SWG-2009-01187. No determination from USACE has been provided to date. Should USACE |

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| | | | determine that on-site wetlands are protected under federal jurisdiction, Algenol would assess development options, including filing for a wetland permit to fill the wetlands and develop the site. A wetlands application would be submitted to USACE for their review and approval as per the requirements of Section 404 of the Clean Water Act (CWA). Approval of such a permit would likely require wetland mitigation to be performed, which could include restoring/creating wetland area on- or off-site and/or purchasing wetland mitigation credits from an approved wetland mitigation bank. Additionally, the TPWD submitted a letter to DOE, which included recommendations for the mitigation of wetland impacts and for TPWD to be consulted on development of a mitigation plan (see Appendix A). Algenol would implement applicable recommendations as well as consult with the TPWD.<br>DOE reviewed Flood Insurance Rate Maps (FIRM) as provided by the Federal Emergency Management Agency (FEMA) and determined that the Texas site is located outside of the 100- and 500-year floodplains and do not require further analysis. |
| Biological Resources | Migratory Bird Treaty Act | TCEQ / TPWD | As a response to DOE's consultation letter for the project, TPWD submitted a letter which outlined recommendations for the protection of biological resources (see Appendix B). As per TPWD's recommendation, in order to ensure that migratory bird nests or eggs are not adversely impacted by development of the project, Algenol would ensure that initial land disturbing activities for construction of the biorefinery (e.g., land clearing) would be performed outside of the local migratory bird nesting season (April 1 through July 15). Or, in the event that the timing of construction activities ultimately required initial land disturbing activities to be performed within the migratory bird nesting season, a migratory bird nest survey of the site would be performed prior to the commencement of these activities. If nests were found, Algenol would consult with the U.S. Fish and Wildlife (USFWS) and TPWD to determine measures to be performed to ensure that the nests are not adversely impacted. |
| | Endangered Species Act | TCEQ / TPWD | A Threatened and Endangered Species Review was conducted for Dow at the Texas site option and is included in Appendix D. The review summarized vegetation that may provide habitat for state-listed species. As per TPWD's recommendation, prior to land disturbance activities, Algenol would ensure that construction personnel are informed of rare species that have the potential to occur in the project area based on the results of the species review. If a Texas-listed rare, threatened, or endangered species is detected within or near the project site before or during construction, Algenol would notify and consult with TPWD. |
| | Invasive Species Executive Order 13112 | TPWD | As a response to DOE's consultation letter of the project, TPWD submitted a letter which outlined recommendations for the protection of biological resources (see Appendix B). As per TPWD's recommendation, to prevent the impacts of invasive species, Algenol would reseed disturbed soils with vegetation native to the project area. |
| Cultural Resources | Section 106 of the National Historic | Texas Historical Commission | Section 106 of the NHPA requires federal agencies to take into account the effects that their federally funded activities and programs have on significant historic properties. |

**Table 2-3. Permits, Regulations, and Applicant-Committed Measures**

| Resource Area | Permit / Regulation | Agency | Requirements / Applicant-Committed Measures |
|---|---|---|---|
| | Preservation Act (NHPA) | | "Significant historic properties" are those properties that are included in, or eligible for, the National Register of Historic Places. The National Register is administered by the National Park Service in conjunction with the state historic preservation offices (SHPOs). A letter from the SHPO of Texas acknowledges that the project would not affect historic properties (see Appendix B).<br>If potentially significant cultural artifacts are exposed by trenching or below-grade excavation during construction, Algenol would ensure that construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the artifacts and the SHPO was notified. |

## 2.8 NO ACTION ALTERNATIVE

Under the No-Action Alternative, DOE would not authorize Algenol to expend federal funding for the proposed biorefinery project. As a result, the biorefinery and supporting infrastructure would be delayed while Algenol looked for other funding sources, or abandoned if other funding sources could not be obtained. If the biorefinery was abandoned entirely, both the Texas and the Florida sites would remain as they are now until such time as they were leased or sold to another industrial user. Furthermore, reductions in fossil fuel use would not occur and DOE's ability to achieve its objectives under the ARRA would be impaired.

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

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# 3.0 EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental setting and identifies potential impacts of the project for each site option. Each environmental resource section begins with discussions on the existing environmental conditions for the Freeport, Texas site and the Fort Myers, Florida site. The extent of information provided for each resource area is commensurate with the baseline data necessary to support the impacts discussion following descriptions of the existing conditions. The potential impacts identified are discussed as it pertains to the Proposed Action and the No Action Alternative.

## 3.1 LAND USE

### 3.1.1 Existing Conditions

#### *3.1.1.1 Texas Site*

Land uses in the area primarily consist of major chemical manufacturing facilities, including BASF Chemical and Dow's Freeport Operations. Surrounding the project site, Dow's facilities comprise three major processing areas (Plant A, Plant B, and Oyster Creek) that spread across more than 5,000 acres of land with more than 75 individual chemical production plants and an extensive seawater canal system, which Dow uses for its processes. The Freeport Operation also houses its own wastewater treatment facility and power plants that generate 1,300 MW of electricity, which also has the ability to transmit to and receive from the local electrical grid.

The site option property is currently owned by Dow and consists of 26 acres of land north of SH 332. The property is located in unincorporated Brazoria County in which no zoning regulations are imposed. The site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle (Brazoria CAD, 2010). An airfield once transected the proposed site which was utilized by private and military aircraft until its closure in 1976 (Dow, 2010). Surrounding land uses include a capped landfill to the north; residential property to the northeast; industrial uses to the east and west; and Dow's steam condensate tank farm to the south.

#### *3.1.1.2 Florida Site*

The Florida site property, which is owned by Alico Road Business Park, consists of approximately 40 acres of land north of Alico Road and is zoned for heavy industrial use. The site is undeveloped, except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development in the project area. Surrounding land uses include undeveloped land – similar in nature to the general characteristics of the site – to the east, south, and west. To the north of the site is the recently constructed Alico Business Park, which consists of industrial/office uses. Plans are currently in place by the property owners to develop the site and the surrounding area into one or more business parks. The closest residential area to the site is approximately 0.3 miles to the north on Fiddlesticks Boulevard.

The Lee County Comprehensive Plan, last amended in 2009, serves as the source of authority for land development regulations in the project area. Based on the land use plans, the project

location would be within the Gateway/Airport community. Lands in this community are primarily designated as Industrial Development. It is expected that the project area would increase in urbanization with hi-tech/clean industry businesses based on goals set forth in the Lee Plan, and lands reserved under this land use category would provide centrally located areas for research and development, laboratories, industrial activities, and office space (Lee County, 2009).

### 3.1.2 Environmental Consequences of the Proposed Action

#### *3.1.2.1 Common Impacts*

The Proposed Action would result in the conversion of approximately 26 acres for the Texas site and 33 acres for the Florida site of undeveloped, vegetated land to facilities for the operation of the biorefinery, including an office building/laboratory, storage/work areas, a greenhouse, a covered pavilion, and water and ethanol processing areas. Both of the site options are located in industrial settings and fairly isolated from the general public. Therefore, at both site options operation of the biorefinery would be compatible with adjacent and nearby land uses.

#### *3.1.2.2 Texas Site*

Because of the heavy industrial nature of the project area, construction and operation of the biorefinery would not change or conflict with current adjacent land uses. Although the biorefinery would be located on a land parcel upon which no zoning regulations are imposed, the biorefinery would be considered a compatible land use because the project site is located adjacent to existing industrial and chemical manufacturing facilities and on property that would likely have been used for industrial use as it is owned by Dow. Because of the temporary nature of the facility for the Texas site, the land would be reclaimed as pastureland for harvesting feed for cattle after decommissioning of the biorefinery.

#### *3.1.2.3 Florida Site*

The project site is located on property already zoned for industrial use and construction and operation of the biorefinery would be compatible with future development plans as the greater surrounding area is included as part of Lee County's comprehensive plan as an area to be developed for industrial users. Additionally, the Southwest Florida Regional Planning Council reviews various projects for compliance with regional goals, strategies and actions, as determined in accordance with its Strategic Regional Policy Plan. In response to DOE's scoping letter for the project, the Council submitted a letter, which acknowledged that the project is "Regionally Significant and Consistent" with the Strategic Regional Policy Plan, pending review of this EA (see Appendix A). This designation indicates that the project is of regional importance and appears to be consistent with development plans in the region.

### 3.1.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either site option and no impacts to land use from the proposed facility would occur. At the Florida site, the property would likely be developed as Lee County has designated the area for industrial use.

## 3.2 VISUAL RESOURCES

### 3.2.1 Existing Conditions

#### *3.2.1.1 Texas Site*

The Texas site option is located on Dow property in an existing industrialized area near Freeport, Texas (see Figures 2-3 through 2-5). The viewscape of the project area consists of large industrial-type structures, open grassy fields, and traffic on SH 332. Directly south of the project site, Dow operates a tank farm consisting of several tanks that store steam condensate from Dow processes. Shintech, Inc., a plastics manufacturer, is located approximately 0.5 mile west of the project site; and another industrial facility is located southeast of the site.

The community of Oyster Creek is located to the east of the site. The closest residential properties are located 0.5 miles to the northeast, along Oyster Creek Bend Road. Public views of the project site are limited to some of these residential properties and from motorists on SH 332. The Brazoria National Wildlife Refuge is located approximately 2 miles northeast of the project site. This wildlife conservation area borders a bay on the Intracoastal Waterway and provides quality habitat for wintering migratory waterfowl and other bird life. Direct views of the project site from this refuge, if any, are minimal.

#### *3.2.1.2 Florida Site*

The Florida site option is located in an area zoned for heavy industrial use (see Figure 2-6 through 2-8). Currently, most of the surrounding areas to the south and west can be characterized as undeveloped, agricultural/pastureland, similar in nature to the general characteristics of the project site. The property located east of the site has been heavily disturbed from the construction of stormwater systems - plans are currently in place by the property owners to develop the site and the surrounding areas into one or more industrial and business parks. The Alico Road Business Park, LP is located directly north of the project site and consists of warehouse and office buildings, including the location of Algenol's planned R&D facility and PDU. Additional industrial facilities and users are located southwest of the site.

The closest residential area to the site is approximately 0.3 miles to the north on Fiddlesticks Boulevard, which is separated from the industrial-zoned project area by an existing canal and vegetation. Public views of the project site from this residential area are blocked due to the vegetation located along the canal and buildings in the Alico Business Park; motorists on Alico Road may have some direct views of the project site.

### 3.2.2 Environmental Consequences of the Proposed Action

#### *3.2.2.1 Common Impacts*

Construction of the biorefinery would result in localized adverse visual impacts to neighboring land uses that have direct views of the project site. During the six-month construction phase of the project, there may be some effects to the viewshed as heavy equipment is used, soil is disturbed, and noise and dust may temporarily degrade the visual quality of the site. However, because the site options are located within industrial settings, limited public views, and the effects would be limited to six months, the degree of visual impacts would be negligible during construction.

Once constructed, it is expected that visual impacts resulting from the operational phase of the biorefinery would be minor as the degree of change to the existing settings would be low and public views of the biorefinery would be minimal.

#### *3.2.2.2 Texas Site*

Construction of the proposed facility would have negligible impacts on nearby residential areas as the nearest residence is 0.5 miles to the east of the project site and direct views of the site are limited to a few residential properties. Overall, construction of the biorefinery would result in minor visual impacts as the project site is located adjacent heavily to industrial land uses and vacant land and, therefore, the degree of change in the visual quality of the area.

Once operational, the biorefinery would result in minor impacts to the visual setting of the area as the adjacent Dow tank farm would generally block views of the biorefinery from motorists on SH 332, direct views from the Brazoria National Wildlife Refuge are minimal, and the degree of change in the visual quality of the project area would be low. Additionally, any visual impacts would be temporary as the biorefinery would be decommissioned after a three-year operational span.

#### *3.2.2.3 Florida Site*

Construction of the proposed facility would have negligible impacts on nearby residential areas as the nearest residence is 0.3 miles to the north of the project site and views of the project site from this residential area would generally be blocked. Overall, construction of the biorefinery would result in minor degradation to the visual quality of the project area as the site is located in an area zoned for industrial use and public views of the construction site would be limited to motorists on Alico Road.

Once operational, the biorefinery would result in minor impacts to the visual setting of the immediate, planned to become industrial area. The project site would be located 0.8 miles north of Alico Road and because the associated components of the biorefinery would be one-story structures, impacts to the visual quality of the area would be expected to be minor as public views of the site would be limited to motorists on Alico Road.

### 3.2.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either site option and the visual quality of the sites would remain unchanged. Potential development at the Florida site would likely occur as the county has plans to develop the area into industrial and business park areas.

## 3.3 CULTURAL RESOURCES

Cultural resources include sites, buildings, structures, or areas that are of historic, cultural, archeological, and/or architectural significance (including sites on or eligible for the National Register of Historic Places [NRHP] and the National Registry of Natural Landmarks). NHPA Sections 106 and 110 (16 U.S.C. §§ 470, *et seq*.) and NEPA regulations require all construction receiving federal funding to identify the potential prehistoric and historic cultural resources in an area to assure that no unnecessary harm comes to historic properties as a result of federal actions. The regulations also state the need to determine what potential adverse impacts could occur if the Proposed Action was completed.

As part of the Section 106 process, DOE submitted consultation letters to the offices that oversee the preservation of cultural resources for each state. These letters are provided in Appendix B. Response letters were received from the offices and are discussed in greater detail below. Additionally, to meet its obligation under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), 25 U.S.C. §§ 3001, *et seq.*, DOE reviewed the Native American Consultation Database to identify any potential Native American groups as having any land claims or interests in the project area (NACD, 2010) and submitted consultation letters to these organizations (provided in Appendix B). Nine potential tribal groups were identified for the Texas site (Yselta del Sur Pueblo, Alabama-Coushatta Tribe of Texas, Comanche Nation of Oklahoma, Kiowa Tribe of Oklahoma, Tonkawa Tribe of Oklahoma, Kickapoo Tribe in Kansas, Kickapoo Tribe of Oklahoma, Kickapoo Traditional Tribe of Texas, and the Wichita and Affiliated Tribes) and two potential tribal groups were identified for the Florida site (Seminole Nation of Oklahoma and Seminole Indian Tribe of Florida).

### 3.3.1 Existing Conditions

#### *3.3.1.1 Texas Site*

DOE gathered information on relevant cultural sites in/near the project area through a records search using Texas Historical Commission resources located on the Commission's website, including the NRHP listing (Texas Historical Commission, 2010a). The nearest National Historic property is the Duranzo Plantation, located approximately 12 miles southwest of the project site (HMSA, 2009).

For this EA, DOE defined the Area of Potential Effect (APE) (or limits of ground disturbance) for cultural resources as 1,000 feet beyond the project site boundary which should be beyond noise and vibrations produced as a result of construction. Based on site observations, aerial images, and a review of the Texas Historical Commission Atlas, DOE has determined that no archaeological sites or structures 50 years old or older are present within the APE. Soils at the location have likely been disturbed by previous industrial activities, as well as activities associated with a former airfield that was located on part of the site.

#### *3.3.1.2 Florida Site*

DOE gathered information on relevant cultural sites in/near the project area through a records search on the Florida Division of Historical Resources' website and the NRHP (Florida Division of Historical Resources, 2010a). Multiple sites designated by the Florida Historical Marker Program and National Register are located in downtown Fort Myers, approximately 20 miles from the proposed site. The nearest National Historic property is the Koreshan Unity Settlement Historic District, located approximately five miles from the project site. The Seminole Indians are present in the Fort Myers region but do not have any residential or commercial establishments or registered historical landmarks near the project site.

For this EA, DOE defined the APE (or limits of ground disturbance) for cultural resources as 1,000 feet beyond the project site boundary which should be beyond noise and vibration levels produced during construction. Based on site observations, aerial images, and a records search, DOE has determined that no archaeological sites or structures 50 years old or older are present within the APE. Aerial and soil maps of the project site show prior disturbance from irrigation and canal development in the past.

## 3.3.2 Environmental Consequences of the Proposed Action

### *3.3.2.1 Common Impacts*

The disturbance of land during construction or the operation of the biorefinery could adversely impact cultural resources; however, as discussed previously, no registered historic properties or archaeological sites were identified within the APE at either site option, and cultural resources are not expected to be impacted as a result of the Proposed Action. Response letters from the SHPOs concur that the project would have no effect on historic resources. Additionally, four tribal organizations have responded to DOE's consultation letters and are described below. While unlikely, unmarked graves and/or potentially significant cultural artifacts may be exposed by trenching or below-grade excavation. If this should occur, construction activity would cease within an appropriate radius (no less than 50 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the exposed grave(s) and the SHPO was notified. Tribes would be notified immediately if the grave(s) were determined to potentially contain American Indian remains. Response letters from the SHPOs and the tribal organizations are provided in Appendix B.

### *3.3.2.2 Texas Site*

The Texas site option is not located adjacent to any NRHP-listed sites. Additionally, there is a low potential for archaeological artifacts to be located at the proposed site as soils at the location have likely been disturbed by previous industrial activities. In a letter from the Texas Historical Commission, the Office stated that "No Historic Properties (would be) Affected" (Texas Historical Commission, 2010b). Additionally, three tribal organizations for the Texas site option have responded to DOE's consultation letters to date: the Kickapoo Tribe in Kansas acknowledged concurrence with "no adverse effect" to historic structures or culturally significant sites; the Tonkawa Tribe has no specifically designated historical or cultural sites in the Texas site's project area, but would like to be contacted in the case that cultural resources are encountered; and the Yselta del Sur Pueblo has no concerns due to the project's location being outside of their area of interest. Response letters from the SHPOs and the tribal organizations are provided in Appendix B.

### *3.3.2.3 Florida Site*

The Florida site option is not located adjacent to any NRHP-listed sites. Additionally, there is a low potential for archaeological artifacts to be located at the proposed site as soils at the location have likely been disturbed by previous land development and irrigation activities. In a letter from the state of Florida's Division of Historical Resources, the office determined that the project would have "no effect on historic properties" (Florida Division of Historical Resources, 2010b). Additionally, one tribal organization for the Florida site option has responded to DOE's consultation letters to date – the Seminole Tribe of Florida deferred further commenting for the Florida site option until the review of a Phase I archaeological survey. Algenol is committed to completing a Phase I archaeological survey prior to construction and further consultation if necessary. Response letters from the SHPOs and the tribal organizations are provided in Appendix B.

## 3.3.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, ground disturbance associated with construction of the proposed biorefinery would not occur at either site option, and in situ resources would remain in

place. No NRHP or NRHP-eligible structures would be impacted at either site option. At the Florida site, it is likely that the site would be developed for other projects as the area is being prepared for potential industrial development; therefore, cultural resources at the Florida site may be impacted regardless of whether or not this project would proceed.

## 3.4 AIR QUALITY

### 3.4.1 Existing Conditions

The principal framework for national, state, and local efforts to protect air quality in the United States is the Clean Air Act (CAA), 42 U.S.C. §§ 7401, *et seq.*. Under the CAA, EPA has set standards known as National Ambient Air Quality Standards (NAAQS), established for the protection of public health and the environment. NAAQS consists of six criteria pollutants considered to be key indicators of air quality, namely, carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$), sulfur dioxide ($SO_2$), lead (Pb), and two categories of particulate matter, $PM_{10}$ and $PM_{2.5}$ – PM with an aerodynamic diameter of 10 and 2.5 microns or less, respectively. Two levels of NAAQS exist – primary, to protect the public, including the health of sensitive populations (e.g., children and asthmatics); and secondary, to protect public welfare and quality of life, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The EPA is also responsible for ensuring that air quality standards are met or attained in cooperation with state, Tribal, and local governments through national strategies to control air pollutant emissions.

Areas that meet the NAAQS are said to be in "attainment." The air quality in attainment areas is managed under the Prevention of Significant Deterioration Program of the CAA. The goal of this program is to maintain a level of air quality that continues to meet the standards. Areas that do not meet one or more of the standards are designated as "nonattainment" areas for criteria pollutant(s). The CAA requires nonattainment states to submit to the EPA a State Implementation Plan (SIP) for attainment of the NAAQS. The NAAQS are shown in Table 3-1.

**Table 3-1. National Ambient Air Quality Standards**

| Pollutant | Averaging Period | Primary Standard | | Secondary Standard | |
|---|---|---|---|---|---|
| | | Level | Statistic | Level | Statistic |
| Carbon Monoxide (CO) | 8-Hour[1] | 9 ppm | Maximum | None | |
| | 1-Hour[1] | 35 ppm | Maximum | | |
| Lead (Pb) | Rolling 3-Month Average | 0.15 µg/m$^3$ | Maximum | Same as Primary | |
| | 3-Month Average | 1.5 µg/m$^3$ | Maximum | | |
| Nitrogen Dioxide ($NO_2$) | Annual Average | 0.053 ppm | Arithmetic Average | Same as Primary | |
| | 1-Hour[2] | 0.1 ppm | Arithmetic Average | None | |
| Particulate Matter$_{10}$ ($PM_{10}$) | 24-Hour[3] | 150 µg/m$^3$ | Maximum | Same as Primary | |
| Particulate Matter$_{2.5}$ ($PM_{2.5}$) | Annual Average[4] | 15 µg/m$^3$ | Arithmetic Mean | Same as Primary | |
| | 24-Hour[5] | 35 µg/m$^3$ | 3 Year Average | | |

**Table 3-1. National Ambient Air Quality Standards**

| Pollutant | Averaging Period | Primary Standard | | Secondary Standard | |
|---|---|---|---|---|---|
| | | Level | Statistic | Level | Statistic |
| Ozone ($O_3$) | 8-Hour[6] | 0.075 ppm (2008 standard) | 3 Year Average | Same as Primary | |
| | 8-Hour[6] | 0.08 ppm (1997 standard) | 3 Year Average | | |
| | 1-Hour[7] | 0.12 ppm | Not Applicable in Brazoria or Lee Counties | | |
| Sulfur Dioxide ($SO_2$) | Annual Average | 0.03 ppm | Arithmetic Mean | None | |
| | 24-Hour[1] | 0.14 ppm | Maximum | | |
| | 3-Hour[1] | None | | 0.5 ppm | Maximum |
| | 1-Hour[8] | 0.075 ppm | 3 Year Average | None | |

[1] Not to be exceeded more than once per year.
[2] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.1 ppm.
[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$^3$.
[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 the standard. The 1997 standard remains in effect while EPA undertakes rulemaking to transition to the 2008 standard.
[7] To attain this standard, the expected number of days with maximum hourly average concentrations above 0.12 ppm is no greater than 1. EPA revoked the 1-hour ozone standard, though some areas have continuing obligations under that standard.
[8] To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.075 ppm.
Note: ppm = parts per million; µg/m$^3$ = micrograms per cubic meter of air.
Source: EPA, 2010a.

Section 176(c) of the CAA (42 U.S.C. 7506(c)) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable SIP required under Section 110(a) of the CAA (42 U.S.C. 7410(a)) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. The proposed project is sponsored and financially supported by DOE and must, therefore, be reviewed for general conformity.

On November 30, 1993[3], the EPA promulgated final general conformity regulations at 40 CFR 51 Subpart W for all federal activities except those covered under transportation conformity. On September 1, 1998, FDEP adopted Rule 62.204.500 of the Florida Administrative

[3] On April 5, 2010, a final rule for revisions to the general conformity regulations was published in the Federal Register (75 *FR* 17254). These revisions, effective as of July 6, 2010, do not impact the determination that general conformity is inapplicable (since the Florida site is located in an attainment area for all criteria pollutants) .

Code, which incorporates the EPA general conformity regulations. The general conformity regulations apply to a proposed federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts. The proposed project is located in an area that is in attainment for all criteria pollutants; therefore, general conformity is not applicable.

The EPA developed emission levels that identify major stationary sources in attainment areas (40 CFR 51.166) in the Prevention of Significant Deterioration (PSD) regulations. A source is classified as a major stationary source if it has the potential to emit 100 tons per year of any regulated pollutant and is one of 28 listed source categories in the PSD regulation. If a source category is not listed in the PSD regulation but has the potential to emit 250 tons per year of any regulated pollutant, then it would also be subject to the PSD regulation. The proposed project is classified as a chemical process plant, which is listed as one of the 28 specific source categories in the regulation; therefore, it is subject to the lower threshold of 100 tons per year.

On February 18, 2010, CEQ released a memorandum to heads of federal departments and agencies entitled *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (CEQ 2010). The guidance document affirms the applicability of NEPA to greenhouse gas (GHG) emissions[4] and climate change impacts and recommends that federal agencies consider opportunities to reduce GHG emissions caused by federal actions. The guidance document specifically indicates that if a proposed action would cause direct[5] emissions of 25,000 metric tons or more of carbon dioxide-equivalent ($CO_2e$) emissions on an annual basis, then agencies should prepare a quantitative and qualitative assessment of emissions. This limit is not to be taken as a threshold of significance, but rather as level that would require analysis under NEPA. Although the emissions level specifically applies to direct emissions of GHG, the guidance document recommends that both direct and indirect[6] GHG emissions be analyzed. The public comment period for the guidance document closed on May 24, 2010; however, the final guidance document has not yet been issued.

#### *3.4.1.1 Texas Site*

The state of Texas does not have specific air quality standards and instead has adopted and enforces the NAAQS within the state (see Table 3-1) (as per Texas Administrative Code Title 30, Part 1, Chapter 101, Subchapter A, Rule §101.21). Brazoria County is within the Houston-Galveston-Brazoria Ozone Nonattainment Area, which consists of eight contiguous counties in eastern Texas (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and

[4] CEQ defines GHGs in accordance with Section 19(i) of Executive Order 13514, which requires the reduction of GHG emissions for Federal agencies (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

[5] Although the draft NEPA Guidance does not define "direct emissions," it is assumed to be consistent with the commonly accepted definition in other reporting regulations and guidance (e.g., the Climate Registry's General Reporting Protocol); namely, that direct emissions are those that a party controls and operates (i.e., company-owned mobile sources, stationary combustion sources, etc.).

[6] Although the draft NEPA Guidance does not define "indirect emissions," it is assumed to be consistent with the commonly accepted definition in other voluntary and mandatory reporting regulations and guidance (e.g., the Climate Registry's General Reporting Protocol); namely, that it includes emissions that a party has control over, but does not own (i.e., purchased steam or electricity).

Waller Counties) that are all considered as severe nonattainment of the 1997 8-hour ozone standard. In 2007, the TCEQ adopted the 1997 Eight-Hour Ozone Nonattainment Area SIP revision. This SIP revision was the first step in addressing the 1997 eight-hour ozone standard in the Houston-Galveston-Brazoria area and represents efforts in planning for attainment of the 1997 eight-hour ozone standard. The SIP revision included a variety of ozone control measures, such as additional Voluntary Mobile Source Emissions Reduction Program commitments and amendments to Texas Administrative Code, relating to the control of VOC emissions from storage and degassing operations in the Houston-Galveston-Brazoria area (Texas Administrative Code Title 30, Part 1, Chapter 115). The Houston-Galveston-Brazoria area's attainment date for the 1997 ozone standard is as expeditiously as practicable, but no later than June 15, 2019 (TCEQ, 2010a). The EPA's Regional Haze Rule requires the improvement in visibility due to airborne pollutants in 156 national parks and wilderness areas (called "Class I areas"). There are no Class I Areas in or near Brazoria County (EPA, 2009a). Table 3-2 lists the emissions in Brazoria County in 2002 for the following air pollutants: CO, $NO_x$, $PM_{10}$, $PM_{2.5}$, $SO_2$, and VOCs.

**Table 3-2. Air Pollutant Emissions in 2002 in Brazoria County**

| Pollutant Source | CO | $NO_x$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC |
|---|---|---|---|---|---|---|
| Point Sources (tons per year) | 5,974 | 20,852 | 898 | 826 | 4,705 | 6,111 |
| Non-Point and Mobile Sources (tons per year) | 53,842 | 23,277 | 39,466 | 5,689 | 6,490 | 9,731 |
| **Total (tons per year)** | **59,816** | **44,129** | **40,364** | **6,515** | **11,195** | **15,842** |

Source: EPA, 2010b.

### *3.4.1.2 Florida Site*

In addition to the NAAQS, the state of Florida also has air quality standards which are described in Table 3-3. Lee County is considered in attainment for all NAAQS and the Florida standards. There are no Class I areas in the immediate vicinity of the site; the closest Class I area is Everglades National Park, approximately 50 miles south of the site (EPA, 2009a). Table 3-4 lists the emissions in Lee County in 2002 for: CO, $NO_x$, $PM_{10}$, $PM_{2.5}$, $SO_2$, and VOCs.

**Table 3-3. Florida Ambient Air Quality Standards**

| Pollutant | Averaging Period | Standard | |
|---|---|---|---|
| | | Level | Statistic |
| Carbon Monoxide (CO) | 8-Hour[1] | 9 ppm | Maximum |
| | 1-Hour[1] | 35 ppm | Maximum |
| Lead (Pb) | 3-Month Average | 1.5 µg/$m^3$ | Maximum |
| Nitrogen Dioxide ($NO_2$) | Annual Average | 0.05 ppm | Arithmetic Mean |
| Particulate Matter$_{10}$ ($PM_{10}$) | 24-Hour[1] | 150 µg/$m^3$ | Maximum |
| | Annual Average | 50 µg/$m^3$ | Arithmetic Mean |
| Ozone ($O_3$) | 1-Hour[2] | 0.12 ppm | Maximum |
| Sulfur Dioxide ($SO_2$) | Annual Average | 0.02 ppm | Arithmetic Mean |

**Table 3-3. Florida Ambient Air Quality Standards**

| Pollutant | Averaging Period | Standard | |
|---|---|---|---|
| | | Level | Statistic |
| | 24-Hour[1] | 0.1 ppm | Maximum |
| | 3-Hour[1] | 0.5 ppm | Maximum |

[1] Not to be exceeded more than once per year.
[2] Not to be exceeded an average of more than 1 day per year.
Note: ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter of air.
Source: Florida Administrative Code Chapter 62-204.240

**Table 3-4. Air Pollutant Emissions in 2002 in Lee County**

| Pollutant Source | CO | $NO_x$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC |
|---|---|---|---|---|---|---|
| Point Sources (tons per year) | 232 | 1,953 | 72.3 | 37.5 | 315 | 178 |
| Non-Point and Mobile Sources (tons per year) | 178,876 | 23,717 | 9,197 | 2,206 | 3,910 | 33,856 |
| **Total (tons per year)** | **179,108** | **25,670** | **9,269.3** | **2,243.5** | **4,225** | **34,034** |

Source: EPA, 2010c.

## 3.4.2 Environmental Consequences of the Proposed Action

### *3.4.2.1 Common Impacts*

Construction of the biorefinery would produce low-level, intermittent, and transient emissions of $PM_{2.5}$, and $NO_x$, $PM_{10}$, and CO from vehicles, and trucks and the operation of construction machinery, as well as $PM_{2.5}$ and $PM_{10}$ associated with earth and material movements for land clearing and other activities. Appreciable impacts on ambient air pollution concentrations from vehicle emissions are expected to be minor and localized because the traffic increase from construction and personal vehicles would be small and temporary and most of the heavy construction equipment are expected to stay onsite until the construction phase is over (approximately six months). Thus, construction activities would not be expected to produce a significant degradation of ambient air quality.

Algenol used Aspen Plus process simulation software to evaluate loss of ethanol to the atmosphere. During operations, it is expected that the biorefinery would be a minor source of air emissions – the most notable emission would be ethanol, which is estimated under normal operating conditions to be less than 25 pounds per year. The only emission other than ethanol would be oxygen. Using simulation modeling, the worst case loss of ethanol to the atmosphere at full scale operation and targeted production levels would be approximately 0.6 metric tons per year.

The primary emissions of GHGs would be from onsite electricity use, with the ethanol separation equipment being the major consumer of energy and contributor to the carbon footprint. Additional GHG emissions would also be associated with the use of nitrogen and phosphorous fertilizers, photobioreactor production and disposal, the transportation of produced ethanol, and ethanol combustion in vehicles.

Although actual GHG emission estimates from the proposed biorefinery are not yet available, one of Algenol's primary objectives for this project includes the development of a process that is energy positive and achieves $CO_2$ emission reductions in comparison to gasoline. A study was conducted to evaluate the lifecycle GHG emissions based on Algenol's algae-to-ethanol process as a function of initial ethanol concentration (Luo et al., 2010). The study determined that, depending on targeted ethanol concentrations, the net lifecycle energy consumption (includes direct and indirect energy consumptions) can range from 0.2 $MJ/MJ_{EtOH}$[7] to 0.5 $MJ/MJ_{EtOH}$ and the net lifecycle GHG emissions can range from 11 grams $CO_2e$[8]/$MJ_{EtOH}$ to 27 grams $CO2e/MJ_{EtOH}$. In comparison to gasoline (91.3 gram $CO_2e$/MJ), these predicted values represent 70 to 88 percent reductions in the carbon footprint compared to conventional gasoline. Therefore, it is anticipated that the biorefinery would result in point source GHG emissions, but an overall net reduction in global GHG emissions. See Section 4.2.4 which discusses the cumulative air quality impacts of the biorefinery.

#### *3.4.2.2 Texas Site*

Based on the Aspen Plus process simulation modeling, it is expected that the biorefinery would be authorized under permit-by-rule (Title 30, Texas Administrative Code, Section 106.261). The TCEQ would be the agency responsible in issuing such a permit. Because the project site is located in a severe ozone nonattainment area, General Conformity rules for ozone apply. However, VOC and $NO_x$ emissions (which are precursors to ozone formation) from the biorefinery would be well below the 25-ton per year significance level (from transportation-related activities). Therefore, in a letter submitted to DOE the TCEQ acknowledged that a general conformity analysis would not be required (see TCEQ's letter in Appendix A). Minor impacts to the local air quality are expected as minimal amounts of emissions would be generated by the biorefinery and associated vehicles.

#### *3.4.2.3 Florida Site*

Based on the Aspen Plus process simulation modeling, it is expected that the biorefinery would be authorized under the FDEP Division of Air Resource Management's Air General Permit. The General Permit is a registration and permit-by-rule program designed for small businesses that may be classified as a minor, area or point source of air pollution (Florida Administrative Code 62-210.310). Minor impacts to the local air quality are expected as minimal amounts of emissions would be generated by the biorefinery and associated vehicles.

### 3.4.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either site option and, therefore, no additional air emissions would be generated and impact air quality. At the Florida site, it is likely that the site would be developed for other projects as the area is being prepared for potential industrial development; therefore, air quality at the Florida site may be impacted regardless of whether or not this project would proceed.

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[7] $MJ/MJ_{EtOH}$ – megajoule per megajoule of ethanol

[8] Here the carbon emission is defined as a mass of $CO_2$-equivalent (e.g., grams) divided by a unit of electricity generation (e.g., megajoule of ethanol).

## 3.5 GEOLOGY AND SOILS

The Federal Farmland Protection Policy Act (7 U.S.C. §§ 4201, *et seq*.) has been enacted in an effort to document the potential impacts to agricultural land through the NEPA process and to preserve land with the potential to consistently produce food and raw materials. The supply of high quality farmlands is limited; therefore, the USDA encourages the preservation of soils classified as prime farmland, or soils used for agriculture unique to the state. Prime farmland soils are defined by the USDA as: "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods." (USDA, 2010b). Other soils can be defined as unique farmlands if they are not suited for prime farmland designation, yet are used locally for the production of specific high-value food and fiber crops. This section discusses the existence or non-existence of prime farmland and/or unique farmland soils at both of the site options.

Because the biorefinery for the Florida site option would use groundwater to supply seawater, a groundwater feasibility study was conducted and includes descriptions of the subsurface conditions at this site location. The study's description of the geologic formation of the Florida site is summarized in this section. The existing groundwater conditions and analysis are described in Section 3.6.

### 3.5.1 Existing Conditions

#### *3.5.1.1 Texas Site*

The Texas site is located in the Coastal Prairies physiographic subprovence of the Gulf Coastal Plains (BEG, 1996). The area is characterized by a maximum elevation of 300 feet above sea level, and nearly flat strata that gently slopes to the southeast at the Gulf of Mexico shoreline. The surficial geology primarily consists of thick layers of deltaic sands, silts and clays. Continental rifting in the Mesozoic Era created the Gulf of Mexico basin, which collects sediment from the central United States and Central America.

The project site is located on Quaternary alluvium sediments, which were deposited from flooding and migration of the Brazos River and other stream channels (BEG, 1992), and approximately five feet above sea level, surrounded by oxbow lakes and meandering stream channels. The elevation grades very gradually to the southeast. The low elevation change and high sediment content of the rivers are indicative of a river delta landform. Texas has a very low seismic potential, with a 10 percent chance of a peak ground acceleration of 0.01 times the gravity coefficient in 50 years. This potential shaking level is the lowest possible in the continental United States.

The soils at the project site are characterized as Surfside clay. The soil is comprised of saline clay from fluvial deposits and generally forms in marshes. The slope is nearly level, poorly drained with slow surface runoff, but rarely flooded (USDA, 1981). Surfside clays have a high shrink-swell potential, as the clay minerals expand when the soil absorbs water. Surfside clay is not classified as a prime farmland soil.

### *3.5.1.2 Florida Site*

The Florida site is located in the coastal lowland region of the Peninsular Florida area. The coastal lowlands consist of flat plains that are typically less than a 100-foot above sea level elevation at the southern tip of Florida, and extend north along the coastline (Altschuler et al., 1994). Elevation at the project site is approximately 17 to 18 feet above sea level, with a very gradual slope to the southwest. The surficial geology is primarily undifferentiated, partially consolidated shell beds that were shallow beds that were deposited during temporary sea level rise in the Plio-Pleistocene. These deposits commonly contain abundant and well-preserved mollusks, corals and barnacles. Underneath the shallow sediments are Upper Pliocene limestones, sands and clay beds. The bedrock formations consist of dolostone and limestone formations with intermixed quartz, and clay beds (Scott and Rupert, 1994). Figure 3-1 presents the bedrock formations underneath the project site.

Southern Florida has a very low seismic potential, with a 10 percent chance of a peak ground acceleration of 0.01 times the gravity coefficient in 50 years. This potential shaking level is the lowest possible in the continental United States.

The soils at the project site consist of Immokalee sand, Pompano fine sand, Boca fine sand, and Pompano fine sand, depressional. The descriptions of the soils are provided in Table 3-5.

**Table 3-5. Soil Units found at the Fort Myers Project Site.**

| Soil Unit Name | Description | Percent of project site |
|---|---|---|
| Immokalee sand | Nearly level, poorly drained soil in flatwood areas. Soils is black sand over light gray sand. Water table is mostly at a depth from 10 to 40 inches, but may recede to greater than 40 inches in extended dry periods. | 65.2 |
| Pompano fine sand | Nearly level, poorly drained silica sand found on broad, poorly drained drainageways. For most of the year, the water table is at a depth of 10 to 40 inches. | 18.3 |
| Boca fine sand | Shallow, nearly level, poorly drained soil on flatwood areas. Soil consists of fine gray sand over fractured limestone. For most of the year, the water table is within the limestone bedrock and beneath the soil column. | 13.3 |
| Pompano fine sand, depressional | Nearly level, poorly drained soils found I depressions. Soils consists of gray fine sand. For most of the year, the water table is at a depth of 10 to 40 inches. Is susceptible to ponding. | 3.2 |

USDA, 1984

All of the soils except the Pompano fine sand, depressional are considered farmlands of unique importance, but not prime farmland soils. The soils at the project site are poorly suited for cultivated crops because of the sandy texture and high wetness; however, they are well suited for pasture and range grasses.

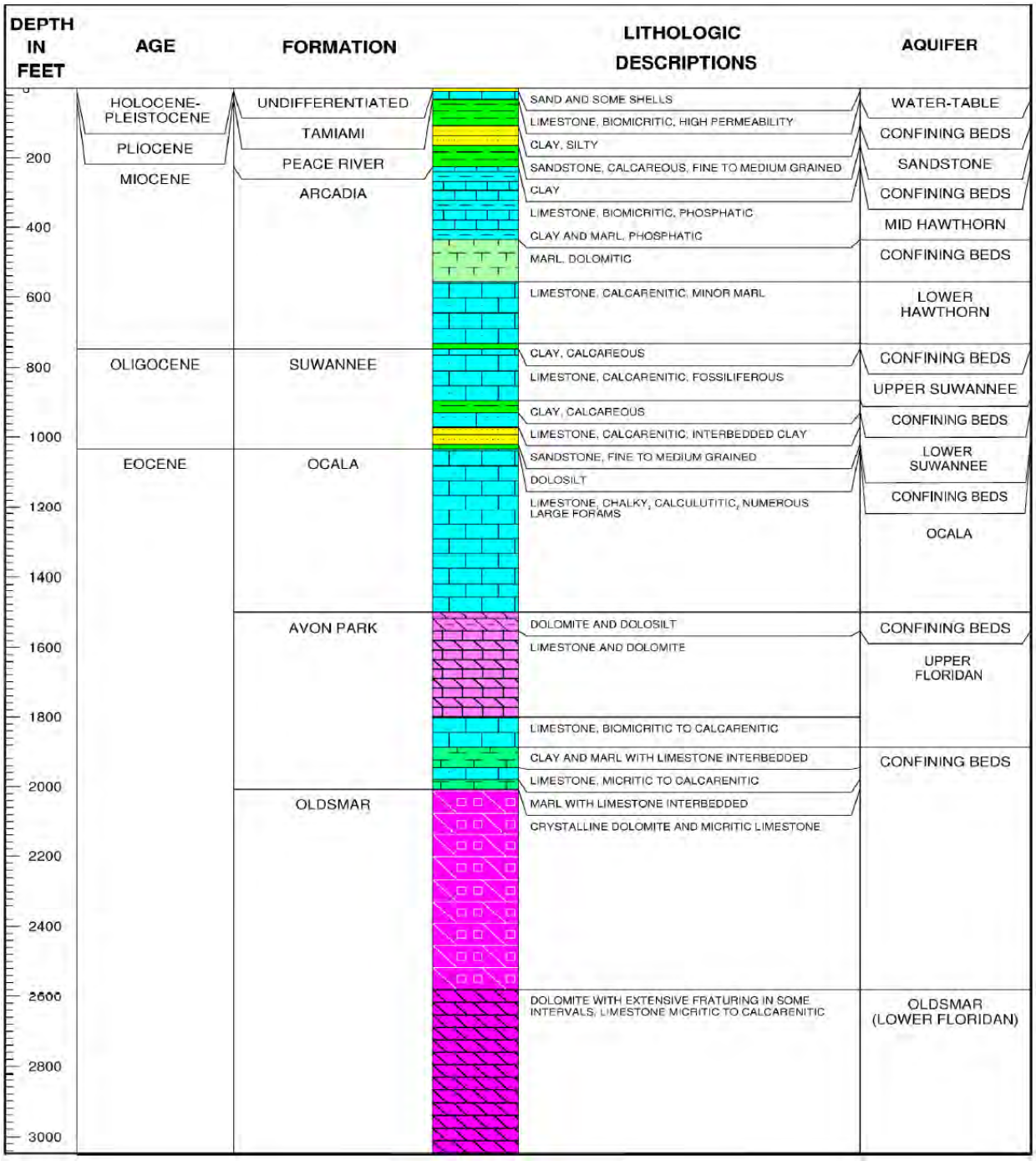


**Figure 3.1. Generalized Hydrostratigraphic Column of the Florida Site (Entrix, 2010a)**

## 3.5.2 Environmental Consequences of the Proposed Action

### *3.5.2.1 Common Impacts*

Several new facilities and support infrastructure would be built at the project site, including a new gravel parking lot, utility connections, office buildings, greenhouse, and the facilities to grow algae and separate the ethanol. With the exception of utilities that would be constructed within road right-of-ways, all of the construction would occur within the 26 acres at the Texas site and 33 acres at the Florida site of land set aside for the project. As a result, up to 26 and 33 acres of soils could be disturbed during construction of the Texas and Florida biorefinery, respectively. Soil disturbance as a result of grading, excavation for the foundation and other construction activities increases the potential that the topsoil would experience increased erosion. Prior to construction, a stormwater permit would be required from the state authority regulating water quality in runoff from construction sites. The permit requires operators to implement stormwater controls and develop a Stormwater Pollution Prevention Plan (SWPPP), which includes best management practices (BMPs) to prevent sediments and other pollutants associated with construction sites from being discharged in stormwater runoff. Potential BMPs include sequestering topsoil as needed, erecting silt fences, and temporarily seeding bare soils areas with native vegetation. Algenol would ensure that the construction contractor implements erosion BMPs to reduce the overall impacts on soils to minor and temporary during construction.

After construction, disturbed areas, such as equipment laydown areas, that are not part of the active facility would be seeded with appropriate vegetation as part of the SWPPP to prevent erosion and sedimentation of exposed soils.

### *3.5.2.2 Texas Site*

There would be no impact to prime farmlands, as soils at the Texas site are characterized as Surfside clay, which is not designated as prime farmland soils. The flat topography and clay composition of the soils, combined with the erosion BMPs to be described in the SWPPP would reduce the potential impacts to soils to minor during construction. There would be no impacts to geologic resources from construction of the project as it is not expected that any drilling or extensive excavating would be required at this site. There would be no additional impacts to the geology or soils during operation. Decommissioning of the biorefinery after a three-year operational phase would result in temporary and minor impacts to soil with placement of appropriate BMPs during decommissioning. After decommissioning, the site would be reclaimed, however, it is unlikely that it would be restored to its original condition and functionality.

### *3.5.2.3 Florida Site*

Algenol reviewed the USDA soil survey map for Lee County, Florida and determined that although the Florida site contains no prime farmland soils, approximately 96.8 percent of the site is characterized as farmland soils of unique importance (USDA, 1984). The land is considered good for cultivating pasture and range grasses; however, it is not currently being used for pasture and is unlikely to be developed for pasture use in the future as the general area is being considered for industrial development by Lee County (Lee County, 2009).

Because most of the site is composed of farmland soils of unique importance, DOE collaborated with the local Natural Resource Conservation Service (NRCS) office to complete AD-1006, the Farmland Conversion Impact Rating form (USDA, 2010b). The rating for the

proposed site was assigned 65 out of 260 points, which indicates the project site is a poor location for farmland protection. Under the Farmland Protection Policy Act rules, sites less than 160 points need not be given further consideration for protection, and no additional sites need to be evaluated (7 CFR 658.4(c)(2)). Because the soils at the proposed site are best suited for cultivating pasture grasses and are located in the center of a developing urban area, the impact to the farmland soils is considered negligible. Appendix B contains the NRCS consultation and the completed AD-1006 form.

The Fort Myers area is known to be a good area to collect Plio-Pleistocene invertebrate and shell fossils from the unconsolidated shell beds and Hawthorne formation (Scott and Rupert, 1994). As there would be some ground surface and subsurface disturbance from excavation and drilling of wells, there is a chance that invertebrate fossils may be moved or disturbed during construction. However, these fossils are common in the region and are often collected by the public in accessible mines, quarries, parks, and stream valleys (Scott and Rupert, 1994). Therefore, the fossils that potentially would be disturbed would not be considered a unique geologic resource, and impacts to geology during construction would be considered minor. There would be no additional impacts to the geology or soils during operation of the biorefinery.

### 3.5.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, ground disturbance associated with construction of the proposed biorefinery would not occur at either site option and soils and geologic resources would remain in place; thus, no impacts would occur from the Proposed Action. At the Florida site, it is likely that the site would be developed from other projects as the area is being planned for potential industrial development; therefore, soils and geologic resources may be impacted regardless of whether or not this project would proceed.

## 3.6 GROUNDWATER

### 3.6.1 Existing Conditions

#### *3.6.1.1 Texas Site*

The Gulf Coast aquifer is located in a broad band underneath coastal Texas communities, which includes Brazoria County. The aquifer is horizontally divided into four units, which are correlated to their host geologic formations. The deepest is the Catahoula confining system, which is overlain by the Jasper aquifer, then the Evangeline aquifer, and the Chicot aquifer. The Gulf Coast aquifer groundwater quality is generally good north of the San Antonio river, although excessive pumping has caused saltwater incursion as far north as Orange County (Davidson and Mace, 2006).

Groundwater conservation districts are the main regulators of groundwater pumping in Texas. The project site would be located in the Brazoria County Groundwater Conservation District. The goal of the district is to “maintain the quality and availability of Brazoria County’s groundwater resources for current users and future generations.” Historic pumping of the shallow aquifers under Brazoria County have changed groundwater flow from northwest-southeast to the northeast (e.g., to Galveston). The change in water flow increases the potential for saltwater incursion into the aquifer (BCGCD, 2005).

High rates of groundwater use have also caused subsidence in the northeastern section of Brazoria County. Although Freeport is not currently affected, projections suggest that land subsidence of one to two feet could occur in the Freeport area by 2050 if current water pumping trends continue (BCGCD, 2005). Several communities around the project site pump their own water through their local water district. The City of Freeport and Village of Surfside Beach also withdraw potable water from the Gulf Coast aquifer.

#### *3.6.1.2 Florida Site*

Most of the groundwater in Lee County is located within the carbonate bedrock at depths of 500 to 1,000 feet below the ground surface. A shallow aquifer system is also present in the unconsolidated sediments above the carbonate bedrock, however most of the municipal wells withdraw from the deeper, larger Floridan aquifer. Between the shallow aquifer system and the Floridan aquifer is the Hawthorn aquifer, which is present in the Arcadia formation. The Floridan aquifer is the principal source of groundwater in northern Florida, although it is often too saline for use in southern Florida. The aquifer is located in the Avon Park and Oldsmar formations, and divided into three units: the Upper, Middle, and Lower Floridan aquifer, which are separated by clay-rich confining units (see Figure 3-1). The aquifer is recharged by rainfall in the northwest portions of the state and some infiltration from groundwater in the southeast. Consistent recharge and upper and lower confining units contribute to artesian pressure in northern Florida. Salinity in the Floridan aquifer increases with depth, with the lower aquifer chemical composition that approaches that of seawater (Meyer, 1989).

The City of Fort Myers withdraws approximately 7.5 million gallons a day from 16 wells in the Floridan Aquifer, drilled down to 800 feet below ground surface. The City of Fort Myers Water Treatment Plant has a capacity of 12 million gallons and purifies the water through a reverse osmosis process (City of Fort Myers, 2010).

The FDEP and EPA define an Underground Source of Drinking Water (USDW) as any aquifer which contains fewer than 10,000 milligrams per liter of total dissolved solids (TDS) and is either currently used as a drinking water source or has the volume and capacity to supply drinking water in the future. These aquifers are regulated stringently by the agencies and are not typically used for disposal of saline water. The base of the USDW in the project area is estimated to be about 1,400 feet below surface level (Entrix, 2010). The Floridan aquifer is influenced by ocean infiltration, which generates a saline gradient that crosses the USDW 10,000 milligram per liter TDS boundary. Figure 3-1 provides a graphic depiction of subsurface conditions within the project area, including aquifer information. As indicated in the figure, the base of the Ocala Formation, at 1,400 to 1,500 feet below the surface, is estimated to be the base of the lowest USDW aquifer in the project area (Entrix, 2010a). The Upper and Lower Floridan aquifers are of interest for this project as these aquifers are below the base of the USDW and are identified as potential seawater supply sources and disposal zones.

### 3.6.2 Environmental Consequences of the Proposed Action

#### *3.6.2.1 Common Impacts*

Potential impacts to groundwater include the contamination of groundwater during the construction and operation of the biorefinery from accidental spills and the decrease of groundwater sources for public consumption from using the public drinking water supply during operation of the biorefinery. Stormwater BMPs would be put in place per state-required NPDES

permits to minimize potential groundwater contamination. The annual freshwater requirement of 210,000 gallons for processes at the biorefinery is generally considered a low usage rate in comparison to the average consumption rates of public drinking facilities (see Section 3.11) and is expected to have minor impacts to the quantity of water supply resources in the project areas.

The biorefinery at the Texas site would not directly withdraw groundwater as the facility would use Dow's seawater canal as its source of process water supply. At the Florida site, the biorefinery would use groundwater as its source for the process water supply and process wastewater disposal system. Potential impacts to groundwater at each of the site options are discussed in greater detail below.

#### *3.6.2.2 Texas Site*

The impact to the groundwater from constructing and operating the biorefinery would be minor, because the process water would be supplied through seawater, not freshwater withdrawn from the Gulf Coast aquifer. A small incremental increase in use of the potable water would occur due to the make-up water needed for the photobioreactors and the increase in employees; however, the public water supply is obtained from surface waters and, thus, would not directly impact groundwater. A SWPPP would be in place prior to any construction at the project site. The use of the BMPs outlined in the SWPPP would reduce the potential for stormwater and accidental spills to infiltrate the groundwater resources.

#### *3.6.2.3 Florida Site*

For the Florida site option, Algenol plans on meeting requirements for the process water and wastewater disposal by using groundwater sources. Saline water for the photobioreactors would be withdrawn from the Floridan aquifer using an on-site well system. The process water would be treated via an ultra-filtration process and sterilized using common chlorination and de-chlorination processes. The production well or a separate injection well would pump treated saline wastewater back to recharge the aquifer. Prior to reinjection, the biomass would be removed from the wastewater. Saline water needs for the project would be approximately 3.6 million gallons per year. An additional 210,000 gallons per year of freshwater would also be required for the photobioreactor process, which would be obtained from the City of Fort Myers public water supply (see Section 3.11). Process wastewater would be generated at about 10,000 gallons per day.

A groundwater feasibility study (Entrix, 2010a) was conducted for Algenol to provide appropriate design options for the process water supply and wastewater disposal system. As discussed in Section 2.7.1, four conceptual design options for the production, injection, and monitoring wells were identified. These designs were primarily based on well permits and regulations, water quality data, hydraulic characteristics of the formation of the source water, and economic constraints. Chemical constituents that were analyzed were chloride, TDS, sodium, sulfate, alkalinity, calcium, and fluoride.

Based on water quality data, the study identified

*For this project, **Zone 1** is defined as 1,600 and 1,800 feet below ground surface and **Zone 2** is 2,500 and 2,700 feet below ground surface.*

*An **Underground Source of Drinking Water (USDW)** is any aquifer which contains fewer than 10,000 milligrams per liter of TDS and is either currently used as a drinking water source or has the volume and capacity to supply drinking water in the future. In the project area, the base of the USDW is approximately 1,400 feet below surface level (Entrix, 2010a).*

*An **Aquifer Storage and Recovery (ASR)** well refers to a one-well system that is used for both production and disposal.*

two potential zones below the USDW for potential production and injection wells – Zone 1 and Zone 2. Zone 1 is located between approximately 1,600 and 1,800 feet below ground surface in the Avon Park formation (Upper Floridan aquifer – see Figure 3-1) and Zone 2 is located between approximately 2,500 and 2,700 feet below ground surface in the Oldsmar formation (Lower Floridan aquifer - see Figure 3-1). The feasibility study concluded that, in general, the water quality of the process water (seawater) and process wastewater were found to be comparable to the water quality of the formation water found in both of these zones (Entrix, 2010a). As concluded in the study, Algenol would likely have the following four options for process water and wastewater disposal systems:

- **Option 1: One ASR well (for production and disposal) completed in Zone 1; and one monitoring well.** The monitoring well would be completed above the USDW, between 1,100 and 1,200 feet below land surface.
- **Option 2, Variation 1: One ASR well (for production and disposal) completed in Zone 2; and one monitoring well**. If two flow zones are identified within the target interval, then one zone would be used for production, and the other for wastewater injection. The zones would be separated by a packer to minimize mixing. The monitoring well would be completed above the USDW, between 1,100 and 1,200 feet below land surface.
- **Option 2**, **Variation 2: One dual-zone well (for production and monitoring) completed in Zone 1 and between 1,100 and 1,200 feet; and one injection well (for disposal) completed in Zone 1.** A dual-zone well would be used for production and monitoring – the lower zone would be completed between 1,600 and 1,800 feet below land surface (Zone 1) for production and the upper zone would be completed between 1,100 and 1,200 feet below land surface for monitoring. The production and monitoring zones would be separated by a packer for the dual-zone well. A separate injection well would be used for disposal, completed in Zone 1.
- **Option 3: Two wells (one for production, one for disposal) completed in Zone 1; and one monitoring well**. The production and injection would be separated as far apart as possible. The monitoring well would be completed between 1,100 and 1,200 feet below land surface.
- **Option 4: One well (for disposal) completed in Zone 1; one well (for production) completed in Zone 2; and one monitoring well**. The monitoring well would be completed between 1,100 and 1,200 feet below land surface.

The FDEP regulates ASR and injection wells under its Underground Injection Control (UIC) Program, which is a permitting and enforcement activity that the EPA has delegated to FDEP. The groundwater supply well would also be under the jurisdiction of the South SFWMD, though in this case, FDEP's regulations are more stringent and, therefore, well requirements discussed in this section are in terms of FDEP permitting requirements A water use permit would be required from SFWMD.

To ensure that the injected process wastewater would not migrate to the USDW, and as a requirement for a UIC permit, the monitoring well would be drilled to 1,100 to 1,200 feet deep within 150 feet of the injection well. The injected wastewater would be saline, and would be denser than the host aquifer, so the plume is predicted to move down and laterally. However, the monitoring well would provide a first indication if the injected materials began to move towards the USDW. If an extensive lateral plume is anticipated, FDEP may require a secondary monitoring well further away from the injection well. Monitoring requirements would include specific conductance, dissolved chloride, sulfate, TDS, fecal and total coliform, nitrogen

compounds, total organic carbon, phosphorous, and total nitrogen. Water would also be periodically sampled for *Cryptosporidium*, *Giardia* and other biological contaminants.

Based on preliminary discussions with the FDEP, injection wells would most likely be covered under Class I or Class V well rules. Under a Class I permit, the wastewater would need to be injected beneath the deepest USDW, which is satisfied by injecting into Zone 1 or 2. Algenol would also be required to demonstrate that the hydrogeologic environment would be suitable for the injection water, and that injection would not modify the ambient water quality of the aquifers above the injection zone. The FDEP may request that the applicant provide, in addition to site-specific and area of review information, regional information that would allow prediction of the regional impact of the proposed injection well. At least one confining zone would be required between the injection wellhead and the deepest USDW.

*A comprehensive set of rules has been adopted to regulate underground injection. Under these rules, injection wells that are allowable in Florida fall into the following categories:*
***Class I** - Wells used to inject municipal or industrial wastewater (by-product from desalinization facilities) beneath the lowermost USDW.*
***Class II** - Wells used to inject water associated with the production of oil and gas or water used to enhance hydrocarbon recovery.*
***Class III** - Wells which inject fluids for extraction of minerals.*
***Class V** - Wells not included in the other well classes which inject nonhazardous aqueous solutions. There are several subgroups associated with this classification.*

ASR system wells and experimental technology wells are both regulated by the Class V rules. The application of a Class V permit would allow for more flexibility in well design. If an ASR well were to be used, then the injected process wastewater would have to meet more stringent water quality standards.

With the selection of a well option that matches the appropriate UIC permit class, the implementation of production and injection wells would likely have a minor impact to the groundwater resources at the Florida site. Both the withdrawal and injection would occur in saline aquifers that are too salty for use as drinking water, and there are several confining units between the target aquifer and municipal groundwater wells. The Oldsmar formation is the principal formation for municipal wastewater disposal wells in southern Florida, so the use of an injection well for disposal of wastewater would not be unique (Entrix, 2010a). The groundwater use would be withdrawn at a rate of 50 gallons per minute. There are no production wells at a depth of 1,600 feet or deeper, in Lee County, so the use of the water would not impact other users, nor would the injection of wastewater contaminate existing withdrawal wells.

The use of the Floridan aquifer would have a minor impact to the Floridan aquifer and the local water supply. The Floridan aquifer is located throughout Florida and provides water to thousands of domestic, industrial, and irrigation wells. The City of Fort Myers wells are drilled to approximately 800 feet below ground surface, while the project would use water from depths below 1,500 feet. As the biorefinery requires water with salinity close to seawater, the project would withdraw groundwater from the Lower Floridan aquifer, which is hydraulically distinct from the Upper Floridan aquifer, the public water supply for the City of Fort Myers. Furthermore, several clay-rich confining beds are also located between Zones 1, 2, and the Fort Myers wells, which would prevent vertical transmission of the aquifers.

### 3.6.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options and impacts to groundwater would not occur as no additional withdrawal would be expected. Although it is likely that the Florida site option would be developed by an industrial user, it is unknown at this time the potential for direct groundwater withdrawal by future users.

## 3.7 SURFACE WATER

### 3.7.1 Existing Conditions

#### *3.7.1.1 Texas Site*

The Texas site lies within the Austin-Oyster Creek Watershed, which is part of the San Jacinto-Brazos Coastal Basin (USGS, 2010a). The major surface waters located in this watershed include Austin Bayou, Bastrop Bayou, Oyster Creek, the Intracoastal Waterway, and the old Brazos River Channel or Freeport Harbor Channel. The relatively low relief of the watershed promotes slow water movement, which is typical of coastal areas. Overall, bacteria and nutrient concerns and/or impairments are found throughout the watershed and sources are usually associated with municipal, rather than industrial, activities. An extensive seawater canal system surrounds Dow's Freeport facilities, which Dow uses for its manufacturing processes and is included in the Austin-Oyster Creek and Old Brazos River Channel Watersheds of the basin.

Based on the results of an elevation survey conducted for the wetlands study, stormwater sheetflow appears to predominantly collect in southeastern portions of the property and only during high precipitation events, where it flows at sufficiently high elevations, does runoff seem to travel offsite through a series of drainages to an upland drainage ditch associated with the northern side of SH 332 (Entrix, 2009). The East Union Bayou is the nearest natural waterbody to the site. Other surface water features within one mile of the site include Horseshoe Lake, Dutch Lake, and Oyster Creek, none of which are impaired (NEPAssist, 2010).

The state of Texas controls its wastewater and stormwater discharges in accordance with CWA regulations under a TCEQ-enforced program known as the Texas Pollutant Discharge Elimination System (TPDES). Under this program, the TCEQ also requires that a TPDES General Permit for Stormwater Discharges from Construction Activity be obtained prior to the commencement of any construction activity that disturbs one or more acres of land (TCEQ, 2010b).

#### *3.7.1.2 Florida Site*

The Florida site option is located within the Kissimmee-Everglades region (also known as the SFWMD), which is home to water bodies of national importance such as Lake Okeechobee and the Everglades. The proposed project area is located within the Everglades West Coast Basin (USGS, 2010b). Natural freshwater sheetflow patterns have been significantly altered in this watershed due to manmade flood control and drainage structures, which has resulted in drought conditions and major fire hazards during the dry season and excessive stormwater runoff during the wet season.

There are no natural surface water features on the proposed project site. Currently, the site contains a canal system along the eastern site boundary which was constructed as a

comprehensive stormwater management system in anticipation of development in the area. Stormwater is currently handled by these canals and existing roadside swales along Lee Road. Runoff from the site eventually drains south into swales along Alico Road and then into Tenmile Canal. Estero Bay Drainage and Tenmile Canal are located within three miles of the site and are both impaired due to low dissolved oxygen concentrations (NEPAssist, 2010; EPA, 2010d and 2010e).

The state of Florida controls its wastewater and stormwater discharges in accordance with CWA regulations under the FDEP NPDES Stormwater Permitting Program. Stormwater in the project area is also under the jurisdiction of the SFWMD, which requires Environmental Resource Permits from residential and commercial developments. Algenol would obtain an Environmental Resource Permit, which is required before beginning any land use or construction activity that could affect wetlands, alter surface water flows or contribute to water pollution.

### 3.7.2 Environmental Consequences of the Proposed Action

#### *3.7.2.1 Common Impacts*

The Proposed Action would disturb up to 26 acres at the Texas site and up to 33 acres at the Florida site during the construction phase. Initial construction activities would involve preparing the area for major construction work. This initial work would consist of clearing vegetation and grading areas. The exposure of soils and leveling of land could result in modified surface water runoff patterns from the site and lead to temporary increased runoff and sedimentation rates into receiving waterbodies.

Prior to construction, Algenol would obtain a stormwater permit and ensure that the construction contractor implements stormwater management controls as outlined in the SWPPP. The SWPPP would include BMPs to prevent sediments and other pollutants associated with construction sites from being discharged in stormwater runoff. Potential for surface water contamination from accidental spills could occur during construction activities; however, spill prevention and response procedures would also be outlined in the SWPPP. In general, adherence to proper stormwater management and BMPs during construction, as identified in the SWPPP, would minimize water quantity and quality degradation of receiving waters.

The Proposed Action would result in the conversion of up to 26 acres at the Texas site and 33 acres at the Florida site of vegetated land to gravel or impervious surfaces, which would increase stormwater rates and amounts of runoff contaminants, including sediments, into receiving waterbodies. The roads and parking lot for the biorefinery would be gravel. All the pads for the storage and work containers would be made of compacted crushed road rock base material. The majority of the site would be comprised of impervious areas (see Figures 2-9 and 2-10), which would include the ‘contained area’ under the photobioreactors and the miscellaneous covered work and processing areas and buildings as identified in Section 2.5.2.

The containment area of the photobioreactors would be lined with a geomembrane with material characteristics similar to those placed in landfills. The drainage from the containment area would be controlled by valves and would be drained by gravity to buried sump pumps. In the case of a spill, drainage from the containment area would be diverted to a water sterilization system that would remove biomass and sterilize the water using chlorine. All sterilized water would be stored for reuse in the photobioreactors or evaporated in evaporation tanks.

During operations of the biorefinery, stormwater would be managed onsite consistent with the states regulations on stormwater management. At the proposed biorefinery water quality impacts as a result of stormwater runoff would be mitigated as prescribed under the appropriate stormwater permit to prevent downstream impacts. In general, it is anticipated that adherence to the SWPPP and stormwater permit would result in minor impacts to surface water resources during operation of the biorefinery.

#### *3.7.2.2 Texas Site*

Under requirements set forth by the TPDES, Algenol would apply for a Construction General Permit from the TCEQ to authorize stormwater discharges for construction activities that would disturb five acres or more of land. The permit application requires the development of a SWPPP and submittal of a Notice of Intent to TCEQ. Additionally, Dow implements their own environmental review process, which provides additional stormwater protection guidelines for construction activities conducted on Dow property. Adherence to proper stormwater management procedures and BMPs during construction, as identified in the SWPPP, would minimize erosion and sediment impacts and water quality degradation of receiving waters and the Austin-Oyster Creek Watershed and, therefore, impacts to surface water resources are expected to be temporary and minor during construction.

Because the Texas site option is within Dow's Freeport operations, the elevation and drainage control would be dictated by and integrated into the Dow master site plan. Dow engineers would provide the final elevation and drainage specifications. During operations of the biorefinery, stormwater management at the Texas site would be authorized by the TCEQ's Multi-Sector General Permit; a Notice of Intent regarding project details would be filed with TCEQ with the permit, which would also include stormwater pollution prevention procedures for the biorefinery.

Seawater for operation would be required at a rate of approximately 3.6 million gallons per year. The seawater would be obtained from an existing permitted Dow seawater intake at a canal on Dow's property and trucked to the site of the biorefinery. The extensive seawater canal system surrounding Dow's facilities would have more than enough capacity to supply the biorefinery's annual seawater requirement as the usage is considered relatively small and impacts to regional surface waters are expected to be minor. Additionally, impacts to surface waters from the biorefinery would be temporary as the facility would be decommissioned after a three-year operational phase.

The freshwater supply would be taken from the local public system and impacts on local service are discussed in Section 3.11.

#### *3.7.2.3 Florida Site*

Under requirements set forth by the state's NPDES program, Algenol would obtain an Environmental Resource Permit from the SFWMD to authorize stormwater discharges for construction activities. The permit application requires the development of a SWPPP and submittal of a Notice of Intent to the FDEP and SFWMD. Adherence to proper stormwater management procedures and BMPs during construction, as identified in the SWPPP, would minimize erosion and sediment impacts and water quality degradation of receiving waters and the Everglades West Coast Basin, and therefore, impacts to surface water resources are expected to be temporary and minor during construction. The FDEP submitted a letter to DOE (see Appendix A), which stated that during the Environmental Resources Permit process the project

was determined to be consistent with the Florida Coastal Management Program and that the state had no objections to the project.

On-site stormwater control already consists of the stormwater canals located along the eastern site boundary. The Environmental Resource Permit would also address permanent stormwater management measures for the operation of the biorefinery. Algenol would connect to the existing stormwater system by constructing an eight-acre dry retention basin. The dry retention basin would be the primary element in stormwater management and the existing canals would act as overflow storage during major storm events. Ultimately the stormwater system outflows to existing drainage ditches along Alico Road and then Tenmile Canal. This stormwater control system would be designed to control stormwater runoff, allow sediments to settle out, and eliminate soil erosion; therefore, potential adverse impacts to downstream surface water quantity and quality are expected to be minor during operation of the biorefinery.

Seawater for operation of the biorefinery would be obtained from a groundwater source and wastewater from treatment of the seawater would be injected back into a well. The freshwater supply and disposal of other process wastewater would be centrifuged, carbon filtered, and then along with the wastewater from treatment of the seawater would be injected back into a well – impacts from this process are discussed in Section 3.6.

### 3.7.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur and would not result in any impacts to surface water resources at either site option. Note that the Florida site option would likely be developed by industrial users and could result in surface water impacts during construction and operation activities from new users.

## 3.8 FLOODPLAINS AND WETLANDS

Flooding potential is generally described in terms of flooding recurrence intervals, such as the 100-year or 500-year flood. The 100-year floodplain is the area projected to be inundated by a storm that has a one percent probability of occurring in any year. The 500-year floodplain is the area projected to be inundated by a storm with a 0.2 percent probability of occurring in any year. The 100-year floodplain is the national standard on which floodplain management and the National Flood Insurance Program are based. FEMA has identified and mapped the areas containing both potential site options that are subject to inundation from a 100-year or 500-year flood as Flood Insurance Rate Maps (FIRMs).

Wetlands are defined by USACE as: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (EPA, 2009b).

Wetlands have unique characteristics that set them apart from other ecosystems. These unique characteristics include a substrate that is saturated or inundated with water for part of the growing season, soils that contain little or no oxygen, and plants adapted to wet or seasonally saturated conditions. Wetlands serve many functions, including the storage and slow release of surface water, rain, and seasonal floodwaters to surface waters. Additionally, wetlands provide wildlife habitat (including habitat for many threatened and endangered species), sediment

stabilization/retention functions, and perform an important role in the nitrogen cycle. They also help to maintain stream flow during dry periods, and provide groundwater recharge functions.

Due to their overall importance, certain wetland areas (considered "Waters of the U.S.") are afforded regulatory protections from development at the federal level through USACE. In the City of Fort Myers, state of Florida wetlands regulations are enforced by the SFWMD. The state of Texas defers the regulatory authority of wetlands to USACE.

### 3.8.1 Existing Conditions

#### *3.8.1.1 Texas Site*

The FEMA FIRM for the Texas site shows the site as being located in "Zone X." Zone X indicates an area of minimal flood hazard and the site is determined to be outside of the 100-year and 500-year floodplains (FEMA, 1993).

In November 2009, Dow performed a wetland delineation of the Texas site, which concluded that nearly the entire 35.51-acre area surveyed, including the 26-acre project site, consisted of an isolated wetland (see Figure 3-2). The characterization of "isolated" is important due to the fact that isolated wetlands are not under the jurisdiction of USACE and do not require federal permitting to alter them. The isolated determination was primarily based upon the documented FEMA Zone X designation (minimal flood hazard) and the lack of any defined hydrological connection between the site and USACE-jurisdictional "Waters of the U.S." from elevation survey data. Based upon the result of the elevation survey, rainwater sheetflow appears to predominantly collect in southeastern portions of the site and, only at sufficiently high elevations outside of "normal circumstances," travels offsite through a series of drainages parallel to a pipeline right-of-way corridor adjacent to the eastern border of the site to an upland drainage ditch associated with the northern side of SH 332 (Entrix, 2009). The wetlands report is provided in Appendix C.

In response to DOE's scoping letter for the project, the USACE recommended that a jurisdictional delineation be conducted and submitted to their offices (see Appendix A). Dow has submitted a wetland delineation report (assigned project number SWG-2009-01187) to USACE. To date, the USACE has conducted a site visit and corresponded with Dow regarding the report, but no determination has been received from USACE. Additionally, TPWD submitted a letter to DOE, which included recommending that mitigation for wetland impacts be performed and TPWD be consulted on development of a mitigation plan (see Appendix B).

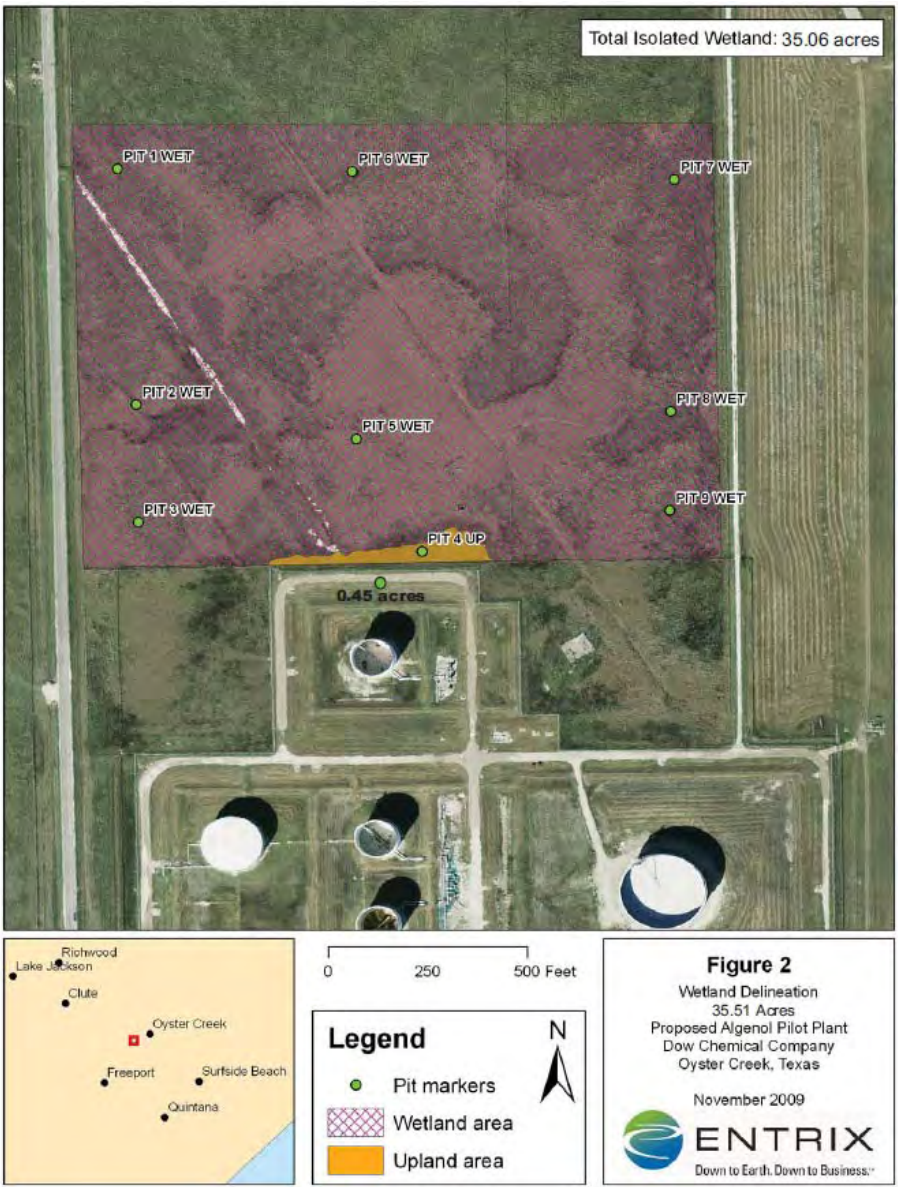


**Figure 3-2. Wetland Mapping on Texas Site (Entrix, 2009)**

### *3.8.1.2 Florida Site*

The FEMA FIRM for the Florida Site shows the site as being located in "Zone X." Zone X indicates an area of minimal flood hazard and the site is determined to be outside of the 100-year and 500-year floodplains (FEMA, 2008).

The USFWS has developed a series of topical maps to show wetlands and deepwater habitats of the U.S. called the National Wetlands Inventory (NWI). NWI mapping of the Florida Site shows a Palustrine Forested (Broad-Leaved Evergreen) wetland area in the northeastern corner, which extends to the north of the site over the existing Alico Business Park (EPA, 2010f) (see Figure 3-3). This may be a historic condition or an error in the NWI mapping as Algenol's Environmental Resource Permit, approved by the SFWMD, for construction on the project area states: "There are no wetlands or other surface waters located within or affected by the proposed

project." (SFWMD, 2007 and 2010) In addition, the on-site areas noted by the NWI mapping as wetland were observed to be heavily disturbed, presumably by development of the stormwater canals along the eastern site boundary. Several soil piles consisting of soils excavated for the canals' development have been developed within the NWI-mapped wetland area (see Figure 2-6). Therefore, the only wetlands present onsite are the existing stormwater management canals.

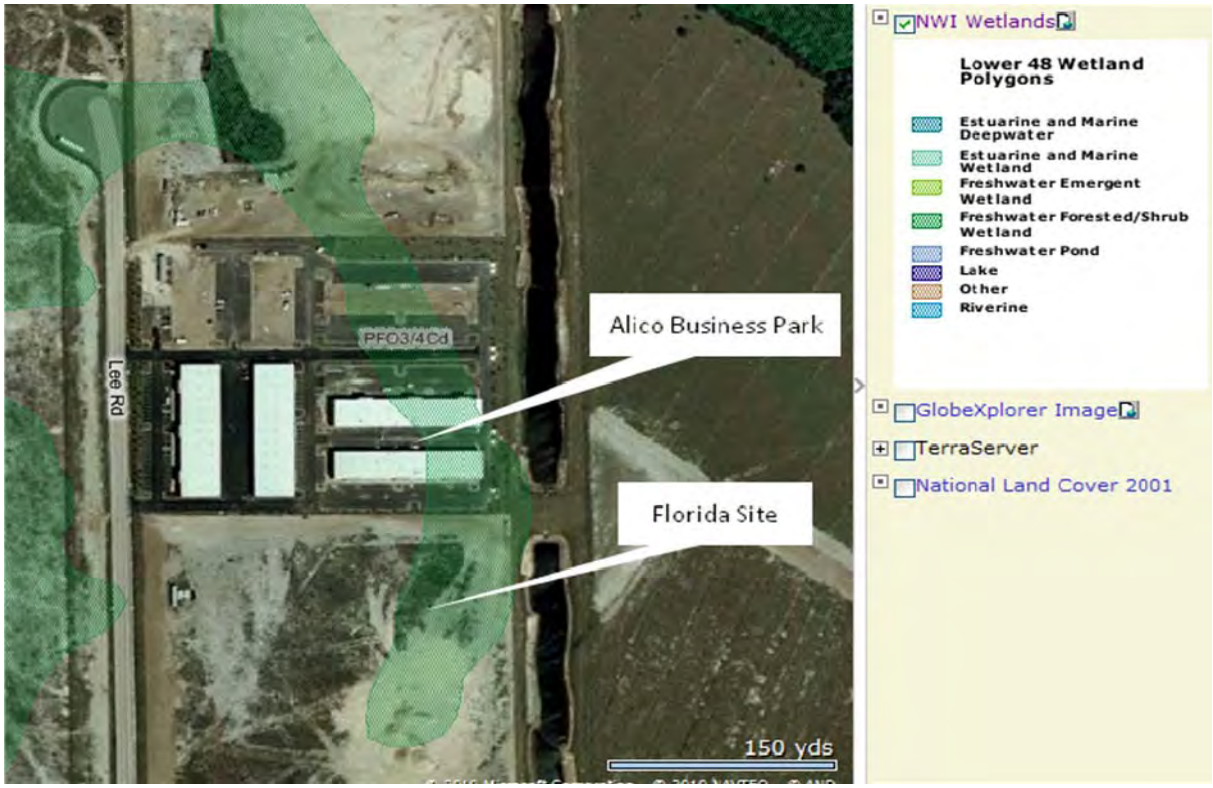


**Figure 3-3. National Wetland Inventory Mapping of Florida Site (EPA, 2010f)**

## 3.8.2 Environmental Consequences of the Proposed Action

Construction and operation of the biorefinery would not result in any adverse impacts to floodplains at either site option as the sites are located outside the 100-year and 500-year floodplains. Impacts to wetlands would not be expected at the Florida site option; potential impacts to wetlands at the Texas site option are discussed below.

### *3.8.2.1 Texas Site*

Development of the biorefinery at the Texas site would require filling up to 26 acres of wetlands; thus, removing them from existence altogether. The USACE is preparing its wetlands determination. Should USACE determine that on-site wetlands are protected under federal jurisdiction, Algenol would assess development options, including filing for a wetland permit to fill the wetlands and develop the site. In this case, a wetlands application would be submitted to USACE for their review and approval as per the requirements of Section 404 of the CWA. Approval of such a permit would likely require wetland mitigation to be performed, which could include restoring/creating wetland area on- or offsite and/or purchasing wetland mitigation credits from an approved wetland mitigation bank. Should the area be deemed jurisdictional and USACE rejects the application for the permit, the site would not be developed for the

biorefinery. If USACE determines that the on-site wetlands are not under their jurisdiction, the site could legally be developed without the need to obtain a wetland permit.

Additionally, the TPWD submitted a letter to DOE, which included recommendations for the mitigation of wetland impacts and TPWD to be consulted on development of a mitigation plan (see Appendix B).

#### *3.8.2.2 Florida Site*

Although NWI mapping indicates the presence of wetlands on the Florida site in addition to the stormwater canals, for reasons previously stated, it is apparent that these wetlands do not actually currently exist. No alterations to the existing stormwater canals would occur other than the potential influx of additional stormwater generated onsite, which is the purpose of these canals. Therefore, it is expected that the development of the biorefinery at the Florida site would have no impact to wetlands.

### 3.8.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either site option and impacts to wetland or floodplains would not occur. Development at the Florida site would likely occur; however, as there are no wetlands in the area, wetlands impacts are not expected.

## 3.9 BIOLOGICAL RESOURCES

### 3.9.1 Existing Conditions

#### *3.9.1.1 Texas Site*

The Texas site option is located in the Western Gulf Coastal Plain Ecological Subregion (based on the U.S. Forest Service's National Hierarchical Framework of Ecological Units), is undeveloped, and is vegetated with herbaceous and scrub-shrub vegetation. Currently, the site is used for agricultural purposes, with land periodically being harvested as feed for cattle. The project is located in an industrial area with industrial facilities located to the south, east, and west; to the immediate south is an industrial property containing condensate storage tanks and near the northeast corner lies a capped landfill. The project site is connected to a much larger area with characteristics that appear to be similar in nature to the site itself, which expands to the north. There are no surface water features present onsite; however, a recent wetland survey concluded that the majority of the site surveyed consists of isolated wetland (Entrix, 2009) (see Section 3.8 and Appendix C).

Vegetation at the Texas site consists primarily of a mix of wetland species, including: gulf cordgrass (*Spartina spartinae*), jointed flatsedge (*Cyperus articulatus*), rattlebox (*Sesbania drummondi*), bushy sea-oxeye (*Borrichia frutescens*), camphor weed (*Pluchea odorata*), eastern false willow (*Baccharis halimifolia*), giant bulrush (*Schoenoplectus robustus*), and cat-tail (*Typha latifolia*). Upland plant species present include: annual ragweed (*Ambrosia artemisiifolia*) and Bermuda grass (*Cynodon dactylon*) (Entrix, 2009).

The Texas site is approximately two miles southwest of the Brazoria National Wildlife Refuge, which consists of a complex of coastal wetlands and prairie harboring more than 300 bird species. The Brazoria National Wildlife Refuge serves as an end point of the Central

Flyway for waterfowl in winter, and an entry point for neotropical migratory songbirds crossing the Gulf of Mexico (USFWS, undated).

In general, the Western Gulf Coastal Plain Ecological Subregion is habitat for a variety of mammals, including white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), striped skunk (*Mephitis mephitis*), and many small rodents and shrews. Typical herpetofauna include box turtle (genus *Terrapene*) and common garter snake (*Thamnophis sirtalis*). Game birds, such as turkey (*Meleagris gallopavo*), bobwhite (*Colinus virginianus*), and mourning dove (*Zenaida macroura*), are widespread. Common songbirds include red-eyed vireo (*Vireo olivaceus*), cardinal (*Cardinalis cardinalis*), and wood thrush (*Hylocichla mustelina*). Resident and migratory nongame bird species are numerous (McNab and Avers, 1994The USFWS lists several federally-protected species as potentially occurring in Brazoria County, which are identified in Table 3-6. Species that generally utilize terrestrial habitats include the bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), and piping plover (*Charadrius melodus*), though these species are principally found near freshwater or marine aquatic habitats and are not expected to occur in the herbaceous and scrub-shrub vegetation found at the site.

**Table 3-6. Federally Protected Species Potentially Occurring in Brazoria County, Texas**

| Common Name/Federal Protection Status | Scientific Name | Typical Habitat |
|---|---|---|
| ***Birds*** | | |
| Bald eagle – Delisted[1] | *Haliaeetus leucocephalus* | Habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds. Usually nests in tall trees or on cliffs near water. Avoids areas with nearby human activity and development. |
| Whooping crane – Endangered | *Grus americana* | Nesting occurs in dense vegetation in shallow ponds, freshwater marshes, wet prairies, or along lake margins. Habitat during migration and winter includes marshes, shallow lakes, lagoons, salt flats, grain and stubble fields, and barrier islands. A population nests in Wood Buffalo National Park and adjacent areas in Canada and winters in coastal marshes in Texas. |
| Piping plover – Threatened in Texas | *Charadrius melodus* | Sandy beaches, mudflats, sandflats, spoils islands, areas adjacent to inlets and passes. |
| Northern aplomado falcon - Endangered | *Falco femoralis septentrionalis* | Coastal prairies along sand ridges, in woodlands along desert streams, and in desert grasslands with scattered mesquite and yucca. |
| Mountain plover – Proposed Threatened | *Charadrius montanus* | Nesting habitat includes high plains/shortgrass prairie and desert tablelands. Often breeds in close proximity to prairie dog towns. Within Texas, breeding is only known to occur in the extreme northern portion of the state. |
| ***Mammals*** | | |
| West Indian manatee – Endangered | *Trichechus manatus* | Shallow coastal waters, estuaries, bays, rivers, and lakes; throughout most of the range, manatees appear to prefer rivers and estuaries over marine habitats. |
| American black bear - Threatened | *Ursus americanus* | Forests and nearby openings, including forested wetlands. When inactive, they occupy dens under fallen trees, ground-level or above-ground tree cavities or hollow logs, underground cave-like sites, or the ground surface in dense cover. |

**Table 3-6. Federally Protected Species Potentially Occurring in Brazoria County, Texas**

| Common Name/Federal Protection Status | Scientific Name | Typical Habitat |
|---|---|---|
| ***Reptiles*** | | |
| Green sea turtle – Threatened in Texas | *Chelonia mydas* | Marine and estuarine areas; nests on beaches. |
| Hawksbill sea turtle – Endangered | *Eretmochelys imbricata* | Marine and estuarine areas; nests on beaches. |
| Kemp's ridley sea turtle – Endangered | *Lepidochelys kempii* | Marine and estuarine areas; nests on beaches. |
| Leatherback sea turtle – Endangered | *Dermochelys coriacea* | Marine and estuarine areas; nests on beaches. |
| Loggerhead sea turtle – Threatened | *Caretta caretta* | Marine and estuarine areas; nests on beaches. |

Source: USFWS, 2010; NatureServe, 2009.
[1] Bald eagle is delisted under the Endangered Species Act, but is still protected under the Bald and Golden Eagle Protection Act.

The TPWD held a public meeting in July 2010, to gather input regarding which non-native algae to consider for importation, possession, use, and sale in Texas (TPWD, 2010). In an effort to allow the use of some non-native algae while adhering to its mission of wildlife protection and conservation, the Texas Legislature has directed TPWD to create a list of approved exotic aquatic plants, which includes algae. The list of approved species is expected to be finalized by the end of the year. The use of a list of *approved* plant species is a departure from the TPWD's present use of a list of *prohibited* species to restrict the importation and sale of certain non-native plants. No algae are on the current prohibited list. Before inclusion on the approved list, species must pass a scientific risk analysis to ensure that it does not have the potential to negatively impact the state's aquatic resources. Possession of other non-native species is allowed with a permit.

DOE submitted consultation letters to the USFWS and the TPWD to solicit comments on the project and information regarding the potential presence of protected species or habitat in the area of the Texas site (see Appendix B). In response, TPWD submitted a letter dated July 2, 2010, which includes the agency's comments and recommendations for the project (see Appendix B). TPWD recommended that a review of their Brazoria County List of Rare Species be performed to determine if any state-protected species could utilize on-site habitats and recommended that if any portion of the site could support rare species, a species surveys be conducted prior to construction activities (the list is provided in Appendix D). Consultants for Dow performed a protected species review and produced a report of their findings, which is included in Appendix D. See Section 3.9.2.2 for a summary of the report's findings and a description of applicability to the Texas site and TPWD comments.

### *3.9.1.2 Florida Site*

The Florida site is in the Florida Coastal Lowlands (Western) Ecological Subregion (based on the U.S. Forest Service's National Hierarchical Framework of Ecological Units) and is mostly undeveloped aside from a canal system along the eastern site boundary constructed for stormwater management in anticipation of the development of the site and surrounding area. There are large soil piles on the site, which consist of materials excavated for the development of the canals. The vast majority of the on-site vegetation consists of grasses (sedge species) with

some larger herbaceous vegetation (e.g., ragweed [*Ambrosia artemisiifolia*]) primarily concentrated on and around the soil piles and other disturbed areas (e.g., around a dirt access road entering the site near the southwestern site boundary). There are no surface water features on the site besides the stormwater canals.

Currently, the site is considered vacant land in a generally highly developed portion of Fort Myers. The Alico Business Park is adjacent to the northern site boundary and immediately adjacent to the eastern, southern, and western (across Lee Road) boundaries is land similar in nature to the site itself. The land to the west is actively used for cattle grazing, as is much of the property in the general area. Based on aerial photography, it appears that, historically, the site and surrounding area was likely to be forested because a few stands of trees remain, though the vast majority of the land area is grassy. There is a forested tract approximately 0.25 miles to the northeast of the site, which is dominated by the aggressive, invasive melaleuca tree (*Melaleuca quinquenervia*).

In general, the Florida Coastal Lowlands (Western) Ecological Subregion is habitat for a variety of mammals, including white-tailed deer, bobcat (*Lynx rufus*), raccoon, gray squirrel, swamp rabbit (*Sylvilagus aquaticus*), striped skunk, and many small rodents and shrews. Typical herpetofauna include box turtle, common garter snake, and American alligator (*Alligator mississippiensis*). Game birds, such as turkey (*Meleagris gallopavo*), bobwhite (*Colinus virginianus*), and mourning dove (*Zenaida macroura*), are widespread. Common songbirds include pine warbler (*Dendroica pinus*), ruby-throated hummingbird (*Archilochus colubris*), eastern towhee (*Pipilo erythrophthalmus*), and hooded warbler (*Wilsonia citrine*). Resident and migratory nongame bird species are numerous (McNab and Avers, 1994). Overall, wildlife diversity at the project site is likely hindered by the highly developed nature of the surrounding area, relatively monotypic aspects of onsite vegetation, active cattle grazing in the immediate vicinity, and considerable onsite disturbances associated with development of the stormwater canals.

The USFWS lists several federally-protected species as potentially occurring in Lee County, which are identified in Table 3-7. There are more than 100 species protected by the state of Florida, including 34 birds, 30 mammals, 24 reptiles, 5 amphibians, 15 fish, 3 crustaceans, 2 insects, 2 mollusks, and 1 coral (FWCC, 2010) (see Appendix D for the complete list). However, information on the distribution of Florida-protected species by county is not readily available. Many of the federal- and state-protected bird, mammal, and reptile species could potentially utilize grassland habitats in general; however, considering the recently disturbed nature of the Florida site, relatively poor habitat quality afforded by on-site vegetation, and developed nature of the surrounding area, it is considered unlikely that the site offers habitat for any federal- or state-protected species.

**Table 3-7. Federally Protected Species Potentially Occurring in Lee County, Florida**

| Common Name/Federal Protection Status | Scientific Name | Typical Habitat |
|---|---|---|
| ***Mammals*** | | |
| Florida panther – Endangered | *Puma (= Felis) concolor coryi* | High pine, tropical hardwood hammock, scrub, maritime hammock, mesic temperate hammock, pine rockland, scrubby flatwoods, mesic pine flatwoods, hydric pine flatwoods, dry prairie, wet prairie, freshwater marsh, |

**Table 3-7. Federally Protected Species Potentially Occurring in Lee County, Florida**

| Common Name/Federal Protection Status | Scientific Name | Typical Habitat |
|---|---|---|
| | | seepage swamp, pond swamp, mangrove. |
| Puma (mountain lion) – Threatened | *Puma (= Felis) concolor (all subspecies except coryi)* | High pine, tropical hardwood hammock, scrub, maritime hammock, mesic temperate hammock, pine rockland, scrubby flatwoods, mesic pine flatwoods, hydric pine flatwoods, dry prairie, wet prairie, freshwater marsh, seepage swamp, pond swamp, mangrove. |
| West Indian manatee | *Trichechus manatus* | Fresh and saltwater habitats, mangroves. |
| ***Birds*** | | |
| Audubon's crested caracara – Threatened | *Polyborus plancus audubonii* | Improved pastures, mesic temperate hammock, mesic pine flatwoods, hydric pine flatwoods, dry prairie, wet prairie. |
| Piping plover – Threatened in Florida | *Charadrius melodus* | Sandy beaches, mudflats, sandflats, spoils islands, areas adjacent to inlets and passes. |
| Everglade snail kite - Endangered | *Rostrhamus sociabilis plumbeus* | Hydric pine flatwoods, freshwater marsh, pond swamp. |
| Florida scrub-jay – Threatened | *Aphelocoma coerulescens* | Scrub, scrubby flatwoods and adjacent areas. |
| Ivory-billed woodpecker – Endangered | *Campephilus principalis* | Last documented in 1908. |
| Red-cockaded woodpecker – Endangered | *Picoides borealis* | High pine, mesic pine flatwoods, hydric pine flatwoods. |
| Red knot – Candidate for listing | *Calidris canutus rufa* | Tidal flats, rocky shores, beaches. |
| Wood stork – Endangered | *Mycteria americana* | Hydric pine flatwoods, wet prairie, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove, saltmarsh, seagrass. |
| ***Reptiles*** | | |
| Eastern indigo snake – Threatened | *Drymarchon corais* | High pine, tropical hardwood hammock, scrubby high pine, beach dune/coastal strand, maritime hammock, mesic temperate hammock, pine rockland, scrubby flatwoods, mesic pine flatwoods, hydric pine flatwoods, dry prairie, cutthroat grass, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove. |
| American crocodile – Threatened | *Crocodylus acutus* | Mangrove, seagrass. |
| American alligator – Threatened | *Alligator mississippiensis* | Fresh and brackish marshes, ponds, lakes, rivers, swamps, bayous, large spring runs. Basks on land next to water. |
| Green sea turtle – Endangered in Florida | *Chelonia mydas* | Marine and estuarine areas; nests on beaches. |
| Kemp's ridley sea turtle – Endangered | *Lepidochelys kempii* | Marine and estuarine areas; nests on beaches. |
| Loggerhead sea turtle – Threatened | *Caretta caretta* | Marine and estuarine areas; nests on beaches. |
| ***Fish*** | | |
| Gulf sturgeon – Threatened | *Acipenser oxyrinchus desotoi* | Primarily marine/estuarine in winter; migrates to upper rivers in spring for spawning. |
| Smalltooth sawfish – | *Pristis pectinata* | Shallow coastal, estuarine, and fresh waters; often in brackish water near |

**Table 3-7. Federally Protected Species Potentially Occurring in Lee County, Florida**

| Common Name/Federal Protection Status | Scientific Name | Typical Habitat |
|---|---|---|
| Endangered | | river mouths and large embayments. |
| ***Plants*** | | |
| Beautiful pawpaw – Endangered | *Deeringothamnus pulchellus* | Found in open stands of slash pine (*Pinus elliottii*) with an understory mostly of *Serenoa repens*, *Lyonia lucida*, *Vaccinium myrsinites*, *Quercus minima*, and *Befaria racemosa*. |

Source: USFWS, 2008; NatureServe, 2009.

DOE submitted consultation letters to the USFWS and the Florida Fish and Wildlife Conservation Commission (FWCC) to solicit comments on the project and information regarding the potential presence of protected species or habitat in the area of the Florida site. To date, no responses have been received from these agencies. There are numerous species protected by the state of Florida; however, protected species are unlikely to exist at the project site due to the generally poor quality of on-site vegetative habitat, overall low diversity of wildlife observed at the site, and the recently disturbed nature of the site.

## 3.9.2 Environmental Consequences of the Proposed Action

### *3.9.2.1 Common Impacts*

Construction of the biorefinery would result in the conversion of undeveloped, vegetated land to facilities and infrastructure associated with the biorefinery. On-site vegetation would be lost and any wildlife species utilizing the on-site habitat would be displaced. In addition, during construction, it is possible that collisions with vehicles and equipment could cause direct mortality to any wildlife that may be present, though more mobile species (e.g., birds) would likely avoid this. Impacts to biological resources from the construction and operation of the biorefinery at each site option are discussed below.

Algenol initiated consultation with the APHIS, USDA – which regulates the importation, interstate movement, and environmental release of certain microorganisms to prevent the introduction of plant pests – to determine if the hybrid algae would be considered regulated articles under the Plant Protection Act (PPA). APHIS concluded that Algenol's hybrid algae are not derived from plant pests; are non-pathogenic for plants, animals, and humans; and are not known to confer any pest or pathogen characteristics on recipient organisms. Thus, APHIS determined that the hybrid algae are not considered plant pests and would not be regulated under the PPA (USDA, 2010a). Algenol's development, use, transportation, and disposal of hybrid algae would take place in contained facilities or vessels, consistent with EPA's TSCA regulations. As a contingency, for both of the site options, the photobioreactors would be placed inside a water-tight containment area. In the event of a spill of algae culture medium, the drainage would be diverted to a water sterilization system that would remove the biomass and sterilize the water using chlorine bleach.

### *3.9.2.2 Texas Site*

Construction of the biorefinery would result in the clearing of approximately 26 acres of herbaceous and scrub-shrub vegetation and associated wildlife habitat. It is expected that no impacts to state- or federally-protected species would be anticipated to occur because the vegetation is generally considered low quality habitat due to degradation by on-site harvesting of

land for cattle feed and the close proximity to industrial activities. Overall, minor impacts to biological resources would be expected during construction

Algenol contacted TPWD to discuss the agency's July 2, 2010 letter outlining their comments and recommendations on the project (in Appendix B). The following items were determined with respect to biological resources:

- The bald eagle nest noted in TPWD's letter as being located within 1.5 miles of the potential site near Freeport, Texas is associated with Oyster Creek; development of the proposed project would not likely impact this nest.
- For U.S. Migratory Bird Treaty Act compliance a migratory bird nest survey would not be necessary if construction activities were performed outside of the migratory bird nesting season (April 1 – July 15).
- TPWD recommends that DOE review the TPWD's Brazoria County list of rare species to determine if protected species surveys should be performed on the site near Freeport, Texas.

Consultants for Dow performed a protected species review of the Texas site and produced a report of their findings, which is included in Appendix D. The results of the review showed that there were 10 species on TPWD's list that could potentially utilize on-site habitats. However, DOE's review of the report has concluded that these species would be of low regulatory concern (i.e., the potential for violations of state-protected species regulations would be low) at the site and a protected species survey prior to construction activities would not likely be required. The following is a summary of the report's results, DOE's basis for why these species would be of minor concern, and overall impact evaluations:

- In the report there were six species listed as "rare" that could potentially utilize onsite habitat. These species include: arctic peregrine falcon (*Falco peregrinus tundrius*), black rail (*Laterallus jamaicensis*), henslow's sparrow (*Ammodramus henslowii*), plains spotted skunk (*Spilogale putorius interrupta*), coastal gay-feather (*Liatris bracteata*), and threeflower broomweed (*Thurovia triflora*). Bird species are highly mobile; thus, it is considered unlikely that any direct impacts of accidental mortality (e.g., collisions with construction equipment) would occur. In addition, if these species were to utilize onsite habitats there would be ample amounts of similar, higher quality habitat nearby for them to utilize (particularly with respect to the nearby Brazoria National Wildlife Refuge) should the biorefinery be developed. Plains spotted skunk is a generalist in terms of habitat preferences and can utilize a wide range of habitats from wooded areas to prairies and there is no indication that onsite habitats would necessarily be preferable for them (TPWD, 2010a). In addition, plains spotted skunk is nocturnal; therefore, would not be active during the day while construction activities are occurring and the potential for accidental mortality would be low. Coastal gay-feather is a plant species that occurs in clay loam to clayey to sandy loam soils (TPWD, 2010a); therefore, onsite soils (Surfside clay, see Section 3.5) would not likely be suitable. Threeflower broomweed is a plant species that, near the coast, occurs on a veneer of light colored silt or fine sand over saline clay (TPWD, 2010a); therefore, onsite soils (Surfside clay, see Section 3.5) would not likely be suitable.
- In the report there were two bird species listed as Texas threatened noted as potentially utilizing on-site habitats for foraging (i.e., white-faced ibis [*Plegadis chihi*] and wood stork [*Mycteria americana*]); however, on-site habitats would not be suitable for breeding or nesting. Thus, it is considered unlikely that construction of the biorefinery would induce a "take" of these species because nests and eggs would not be disturbed and, considering that birds are highly mobile, would likely avoid the site because of the presence of human

activities. A "take" is defined as "collect, hook, hunt, net, shoot, or snare, by any means or device, and includes an attempt to take or to pursue in order to take" (Texas Parks and Wildlife Code, Title 1, Chapter 1, Subchapter C). As per TPWD's comment letter (see Appendix B), habitats are not protected under Texas regulations. In addition, if these species were to transiently utilize onsite habitats there would be ample amounts of similar, higher quality habitat nearby for them to utilize (particularly with respect to the nearby Brazoria National Wildlife Refuge) should the biorefinery be developed.

- In the report there was one bird species listed as Texas endangered noted as potentially utilizing on-site habitats (i.e., eskimo curlew [*Numenius borealis*]), but this species is considered to be extinct. The last "apparently reliable" sighting of eskimo curlew in Texas occurred in 1987 (NatureServe, 2009); therefore, it is considered unlikely that this species would be encountered at the site.
- In the report there was one reptile species listed as state-threatened, which was noted as potentially utilizing on-site habitats (i.e., timber/canebrake rattlesnake [*Crotalus horridus*]). However, further DOE review indicated that on-site habitats would not likely be suitable for this species as they "prefer moist lowland forests and hilly woodlands or thickets near permanent water sources such as rivers, lakes, ponds, streams and swamps where tree stumps, logs and branches provide refuge…Timber rattlesnakes are found in upland woods and rocky ridges in the eastern United States; the eastern third of Texas." (TPWD, 2009) The site does not show any of the aforementioned characteristics noted by TPWD; thus, the timber/canebrake rattlesnake would be of low concern.

In order to ensure that migratory bird nests or eggs are not adversely impacted by development of the project, initial land disturbing activities for construction of the biorefinery (e.g., land clearing) would be performed outside of the local migratory bird nesting season (April 1 through July 15). Or, in the event that the timing of construction activities ultimately required initial land disturbing activities to be performed within the migratory bird nesting season, a migratory bird nest survey of the site would be performed prior to the commencement of these activities. If nests were found, Algenol would consult with the USFWS and TPWD to determine measures to be performed to ensure that the nests are not adversely impacted. Additionally, although there is generally a low concern that county-listed species would be encountered at the site (based on results of the species review and the periodic harvesting of the land for cattle feed), Algenol would ensure that construction personnel are informed of rare species that have the potential to occur in the project area based on the results of the species review. Ultimately, in the event that any Texas-listed threatened or endangered species is detected within or near the project site before or during construction, Algenol would notify and consult with TPWD. Overall, minor impacts to biological resources would be expected during construction of the biorefinery.

Operation of the biorefinery would include utilizing seawater obtained from canals through existing Dow intake structures. No impacts to aquatic species would be expected as the intakes are already existing and operating and the increased demand for water would be negligible. No additional impacts to biological resources would be expected during operations as impacts would be related to vegetation and habitat losses during construction as described above. The facility would be decommissioned and the land would be reclaimed after the biorefinery's three-year operational phase.

Pending TPWD's final approved plant species list, Algenol may require an Exotic Species Permit from TPWD and would adhere to the stipulations as required under the permit.

#### *3.9.2.3 Florida Site*

Construction of the biorefinery would result in the clearing of up to 33 acres of herbaceous vegetation and associated wildlife habitat. It is expected that no impacts to state- or federally-protected species would occur due to the generally poor quality of on-site vegetative habitat, overall low diversity of wildlife observed at the site, and the recently disturbed nature of the site. To date, no response has been received from USFWS and FWCC to DOE's consultation letters. Overall, low impacts to biological resources would be expected during construction. No additional impacts to biological resources would be expected during operations as impacts would be related to vegetation and habitat losses during construction as described above. If endangered species are detected prior to or during construction or if the FWCC or FDEP raises concerns regarding endangered species, Algenol would implement the appropriate measures, with consultation from state agencies, to ensure that endangered species and habitats would not be adversely impacted. DOE does not anticipate any adverse affects on federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures.

### 3.9.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options and no impacts to biological resources would be expected. At the Florida site, it is likely that development would occur due to comprehensive regional plans; therefore, biological impacts could occur from future land conversion of the project area.

## 3.10 WASTE MANAGEMENT AND HAZARDOUS MATERIALS

### 3.10.1 Existing Conditions

Wastes can generally be divided into three broad categories, including hazardous, nonhazardous, and universal wastes. A hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health and/or the environment. Hazardous wastes are federally regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901, *et seq.*. Nonhazardous wastes are all wastes not classified as hazardous, which is typically thought of as residential or municipal waste. Universal wastes are certain hazardous wastes, e.g. batteries, which, when managed or recycled properly, are not included as hazardous waste.

#### *3.10.1.1 Texas Site*

The state of Texas is divided into regional Councils of Governments, which are voluntary associations of local governments formed under Texas law that deal with the problems and planning needs that cross the boundaries of individual local governments or that require regional attention, such as waste management. The Texas site is located in the Houston-Galveston Area Council (H-GAC), and the subregion Brazoria County. There are two active landfills in Brazoria County (H-GAC, 2003):

- **Seabreeze Environmental Landfill:** Active landfill with a permitted acreage of 245 acres in Angleton, which accepts municipal solid waste (general household-type waste) and construction and demolition debris.

- **Dixie Farm Road Landfill:** Active landfill with a permitted acreage of 96 acres in Pearland, which accepts brush, construction and demolition debris, and other materials free of household-type wastes.

Within Brazoria County, municipal solid waste landfill capacity is expected to exceed generation well into the future. It is estimated that, cumulatively, from 2005 to 2025, municipal solid waste generation will be approximately 9,000,000 tons while the 2003 landfill capacity was approximately 30,000,000 tons (R.W. Beck, Inc., 2005).

#### *3.10.1.2 Florida Site*

Municipal solid waste generated in Lee County is disposed of at the Lee County Resource Recovery Facility, also known as the Waste-to-Energy Plant. The Lee County Resource Recovery Facility burns wastes to produce energy, which is turned into electricity that is sent into the local electrical distribution system. The facility can burn up to 1,836 tons of waste per day (Lee County, undated). In addition, Lee County sends all non-combustible wastes to the Lee/Hendry Landfill in Hendry County. The Lee/Hendry Landfill began operation in 2002 and was expanded in 2005 to a 17 acre footprint. The final landfill size is expected to have 96 acres of land dedicated to municipal solid waste, 112 acres dedicated to ash (e.g., the ash produced from the burning process at the Lee County Resource Recovery Facility), and 75 acres dedicated to construction and demolition debris (Lee County, undated).

### 3.10.2 Environmental Consequences of the Proposed Action

#### *3.10.2.1 Common Impacts*

During construction minor amounts of typical construction refuse and debris would be generated and would need to be disposed of properly. Since no buildings or other structures currently exist at either of the sites, no demolition would be necessary. The amount of municipal solid waste and construction debris generated during construction is anticipated to be minor and would not significantly affect the capacity of disposal facilities for either of the site options.

During construction, small amounts of potentially hazardous waste materials (e.g., waste oils, solvents, and paints) would be generated. Hazardous waste generated during construction would be properly managed and stored on site in accordance with RCRA regulations. Preventative measures, such as providing fencing around the construction site, establishing contained storage areas, responding immediately to spills, and controlling the flow of construction equipment and personnel would help reduce the potential for a release of hazardous materials to occur. The quantity and type of hazardous waste that would be generated during construction would be limited to typical construction-related waste streams commonly accepted by licensed Treatment, Storage, and Disposal facilities for hazardous waste, and commercially-available treatment or disposal would be available. Thus, impacts from hazardous waste disposal are expected to be minor.

During operation of the biorefinery it is expected that small amounts of municipal solid waste (e.g., food wastes) would be generated by the employees. Based on a generation rate of 1.5 pounds per employee per day (CalRecycle, 2010), the 25 full-time employees would be expected to produce approximately 38 pounds of municipal solid waste per day, which would have a negligible impact on waste disposal capacities for either of the site options. The primary process-related waste stream would be a biomass “cake” from the photobioreactors, which would be packaged in plastic bags, sterilized in an autoclave, and could then be disposed of at a landfill

as non-hazardous. It is expected that the volume would be minimal and would also have a negligible impact on waste disposal capacities for either of the site options.

Materials stored onsite would include $CO_2$ (in a 14-ton storage tank), small amounts of chlorine used in water treatment processes, and small amounts of nutrients (nitrogen and phosphorous). In addition, operations would require the use of minimal amounts of hazardous materials for maintenance, such as cleaners and lubricants. Algenol would develop appropriate spill response, pollution prevention, and emergency response plans to address the medical and environmental hazards associated with the biorefinery. The plans would include, at a minimum, a Spill Prevention, Control and Countermeasure (SPCC) Plan, a SWPPP, and an emergency response plan. Spill response training would be provided to employees working with the hazardous materials stored and used on-site. In addition, protective measures, such as providing secondary containment around hazardous material storage areas, would be incorporated into the final design of the biorefinery as necessary and appropriate. These measures would be expected to minimize the potential for impacts from spills of hazardous materials.

The use of hazardous materials would result in the creation of hazardous wastes (e.g., oily rags), which would require proper disposal or recycling. Although the exact amount of hazardous waste generation is not known at this time, it is expected that the biorefinery would qualify as a Conditionally Exempt Small Quantity Generator (CESQG) of hazardous waste as defined by RCRA. A CESQG is defined as a facility that does not generate more than 100 kilograms (approximately 220 pounds or 27 gallons) of hazardous waste per month. As a CESQG, the biorefinery would be required to identify all the hazardous waste generated; not accumulate more than 1,000 kilograms of hazardous waste at any time; and ensure that hazardous waste is delivered to a person or facility that is authorized to manage it (EPA, 2008). Considering that the biorefinery would be expected to generate relatively small amounts of hazardous wastes, no greater than minor impacts to hazardous waste Treatment, Storage, and Disposal facilities would be expected. In addition, the biorefinery would generate universal wastes, e.g. fluorescent light bulbs and batteries, which would be transported offsite to a licensed disposal facility.

#### *3.10.2.2 Texas Site*

At the Texas site, solid wastes would be disposed of at one or more local municipal landfills; likely to be one or both of the landfills currently operating in Brazoria County. The large amount of municipal solid waste disposal capacity in Brazoria County (described in Section 3.3.9.1) would be capable of accepting these wastes with negligible impacts on landfill capacities.

After three years of operation, the biorefinery would be decommissioned (anticipated for July 2014). Most solid wastes generated during decommissioned would be disposed of at nearby municipal landfills. These waste types would include security fencing, gravel roads, drainage piping, photobioreactors, plastic piping, and the geomembrane. The water purification equipment, tanks, and pumping equipment, would be removed from the site and would either be sold for scrap, incinerated, or disposed of at a municipal landfill. The ethanol distillation, water pavilion, greenhouse, and workshop areas would be demolished and either sold for scrap or disposed of in a municipal landfill. The office and lab trailers would be rented and portable, so these buildings would be emptied and returned to the leasing company. The lab equipment that is in good working order would be transferred to another Algenol facility or sold. These one-

time, relatively large waste disposal volumes would be expected to cause no greater than minor impacts on waste disposal capacities of local landfills as ample disposal capacity would be available (see Section 3.3.9.1).

#### *3.10.2.3 Florida Site*

At the Florida site, considering that minimal amounts of wastes would be expected to be produced, it is anticipated that the Lee County Resource Recovery Facility would have available capacity to process biorefinery wastes with negligible impact on processing capacity (1,836 tons per day [Lee County, undated]). The facility would be considered permanent and would operate for its entire useful lifespan (estimated at 25 years); therefore, no near term impacts to waste disposal facilities would result from project decommissioning.

### 3.10.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options; no wastes would be generated and, therefore, no waste facilities would be impacted. At the Florida site, it is likely that development would occur due to comprehensive regional plans; therefore, waste impacts could occur from future land conversion of the project area.

## 3.11 UTILITIES

### 3.11.1 Existing Conditions

#### *3.11.1.1 Texas Site*

The City of Freeport has a variety of electricity utility companies that service the area including Centerpoint Energy, Reliant Energy, Gexa Energy, and TXU Energy. The proposed project site is serviced by Reliant and Centerpoint Energy. Centerpoint Energy owns, operates and maintains the poles, wires and substations that make the delivery of electricity from power plants to customers (Centerpoint Energy, 2010). The electricity is supplied by Reliant which is a subsidiary that is owned and operated by NRG Energy. NRG Energy power plants provide more than 24,000 megawatts of generation capacity of which more than 11,000 megawatts of capacity is located in Texas (NRG, 2010 and Reliant Energy, 2010).

Veolia Water North America is a leading provider of comprehensive water and wastewater services to municipal and industrial customers throughout North America including Freeport, Texas. The Veolia managed system that would service the project area is the Freeport Slaughter Road water system which is treated by the Brazosport Water Authority plant located in Lake Jackson. The plant treats on average approximately 10 million gallons per day and has a maximum treatment capacity of approximately 12 million gallons per day (Brazosport Water Authority, 2010). Although Veolia Water provides wastewater services, the Dow property contains its own wastewater facility, which the biorefinery would connect to, and handles all wastewater generated onsite.

Utility lines for all of the public utilities discussed above are located along SH 332 to the south of the proposed project site.

#### *3.11.1.2 Florida Site*

Florida Power and Light is the principal subsidiary of FPL Group and serves approximately 4.5 million customers in Florida including Fort Myers. Florida Power and Light provides 41,925 megawatts of generation capacity (Florida Power and Light, 2010).

The City of Fort Myers Water Treatment Plant provides water service to the City's customers and works with the SFWMD to ensure water quality control measures meet or exceed state and federal regulations on safe drinking water. The plant capacity is 12 million gallons with a daily demand of 7.5 million gallons (City of Fort Myers, 2010). The City of Fort Myers Wastewater Treatment Division serves the proposed project site and consists of two regional Advanced Wastewater Treatment (AWWT) Facilities. The Central AWWT Facility is designed to treat 11 million gallons of wastewater per day and the South AWWT Facility is designed to treat 12 million gallons per day. These plants treat wastewater from all of Fort Myers and much of Lee County. The South AWWT Facility would serve the proposed Florida site (City of Fort Myers, 2010).

All of the public utilities discussed above are located within the Lee Road right-of-way located directly west of the proposed project site. The utilities are there to serve the recently constructed Alico Business Park which is located directly north of the proposed project site.

### 3.11.2 Environmental Consequences of the Proposed Action

#### *3.11.2.1 Common Impacts*

Because of the short construction duration (approximately six months), the demand on existing utilities services to support construction of the biorefinery would be minimal. Impacts to existing public utility systems are expected to be negligible during the construction period as direct use of utilities would be limited to electrical lines. It is expected that temporary portable sanitary wastewater facilities would be provided and wastewater would be transported to commercial services for disposal. Potable water would be provided from on-site water tanks. Electrical power would be provided by temporary hook-ups to nearby lines and back-up generators to operate construction tools and machinery.

Operation of the biorefinery would require connections to existing potable water, sanitary wastewater (for Florida site), and electrical utility lines. Connecting to these utilities would not require major upgrades to any existing public utility infrastructure. Relatively short extensions along road right-of-ways to the existing utility corridors would be required.

During operation of the biorefinery, the demand on potable water, wastewater, and electrical utilities are expected to be met without resulting in substantial strains on existing capacities of these utilities. Approximately 1.25 million kWh per year of electricity would be required to operate all activities at the biorefinery. Daily potable water demand from the biorefinery would result from a daily workforce of 25 employees (250 gallons per day, assuming a daily usage rate of 10 gallons per day per person) and from make-up water requirements for the photobioreactors (approximately 800 gallons per day, based on 210,000 gallons per year). Sanitary wastewater demand would result from the employees (375 gallons per day, assuming a daily generation rate of 15 gallons per day per person). Impacts to these utility systems specific to the site options are discussed below.

#### *3.11.2.2 Texas Site*

Electricity would be supplied from Centerpoint Energy and Reliant Energy, which are expected to have facilities/systems that would have enough capacity to serve the biorefinery.

Once operational, the daily potable water demand from the biorefinery would be limited to the needs of a daily workforce of 25 employees (of 250 gallons per day) and the make-up water requirement for the photobioreactors (800 gallons per day), for a total of 1,050 gallons per day. This total daily rate represents 0.05 percent of the additional treatment capacity of the Brazosport Water Authority facility. Therefore, it is expected that the biorefinery demand for potable water would have a minor impact on capacity of the public facility.

The daily sanitary wastewater generated from the biorefinery would be 375 gallons per day. Additionally, minimal amounts of laboratory liquid effluent would be collected and stored onsite for collection. This sanitary and laboratory wastewater would be trucked to Dow's wastewater facility located on Dow property. Process wastewater from the treatment of the seawater (1,200 gallons per day) and from the photobioreactors (10,000 gallons per day) would also be treated at Dow's on-site wastewater treatment facility, for a total of approximately 11,600 gallons per day. Dow's wastewater treatment facility would have the additional capacity to meet this demand without the need for upgrades. The use of Dow's wastewater treatment facility would be based on specifications and a defined sampling plan agreed upon between Dow and Algenol.

For the Texas site option, use of the potable water, electricity and Dow's wastewater facility would be short-term and these impacts would be temporary as the operational phase of the biorefinery is expected to occur for three years.

#### *3.11.2.3 Florida Site*

As the proposed biorefinery would operate for approximately 25 years at the Florida site, all utility needs would be satisfied through connections to main pipelines along Lee Road directly west of the site.

Similar to the Texas site, the daily potable water demand from the biorefinery would be approximately 250 gallons per day from employees during operation. The photobioreactors would require 800 gallons per day for a total potable water demand of 1,050 gallons per day which represents 0.009 percent of the treatment capacity and 0.014 percent of the daily demand of the City of Fort Myers water treatment plant. Therefore, it is expected that the biorefinery demand for potable water would have a minor impact on the capacity of the public water treatment facility.

The daily sanitary wastewater generated from the biorefinery would be 375 gallons per day from the employees, which represent 0.003 percent of the South AWWT's capacity. Additionally, minimal amounts of laboratory liquid effluent would be treated and disposed of in the local sanitary sewer system per disposal safety requirements. Impacts to the South AWWT are expected to be minor. Process wastewater from the treatment of the seawater (1,200 gallons per day) and from the photobioreactors (10,000 gallons per day) would be injected into an on-site well for disposal after treatment; therefore, no impact to local utilities from process wastewater is expected. Impacts to the disposal of process wastewater are discussed in Section 3.6.

### 3.11.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options and, therefore, no impacts to public utilities would occur. At the Florida site, it is expected that the area would be developed for industrial users and business parks, which likely would create demand on public utilities that service the area.

## 3.12 TRANSPORTATION AND TRAFFIC

### 3.12.1 Existing Conditions

#### *3.12.1.1 Texas Site*

The key roadways leading up to the Texas site include SH 332, SH 288, SH 288B, and FM 523. The closest interstate highway is Interstate 45, which is approximately 40 miles to the northeast near Texas City and 60 miles to the north near Houston. Because of the site's proximity to the coast, the region has an extensive network of hurricane evacuation routes of which SH 288 and SH 322 are included (TXDOT, 2009). These routes usually comprise large highways built to handle great traffic loads and are typically designed to be adjusted for hurricanes. SH 288 is a four-lane, divided highway between I-45 in downtown Houston and Freeport, where it terminates on FM 1495. SH 288B is a four-lane, undivided highway that intersections SH 288 and SH 332 south of Clute. SH 332 is a four-lane, undivided highway that begins at a junction with SH 36 in Brazoria and heads east to a junction with the Bluewater Highway in Surfside Beach. FM 523 is a two-lane, rural roadway that intersects SH 332 and traverses mainly through rural areas, including Oyster Creek. The project site is located on a private, two-lane asphalt road for industrial users, including Dow, and can be accessed from SH 332.

***Annual Average Daily Traffic (AADT)*** *represents the average daily number of vehicles traveling in both directions over a designated section of highway and varies depending on the vehicle mix, day of the week, and seasonality.*

Daily traffic volumes in the area are considered relatively low to moderate. Due to the industrial nature of the region, trucks make up a moderate amount of the vehicles in the area (approximately 13 to 18 percent on SH 288 and SH 322) (TXDOT, 2008a). Figure 3-4 presents the 2008 Annual Average Daily Traffic (AADT) on Texas Department of Transportation-(TXDOT) maintained roads in the project area (TXDOT, 2008b). No data is available on traffic volumes on the main access road to the project; however, based on field observations, the roadway experiences minimal daily traffic.

The *2000 Highway Capacity Manual* defines six categories of LOS that reflect the level of traffic congestion and qualify the operating conditions of a roadway or intersection. The six levels are given letter designations ranging from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays) (TRB, 2000). LOSs of A, B, or C are typically considered good operating conditions in which minor or tolerable delays of service are experienced by motorists. Based on the AADT and roadway characteristics, it is estimated that the key roadways are operating at an LOS of A or B.

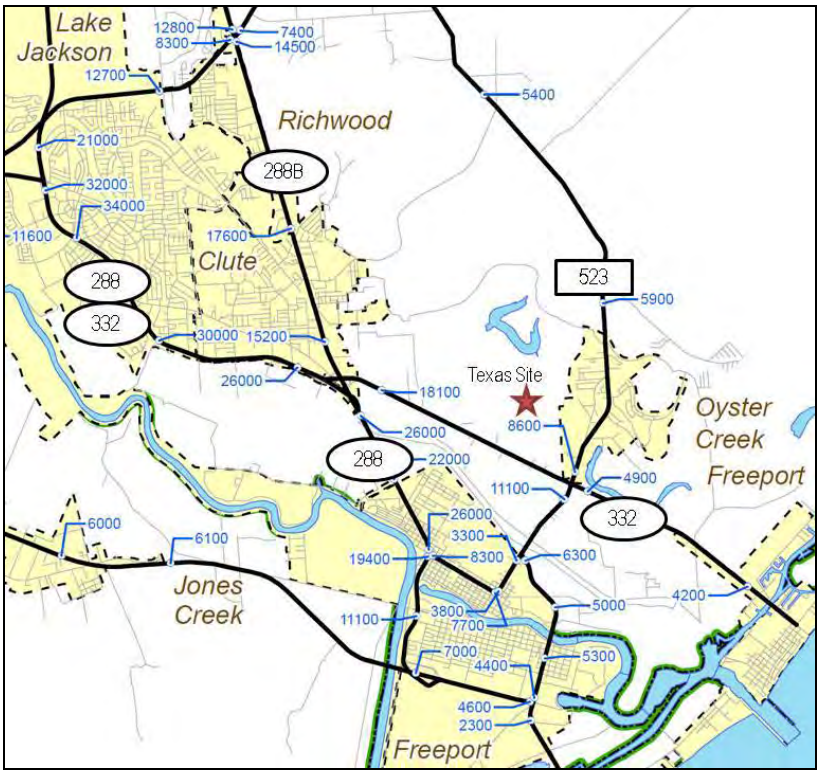


**Figure 3-4. Annual Average Daily Traffic Volumes Near the Texas Site Option (TXDOT, 2008b)**

### *3.12.1.2 Florida Site*

The key roadways leading up to the Florida site include Alico Road, US 41, and Interstate 75. US 41 is a six-lane, divided highway that runs north-south through the state that runs from Miami, Florida to the Upper Peninsula of Michigan. The highway closely parallels Interstate 75 from Naples, Florida in the south all the way north through the state. Interstate 75 also has its southern terminus in Miami and continues all the way north through Michigan up to the Ontario, Canada border. Interstate 75 is an eight-lane, divided highway near the project area and has ramps onto Alico Road. Alico Road (also known as County Road 840) is a six-lane, divided highway and is a major commuter route in the southwest region of Florida; the roadway runs near Southwest Florida International Airport and the campus of Florida Gulf Coast University and is a popular route for accessing both of these locations. The project site is located on Lee Road, which can be accessed from Alico Road, approximately 2,000 feet south from the site. Lee Road is a two-lane, asphalt road that is primarily accessed by users of the business park that is located at the northern end of the road.

Daily traffic volumes in the area are considered relatively moderate to high. Figure 3-5 presents the 2009 AADT (FDOT, 2009). No data is available on traffic volumes on Lee Road; however, based on field observations, the roadway experiences minimal daily traffic. Based on the AADT and roadway characteristics, it is estimated that segments of US 41 are operating at an LOS C or better, and Alico Road and Interstate 75 are operating at an LOS A or B.

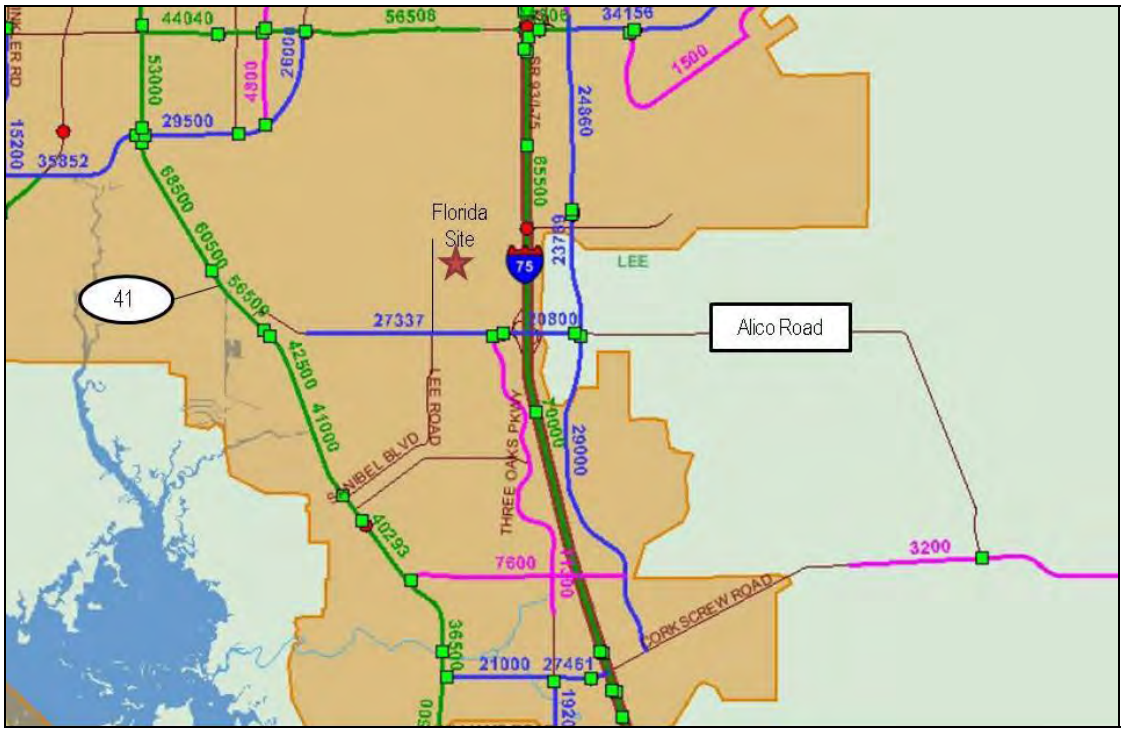


**Figure 3-5. Annual Average Daily Traffic Volumes Near the Florida Site Option (FDOT, 2009)**

## 3.12.2 Environmental Consequences of the Proposed Action

### *3.12.2.1 Common Impacts*

During construction, up to 25 construction workers would be required at the construction site at any given time. It is projected that 30 privately-owned vehicles from workers and visitors could generate 60 trips per day; 10 truck shipments of equipment and materials would result in 20 vehicle trips per day. The 20 daily trips from construction truck deliveries would result in minor impacts on roadways as these deliveries would be distributed throughout the day. Traffic from the POVs (60 trips per day) would mainly occur during peak a.m. and p.m. commute hours. Generally, construction impacts to existing transportation resources would be temporary and localized. Construction vehicles and workers would add to existing local traffic and would potentially cause minor congestion and increased traffic noise and vehicle emissions along main transportation routes.

> ***vehicle trip*** *- a trip is defined as a one-way vehicle movement from an origin to a destination.*

During operation, there would be up to 25 full-time employees staffed at the biorefinery. Using a rate of three trips per day for each employee (two trips for commuting and two trips for miscellaneous activities, assuming half of the employees drive offsite during work for lunch or errands), it is estimated that 75 vehicle trips would be generated by employees.

Truck shipments to the biorefinery would be required for $CO_2$, seawater (for Texas site), nitrogen, phosphate, and chlorine at the following rates:

- $CO_2$ - 1 truck every four to six days
- Seawater – 1.5 trucks per day (for Texas site)

- Miscellaneous (e.g., nitrogen and phosphate) – assumed 3 trucks per week (worst-case)

Truck shipments from the biorefinery would be required for ethanol and wastewater (for Texas site) at the following rates:

- Ethanol – 10 trucks per month
- Brine (from seawater treatment) – 1 truck per day (for Texas site)
- Process wastewater (from photobioreactors) – 2 trucks per day (for Texas site)
- Miscellaneous (e.g., solid waste) – assumed 3 trucks per week (worst-case)

The number of truck shipments and impacts on regional roadways are discussed for each site option in the following sections.

#### *3.12.2.2 Texas Site*

Approximately 80 vehicle trips per day could occur during construction and may result in minor congestion, primarily on SH 332, the key roadway leading up to the project site. When compared to existing AADT (as presented in Figure 3-4), the increase of daily 80 trips on existing key roadways is considered low (e.g., one percent increase on FM 523); existing LOSs are expected to be maintained (LOS A or B) and existing roadways would be able to handle the temporary increase in vehicles during construction.

It is estimated that 75 trips from employees and visitors and approximately 10 truck trips from the transport of materials and waste could result in 85 daily trips during operation of the biorefinery for the Texas site option. When compared to existing AADT, the increase in daily vehicle trips is considered low. During operation of the biorefinery, existing LOSs are expected to be maintained (LOS A or B) and existing roadways would be able to handle the increase in daily vehicle trips. Additionally, increases in daily vehicle trips would have temporary minor impacts to traffic in the project area as the biorefinery would operate over a three-year span.

#### *3.12.2.3 Florida Site*

Similar to the Texas site, 80 vehicle trips per day could result during construction, which may lead to minor congestion. Traffic impacts would primarily occur on Alico Road, the key roadway leading up to the project site. When compared to existing AADT (as presented in Figure 3-5), the daily increase in construction vehicles is considered low (e.g., less than one percent increase on local roads); existing LOSs are expected to be maintained (LOS C or better) and existing roadways would be able to handle the temporary increase in vehicles during construction.

It is estimated that 75 daily trips from employees and visitors and approximately four truck trips from the transport of materials and waste could result in 78 daily trips during operation of the biorefinery for the Florida site option. When compared to the existing AADT, the increase in daily vehicle trips is considered low (e.g., less than one percent increase on key roadways). During operation of the biorefinery, existing LOSs are expected to be maintained (LOS C or better) and existing roadways would be able to handle the increase in daily vehicle trips.

### 3.12.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur and would not result in any additional vehicle trips at either site option. At the Florida site,

development in the area is likely to occur due to regional plans to create industrial and business parks in the area, which would increase vehicles and congestion in the area.

## 3.13 PUBLIC HEALTH AND SAFETY

### 3.13.1 Existing Conditions

The nearest public sensitive receptors to both of the site options are described below. Currently, both site options exist as vacant land in areas where the surrounding land uses are predominantly industrial/office; both sites are fairly isolated from the general public to gain access to the site.

For context purposes, Table 3-8 presents typical background daytime levels found throughout the U.S. under calm and still wind conditions and Figure 3-6 shows typical sound levels of common noise sources.

**Table 3-8. Typical Nominal Background Sound Levels in Residential Communities**

| Description | Typical Range, dBA | Average, dBA |
|---|---|---|
| Very Quiet Rural or Remote Area | 26 to 30 | 28 |
| Very Quiet Suburban or Rural Area | 31 to 35 | 33 |
| Quiet Suburban Residential | 36 to 40 | 38 |
| Normal Suburban Residential | 41 to 45 | 43 |
| Urban Residential | 46 to 50 | 48 |
| Noisy Urban Residential | 51 to 55 | 53 |
| Very Noisy Urban Residential | 56 to 60 | 58 |

Source: EPA, 1971.

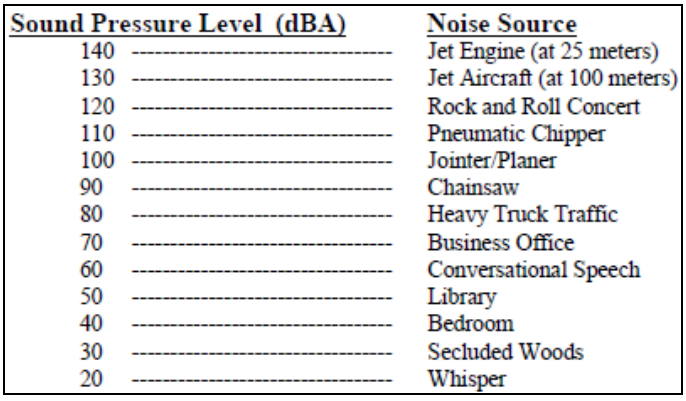


**Figure 3-6. Sound Levels of Common Noise Sources (MPCA, 1999)**

#### *3.13.1.1 Texas Site*

The Texas site is located on property owned by Dow and on a private access road for the neighboring industrial facilities. The closest sensitive receptors to the site are in a residential area approximately 0.5 miles to the east on Oyster Creek Bend Road, which is primarily separated from the project site by vegetation and surface water features. Predominant noise sources in the area are traffic on SH 332 and the access road, and activities at nearby industrial

facilities; however, the area is relatively quiet with background sound levels ranging from 35 to 45 dBA (A-weighted decibels) (see Table 3-8). The Brazoria County's Public Nuisance Abatement Ordinance does not address noise nuisances; thus, there are no local regulations governing noise levels at the site.

At the Texas site, the biorefinery would be serviced by existing Dow emergency services standards and infrastructure. Dow has 24-hour fire and emergency medical services available. Dow operates three staffed fire stations and has emergency medical technicians and doctors on staff.

#### *3.13.1.2 Florida Site*

The Florida site is located on property owned by Alico Road Business Park and on Lee Road, which is primarily used by the businesses and industries located at the business park. The closest sensitive receptors to the site are in a residential area approximately 0.3 miles (1,500 feet) to the north on Fiddlesticks Boulevard, which is primarily separated from the project site by the Alico Business Park. Predominant noise sources in the area are traffic traveling to and from the Alico Business Park on Lee Road, as well as traffic on Alico Road, and aircraft from the nearby airport; however, the area is generally quiet with background sound levels ranging from 40 to 50 dBA.

The City of Fort Myers' Code of Ordinances sets limits on construction/demolition activities on properties within or abutting residential areas (Chapter 54, Article V, Section 54-196). The ordinance only allows these activities from 7:00 a.m. to 7:00 p.m., Monday through Friday excluding holidays.

### 3.13.2 Environmental Consequences of the Proposed Action

#### *3.13.2.1 Common Impacts*

Potential occupational health and safety risks during construction of the biorefinery would be expected to be typical of risks for any other industrial construction sites. These include, but are not limited to: the movement of heavy objects, including construction equipment; slips, trips, and falls; the risk of fire or explosion from general construction activities (e.g., welding); and spills and exposures related to the storage and handling of chemicals and disposal of hazardous waste. The health and safety of construction workers would be protected by adherence to accepted work standards and regulations set forth by the OSHA (29 CFR 1910, and 29 CFR 1926). All personnel involved with construction activities would be properly trained and required to comply with OSHA regulations. Thus, it is expected that minor adverse safety impacts may occur during construction as following OSHA procedures would minimize the risk for injuries.

During the construction phase, noise would be localized, intermittent, and temporary. Nearby employees and residents could notice construction-related noise, but the resulting sound levels would be confined to daytime hours when most people are at work and away from home (i.e., between 7 a.m. and 5 p.m.). Increases in noise levels during construction would mainly result from the use of heavy construction equipment (e.g., bulldozers, scrapers, dump trucks, and concrete mixers). Given the equipment needs of the construction phase, the typical noise levels onsite would be expected to be within the range of 60 to 90 dBA. Table 3-9 presents average noise levels from construction equipment typically used at industrial construction sites.

**Table 3-9. Common Equipment Sources and Measured Noise Levels at 50 feet**

| Equipment | Typical Noise Level in dBA |
|---|---|
| Backhoe Excavator | 85 |
| Bulldozer | 80 |
| Grader | 85 |
| Dump Truck | 91 |
| Pump | 76 |
| Compressor | 81 |

dBA = A-weighted decibels.
Source: Bolt et al., 1971

Based on the noise levels listed in Table 3-9, the overall sound level during construction of the biorefinery would be approximately 93 dBA (assuming all equipment run simultaneously). To predict the noise impact on potential sensitive noise receptors, the 93-dBA noise level was projected from the proposed construction site to the closest residential property by applying general noise attenuation principles. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, the sound level change is inversely proportional to the square distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of a distance produces a 6-dBA reduction in sound. Therefore, based on the 93-dBA sound level, it is expected that noise levels from the construction site would be approximately 33 dBA 1,000 feet from the site, which is not expected to result in significant noise impacts as the closest receptors for both of the site options are located at distances greater than 1,000 feet.

Construction noise levels onsite would primarily be limited to the immediate vicinity of the project site and would mainly impact the health of the construction workers. However, adherence to appropriate OSHA standards would protect the workforce from excessive noise. Temporary and minor construction-related noise impacts would occur for about six months.

During operation of the biorefinery, overall adverse impacts to human health and safety are not expected to be significant. Algenol would plan, direct, and implement EH&S programs, procedures, and policies to ensure compliance with regulatory standards. The EH&S planning would address, among other issues, OSHA's Laboratory Safety Standard, requirements for preparation of Chemical Hygiene Plans, Hazard Communication Standard, the Occupational Exposure to Hazardous Chemicals in Laboratories Standard, and limits on airborne contaminants such as $CO_2$ and ethanol.

The main sources of noise during operation of the biorefinery would come from the operation of pumps in the water processing area and from truck deliveries and are not expected to result in discernable incremental increases in noise levels in the nearest residential areas at either site option. Using comparable sound levels shown in Table 3-9, it is assumed that a sound level of up to 85 dBA could occur from trucks and pumps during operations. Therefore, using the inverse square law to estimate projected sound levels, a 25-dBA level would occur at 1,000 feet and is not expected to be heard at the closest receptors.

Primary concerns to human health and safety would include chemicals stored onsite; of most concern would be $CO_2$ and ethanol. The inhalation of large concentrations of $CO_2$ can cause

asphyxiation that can potentially lead to coma and death. In order to prevent accidents, the $CO_2$ storage tank and the remainder of the system would be equipped with leak detection equipment to ensure that a gas leak is detected immediately and the source is shut off until the problem is fixed. Ethanol is highly flammable as a liquid and as a gas. In order to reduce the potential for ignition, ethanol would be stored onsite in commercially-available storage tanks that meet applicable codes for storage of hazardous materials, away from potential ignition sources.

It is anticipated that the potential air quality impacts to public health would be minor as the air emissions from the biorefinery would primarily be limited to low amounts of ethanol (approximately 25 pounds per year). Section 3.4 discusses impacts to air quality and the ambient air quality standards that represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare within a reasonable margin of safety.

Appropriate safety systems would be in the final biorefinery design to ensure compliance with national, state, and local codes. Storage facilities for the materials required to operate the biorefinery would be designed to minimize worker and public health risks, including being designed for spill containment and the control of releases. Material Safety Data Sheets and Personal Protective Equipment requirements would be made readily accessible to workers to ensure that employees are prepared to handle any required chemicals.

Algenol consulted with USDA's APHIS to determine if the hybrid algae would be considered regulated articles under the PPA. APHIS concluded that Algenol's hybrid algae are not derived from plant pests; are non-pathogenic for plants, animals, and humans; and are not known to confer any pest or pathogen characteristics on recipient organisms. Thus, APHIS determined that the hybrid algae are not considered plant pests and are not regulated under the PPA (USDA, 2010a).

Additionally, EPA would regulate the hybrid algae under TSCA and its implementing regulations (40 CFR Part 725) as microbial products of biotechnology. Algenol met with the Office of Pollution Prevention and Toxics at EPA to solicit their opinion on whether the biorefinery would be consistent with the regulatory exemption discussed in Section 2.4.2 of this EA. As a result of the meeting, EPA indicated that the project would fall under EPA's "contained structure" exemption provided under 40 CFR 725.234; thus, there would be no need to submit a TSCA application for the project to be conducted under those containment measures. DOE agrees that if Algenol's development, use, transportation, and disposal of hybrid algae would take place in contained facilities or vessels as planned, Algenol would qualify for EPA's "contained structure" exemption under 40 CFR 725.234 and would not need to submit a TSCA application for the proposed project.

Also, in order to prevent or minimize the consequences stemming from an accidental release of photobioreactor contents, an EH&S director would consider OSHA's Process Safety Management standard when developing standard operating procedures. Therefore, it is not expected that working with Algenol's hybrid algae would create a safety hazard for workers, the public, or the environment.

#### *3.13.2.2 Texas Site*

Since the distance to the closest sensitive receptor is approximately 2,600 feet (residences to the east on Oyster Creek Bend Road), it is expected that any incremental noise increase from construction of the biorefinery would significantly attenuate with distance and because of

vegetation and building structures located between the project site and the residences. Using the inverse square law to estimate projected sound levels, a 25-dBA level would occur at the closest receptor (not considering the buffering effects of vegetation and structures). Thus, incremental increases in sound levels during construction would not be significantly discernable above and beyond existing noise conditions at any of the sensitive receptors.

Algenol estimated that during operations of the biorefinery the sound level from the site would be approximately 17 dBA at the closest receptor (not considering the buffering effects of vegetation and structures). This contribution to the ambient sound level would not significantly increase the noise levels above and beyond current noise level characteristics of the project area (i.e., highway traffic on SH 332 and nearby industrial activities), and it is anticipated that noise abatement equipment would not be necessary.

At the Texas site, a detailed EH&S plan would be drafted in collaboration with Dow's EH&S department. The EH&S protocols for the biorefinery would be substantially similar to Dow's Freeport site operations. Dow would collaborate with Algenol on the development of EH&S policies and procedures based on or that meet the intent of applicable Dow safety standards. Dow would provide various emergency response services – the biorefinery would be tied into Dow's site-wide alert system for notifications and Dow's on-site , 24-hour emergency response personnel and equipment would respond as needed for fire, medical, and other emergencies. Exact details would be established in the development of lease agreements between Algenol and Dow. Furthermore, operation of the biorefinery would span approximately three years, after which, the facility would be decommissioned. Thus, safety impacts to the public are expected to be minor and temporary during operation of the biorefinery.

#### *3.13.2.3 Florida Site*

Since the distance to the closest sensitive receptor is approximately 1,500 feet (residences to the north on Fiddlesticks Boulevard), it is expected that any incremental noise increase from construction of the biorefinery would significantly attenuate with distance and because of vegetation, building structures, and a road located between the project site and the residences. Using the inverse square law to estimate projected sound levels, a 30-dBA level would occur at the closest receptor (not considering the buffering effects of vegetation and structures). Thus, incremental increases in sound levels during construction would not be significantly discernable above and beyond existing noise conditions at any of the sensitive receptors.

During operations of the biorefinery, the sound levels produced from the pumps and truck deliveries would not significantly increase the noise levels above and beyond current noise level characteristics of the project area (i.e., traffic on Lee Road and Alico Road and aircraft from the nearby airport), and it is not anticipated that noise abatement equipment would be necessary. It is estimated that the sound level from the site would be approximately 22 dBA at the closest receptor (not considering the buffering effects of vegetation and structures). In the event of an emergency, at the Florida site, local emergency services would be contacted consistent with established EH&S protocols.

### 3.13.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options and increased safety risks associated with the biorefinery would

not occur. Additional air emissions and emergencies, such as accidental spills and injuries to workers, would not occur and, therefore, no impacts to the public health would be expected.

## 3.14 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

### 3.14.1 Existing Conditions

The existing conditions for socioeconomics and environmental justice describe population, income, housing, and labor force characteristics in a comparative manner from the smallest geographic units in the immediate vicinity of the sites (census tracts and blocks, municipalities, or counties depending on the parameter reported) to increasingly larger geographic areas (municipalities, counties, states, and the nation depending on the parameter reported). This comparative approach provides a general idea of how characteristics immediately surrounding the sites, which have the greatest potential to be impacted by the Proposed Action, relate to trends at larger geographic scales. This approach is particularly important in terms of ascertaining the potential for disproportionate adverse impacts to populations for environmental justice concerns.

#### *3.14.1.1 Texas Site*

Table 3-10 provides a summary of population characteristics in the area of the Texas site. The project site is located in unincorporated Brazoria County, just outside of the City of Freeport, in eastern Texas along the Gulf Coast. The population of Freeport was estimated by the U.S. Census Bureau as 12,708 in 2000, though 2008 estimated data is not available. In 2000, Freeport's population accounted for 5.9 percent of the total population of Brazoria County. From 1990 through 2008, the populations of the U.S., Brazoria County, and Texas increased steadily; from 1990 through 2000 Freeport's population grew at a lower rate than Brazoria County or Texas as a whole (U.S. Census Bureau, 2010).

**Table 3-10. Comparative Population – Texas Site (1990-2008)**

| Area | 1990 Population | 2000 Population | Percent Change (1990-2000) | 2008 Population Estimate | Estimated Percent Change (2000-2008) |
|---|---|---|---|---|---|
| United States | 248,709,873 | 281,421,906 | 13.2% | 304,059,728 | 8.0% |
| Freeport | 11,389 | 12,708 | 11.6% | Not Available | Not Available |
| Brazoria County | 191,707 | 241,767 | 26.1% | 301,044 | 24.5% |
| Texas | 16,986,510 | 20,851,820 | 22.8% | 24,326,974 | 16.7% |

Source: U.S. Census Bureau, 2010.

Table 3-11 provides a summary of the population composition and poverty status of the areas around the Texas Site based on the 2000 census. The population in the immediate area of the site (Census Tract 6642, Block Group 1) is predominantly white alone with a higher percentage than all of Freeport, all of Brazoria County, all of Texas, and all of the U.S. Within the immediate area of the project site (Census Tract 6642, Block Group 1), the proportion of minority races (15.3 percent) and Hispanic or Latinos (15.1 percent) are much lower than in all of Freeport, all of Brazoria County, or all of Texas. The proportion of minority races is also lower than the value for the U.S. as a whole (24.8 percent); however, the percentage of Hispanics or Latinos is slightly higher. The minority race population composition of all of Brazoria County (22.9 percent) is similar to the U.S. as a whole percentage (24.8 percent); however, in the county, there is a larger percentage of Hispanics or Latinos. Freeport as a whole has a relatively large

percentage of people that identify themselves as Hispanic or Latino (52 percent), considerably higher than all of Brazoria County, all of Texas, or the U.S. as a whole (U.S. Census Bureau, 2010).

Poverty levels in the immediate vicinity of the Texas site (Census Tract 6642, Block Group 1) are higher for individuals (17.4 percent) and families (12.9 percent) than in all of Brazoria County, all of Texas, or the U.S. as a whole. Freeport as a whole has the highest poverty proportion for both individuals (22.9 percent) and families (22.3 percent) of all the geographic areas included; however, all of Brazoria County has the lowest for both individuals (10.2 percent) and families (8.1 percent) (U.S. Census Bureau, 2010).

**Table 3-11. Population Composition and Poverty Status – Texas Site (2000)**

| Parameter | Census Tract 6642, Block Group 1 | Census Tract 6642 | Freeport | Brazoria County | Texas | United States |
|---|---|---|---|---|---|---|
| Population Proportion of White Alone | 84.7% | 89.4% | 61.2% | 77.1% | 70.1% | 75.1% |
| Population Proportion of Black or African American Alone | 3.8% | 2.9% | 13.3% | 8.5% | 11.5% | 12.3% |
| Population Proportion of Other Minority Races | 11.5% | 7.8% | 25.1% | 14.4% | 17.5% | 12.5% |
| Population Proportion with Ethnicity Hispanic or Latino (of any race) | 15.1% | 10.9% | 52.0% | 22.8% | 32.0% | 12.5% |
| Proportion of Individuals with Incomes Below the Poverty Level | 17.4% | 16.7% | 22.9% | 10.2% | 15.4% | 12.4% |
| Proportion of Families with Incomes Below the Poverty Level | 12.9% | 12.3% | 22.3% | 8.1% | 12.0% | 9.2% |

Source: U.S. Census Bureau, 2010.

Table 3-12 provides a summary of housing characteristics in the area of the Texas site. Housing availability in all of Freeport and all of Brazoria County in 2008 was lower than the U.S. as a whole and Texas as a whole figures. Brazoria County as a whole had a higher percentage of owner-occupied housing than in all of Texas and the U.S. as a whole. Local housing rental rates in Brazoria County as a whole were lower than in all of Texas or the U.S. as a whole; however, home values were greater than Texas as a whole (U.S. Census Bureau, 2010).

**Table 3-12. Housing Characteristics – Texas Site (2008)**

| Area | Housing Units | Vacancy Rate | Percentage Owner Occupied | Percentage Renter Occupied | Median Value | Median Contract Rent |
|---|---|---|---|---|---|---|
| United States | 129,060,383 | 12.4% | 66.6% | 33.4% | $197,600 | $687 |
| Brazoria County | 116,066 | 11.0% | 74.9% | 25.1% | $143,700 | $600 |
| Texas | 9,599,073 | 12.3% | 64.9% | 35.1% | $126,800 | $614 |

Source: U.S. Census Bureau, 2010.
Note: 2008 data for Freeport not available.

Table 3-13 provides a summary of estimated labor force and income characteristics in the area of the Texas Site for 2006 through 2008, though data for Freeport was not available. The total civilian labor force in all of Brazoria County consisted of 143,941 individuals, while the unemployment rate was 4.6 percent. This unemployment rate compares favorably to Texas as a whole and the U.S. as a whole, being at least one whole percentage point below the two rates. The median per capita income in all of Brazoria County was very similar to the U.S. as a whole and higher than Texas as a whole. The major employment sectors in all of Brazoria County were: education, health, and social services (19.1 percent); manufacturing (14.6 percent); construction (10.9 percent); professional, scientific, and management, and administrative and waste management services (10.7 percent); and retail trade (10.0 percent) (U.S. Census Bureau, 2010).

**Table 3-13. Estimated Labor Force and Income Characteristics – Texas Site (2006-2008)**

| Area | Civilian Labor Force | Percentage Unemployed | Median Per Capita Income |
|---|---|---|---|
| United States | 152,908,982 | 6.4% | $27,466 |
| Brazoria County | 143,941 | 4.6% | $27,260 |
| Texas | 11,729,165 | 6.0% | $24,709 |

Source: U.S. Census Bureau, 2010.
Note: Data for Freeport is not available.

### *3.14.1.2 Florida Site*

Table 3-14 provides a summary of population characteristics in the area of the Florida site. The project site is located in Fort Myers, Lee County on the western coast of south Florida. The population of Fort Myers was estimated at 60,700 by the U.S. Census Bureau in 2008. In 2008, Fort Myers' population accounted for 10.2 percent of the total population of Lee County. From 1990 through 2008 the populations of the U.S. as a whole, Florida as a whole, and Lee County as a whole increased steadily; it is estimated that Fort Myers' population grew at a considerably higher rate from 2000 to 2008 (34.5 percent) than from 1990 to 2000 (6.6 percent) (U.S. Census Bureau, 2010).

**Table 3-14. Comparative Population – Florida Site (1990-2008)**

| Area | 1990 Population | 2000 Population | Percent change (1990-2000) | 2008 Population Estimate | Estimated Percent change (2000-2008) |
|---|---|---|---|---|---|
| United States | 248,709,873 | 281,421,906 | 13.2% | 304,059,728 | 8.0% |
| Fort Myers | 45,206 | 48,208 | 6.6% | 60,700 | 25.9% |
| Lee County | 335,113 | 440,888 | 31.6% | 593,136 | 34.5% |
| Florida | 12,937,926 | 15,982,378 | 23.5% | 18,328,340 | 14.7% |

Source: U.S. Census Bureau, 2010.

Table 3-15 provides a summary of the population composition and poverty status of the areas around the Florida site based on the 2000 census. The population in the immediate area of the site option (Census Tract 401.07, Block Group 2) is predominantly white alone with a higher percentage than all of Fort Myers, all of Lee County, all of Florida, and the U.S. as a whole. Within the immediate area (Census Tract 401.07, Block Group 2), the proportion of minority races (1.6 percent) and Hispanic or Latinos (1.7 percent) are much lower than in all of Fort Myers, all of Lee County, all of Florida and the U.S. as a whole. The minority race population

composition of Lee County as a whole (12 percent) as well as Hispanics or Latinos (9.5 percent) is lower than in both Florida as a whole and the U.S. as a whole. Fort Myers as a whole has a relatively high percentage of minority races (43.7 percent), while the proportion of Hispanics or Latinos is similar to Florida as a whole and the U.S. as a whole (U.S. Census Bureau, 2010).

Poverty levels in the immediate vicinity of the Florida Site (Census Tract 401.07, Block Group 2) are lower for individuals (5.0 percent) and families (7.7 percent) than in all of Florida and the U.S. as a whole; they are less than Lee County as a whole for individuals, but slightly higher for families. Fort Myers as a whole has the highest poverty proportion for both individuals (21.8 percent) and families (18.1 percent) of all the geographic areas included. Lee County as a whole has lower poverty proportions for individuals (9.7 percent) and families (6.7 percent) than either Florida as a whole or the U.S. as a whole (U.S. Census Bureau, 2010).

**Table 3-15. Population Composition and Poverty Status – Florida Site (2000)**

| Race | Census Tract 401.07, Block Group 2 | Census Tract 401.07 | Fort Myers | Lee County | Florida | United States |
|---|---|---|---|---|---|---|
| Population Proportion of White Alone | 98.3% | 95.7% | 56.4% | 87.7% | 78.0% | 75.1% |
| Population Proportion of Black or African American Alone | 0.6% | 1.1% | 33.4% | 6.6% | 14.6% | 12.3% |
| Population Proportion of Other Minority Races | 1.0% | 3.1% | 10.3% | 5.7% | 7.4% | 12.5% |
| Population Proportion with Ethnicity Hispanic or Latino (of any race) | 1.7% | 3.5% | 14.5% | 9.5% | 16.8% | 12.5% |
| Proportion of Individuals with Incomes Below the Poverty Level | 5.0% | 4.1% | 21.8% | 9.7% | 12.5% | 12.4% |
| Proportion of Families with Incomes Below the Poverty Level | 7.7% | 5.0% | 18.1% | 6.7% | 9.0% | 9.2% |

Source: U.S. Census Bureau, 2010.

Table 3-16 provides a summary of housing characteristics in the area of the Florida Site. Housing availability in all of Fort Myers and all of Lee County in 2008 was considerably greater than the U.S. as a whole or Florida as a whole. While Lee County as a whole had a higher percentage of owner-occupied housing than all of Florida and the U.S. as a whole, Fort Myers as a whole had a proportion of renter-occupied homes that is considerably higher than all of Florida or the U.S. as a whole. Local housing values and rental rates in all of Fort Myers were lower than in Florida as a whole; however, home values and rental rates for Lee County as a whole were comparable to all of Florida (U.S. Census Bureau, 2010).

**Table 3-16. Housing Characteristics – Florida Site (2008)**

| Area | Housing Units | Vacancy Rate | Percentage Owner Occupied | Percentage Renter Occupied | Median Value | Median Contract Rent |
|---|---|---|---|---|---|---|
| United States | 129,060,383 | 12.4% | 66.6% | 33.4% | $197,600 | $687 |
| Fort Myers | 34,464 | 30.0% | 41.5% | 58.5% | $176,000 | $772 |
| Lee County | 364,948 | 33.2% | 75.0% | 25.0% | $211,700 | $828 |
| Florida | 8,798,213 | 19.8% | 69.7% | 30.3% | $218,700 | $808 |

Source: U.S. Census Bureau, 2010.

Table 3-17 provides a summary of estimated labor force and income characteristics in the area of the Florida Site for 2006 through 2008. The total civilian labor force in all of Lee County consisted of 273,729 individuals, while the unemployment rate was 6.5 percent. This unemployment rate compares favorably to Florida as a whole and the U.S. as a whole; however, in Fort Myers as a whole the unemployment rate was 7.6 percent for a civilian labor force of 29,803, approximately one full percentage point higher than in Lee County as a whole, Florida as a whole, and the U.S. as a whole. The median per capita income in Lee County as a whole was higher than in all of Florida and in all of the U.S.; however, in all of Fort Myers it was considerably lower. The major employment sectors in Lee County as a whole were: education, health, and social services (17.6 percent); construction (15.5 percent); retail trade (14.3 percent); professional, scientific, and management, and administrative and waste management services (11.1 percent); and arts, entertainment, and recreation, and accommodation, and food services (10.1 percent). The major employment sectors in Fort Myers as a whole were: construction (21.0 percent); education, health, and social services (20.7 percent); retail trade (12.9 percent); and professional, scientific, and management, and administrative and waste management services (10.0 percent) (U.S. Census Bureau, 2010).

**Table 3-17. Estimated Labor Force and Income Characteristics – Florida Site (2006-2008)**

| Area | Civilian Labor Force | Percentage Unemployed | Median Per Capita Income |
|---|---|---|---|
| United States | 152,908,982 | 6.4% | $27,466 |
| Fort Myers | 29,803 | 7.6% | $23,985 |
| Lee County | 273,729 | 6.5% | $30,693 |
| Florida | 8,914,541 | 6.4% | $27,151 |

Source: U.S. Census Bureau, 2010.

## 3.14.2 Environmental Consequences of the Proposed Action

### *3.14.2.1 Common Impacts*

During construction for either of the site options, no housing or commercial facilities would need to be demolished as both site options currently consist of vacant land. Construction of the biorefinery would require approximately 25 workers at any given time to be onsite for up to approximately six months. It is expected that these workers could be hired from the available labor pool in the areas of either of the site options, which are sufficiently large to absorb this demand without negatively impacting labor availability. Considering that the number of

construction workers is relatively small, impacts on the local populations, economies, and housing markets in the areas around either of the site options would be negligible.

Operation of the biorefinery at either of the site options would be expected to result in the creation of up to 25 full-time jobs. This would likely result in a minor, but beneficial, impact on the local economy by providing additional employment opportunities and increasing indirect spending on local businesses.

It is expected that operation of the biorefinery would have minor impacts on local housing demand or labor pools, because of the relatively low number of new jobs that would be created. Both site options are located in industrial/office areas and neither have any residences within 0.25 miles of them. Thus, operational impacts on local housing values would be expected to be negligible, as impacts from air emissions, traffic, and noise would be minor (see Sections 3.4, 3.12, and 3.13, respectively).

#### *3.14.2.2 Texas Site*

The biorefinery would result in the loss of 26 acres of land that is periodically harvested for cattle grazing. The property is currently owned by Dow. Negligible economic impacts to agricultural interests of losing this land for feed for cattle would result as the size of the property is relatively small, leasing suitable land in the general area would be possible, and Dow could continue to lease adjacent property for grazing. Furthermore, the impact would be temporary as the biorefinery would be decommissioned after its three-year operation.

At the Texas site there is little likelihood of the occurrence of disproportionately adverse impacts on minorities or below-poverty individuals and families. In 2000, the immediate neighborhood of the site (Census Tract 6642, Block Group 1) was predominantly white alone with relatively low proportions of minority races (15.3 percent) and Hispanics or Latinos (15.1 percent) when compared to Brazoria County and Texas. The proportion of incomes below the poverty level for individuals (17.4 percent) and families (12.9 percent) is higher than Brazoria County and Texas; however, it is not a substantial difference from the Texas proportions (individuals – 15.4 percent; families – 12.0 percent).

#### *3.14.2.3 Florida Site*

At the Florida site there is little likelihood of the occurrence of disproportionately adverse impacts on minorities or below-poverty individuals and families. In 2000, the immediate neighborhood of the site (Census Tract 401.07, Block Group 2) was predominantly white alone with very low proportions of minority races (1.6 percent) and Hispanics or Latinos (1.7 percent). In addition, the proportions of incomes below the poverty level for individuals (5.0 percent) and families (7.7 percent) were also relatively low when compared to Lee County and Florida.

### 3.14.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the biorefinery would not occur at either of the site options and impacts to socioeconomic and environmental justice would not occur, including the potential minor beneficial impacts on the local economy resulting from direct and indirect job creation and increased local spending.

# 4.0 CUMULATIVE IMPACTS OF THE PROPOSED ACTION

The CEQ regulations implementing NEPA require the consideration of cumulative impacts as part of the process (40 CFR 1508.7):

*"Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time."*

This section analyzes potential cumulative impacts to selected resource areas described throughout Chapter 3. The effects associated with the proposed project are analyzed in combination for their incremental contribution to cumulative effects when added to impacts from other planned and reasonably foreseeable actions. For an affected resource area, each reasonably foreseeable future action, including the Proposed Action, adds an increment to the total (cumulative) impact. For this analysis, the past and present effects are accounted for in the existing baseline of the affected environment section of this EA.

## 4.1 EXISTING AND REASONABLY FORESEEABLE PROJECTS

For future actions to be relevant to the cumulative effects analysis, the actions must affect resources (be the cause of some type of effect whether beneficial or adverse) within the region of influence for the analysis. For the Texas site option, the region of influence for this project is within property boundaries, Brazoria County, or the Austin-Oyster Creek Watershed, depending on the environmental resource area. For the Florida site option, the region of influence for this project is within property boundaries, Lee County, or the Everglades West Coast Basin Watershed, depending on the environmental resource area.

DOE is not aware of any major planned future developments in the region of influence for the Texas site. The only known planned future projects in the area consist of TXDOT road improvements to SH 288 and SH 332, approximately five miles west of the Texas site, and to FM 523 north of its intersection with SH 332 just east of the Texas site. SH 288/332 is currently being improved to add two-lane frontage roads in each direction where the roadway passes through the City of Clute and several new hotels have been constructed. Plans are in place to widen FM 523 from a two-lane road to four lanes (Brazoria County, 2006). DOE contacted the Building Departments of the cities of Clute and Freeport for information on potential future projects that could cause cumulative impacts with the biorefinery and both departments responded that no major building permit applications have been submitted in their cities other than for residential developments.

There are several plans for development projects in the area of the Florida site; most notable are plans to continue with additional industrial developments along Lee Road. In addition, Lee County is planning for additional industrial and research and development-type facilities to be developed along Alico Road near the Florida site. The aforementioned projects would have the greatest potential to cause cumulative impacts in conjunction with the biorefinery; however, additional projects in the general area include the development of a sports training complex and an expansion of existing office facilities several miles away from the Florida site on Daniels

Parkway. The South Florida Regional Airport is also planning to add an additional runway (Blackwell, 2010).

Other than those mentioned above, DOE is not aware of any other known or anticipated projects in the areas of the sites. It is anticipated that new residential development projects would occur in the areas of the sites; however, no plans are currently in place for any major subdivisions.

## 4.2 ENVIRONMENTAL CONSEQUENCES

### 4.2.1 Land Use

Texas Site

Development of the biorefinery would convert up to 26 acres of pastureland to an industrial land use. The biorefinery would operate for approximately three years; after decommissioning the land would be reclaimed as pastureland. The surrounding area is mainly industrial; therefore, the biorefinery would be compatible with adjacent land uses. The proposed TXDOT road improvement projects would not be expected to impact the land use.

Florida Site

Development of the biorefinery would convert up to 33 acres of vacant land (containing herbaceous vegetation) to an industrial land use. The Florida biorefinery would be a permanent facility that would operate for its entire useful lifespan (estimated at approximately 25 years). Lee County has been supportive of Algenol operations in the area and has provided funding for Algenol's R&D facility. A letter from the Southwest Florida Regional Planning Council has designated the proposed project as "Regionally Significant and Consistent" with local planning policies and plans; therefore, in terms of cumulative land use concerns it is considered that the biorefinery would be beneficial in terms of advancing Lee County's land use plans for the area. Development of additional industrial and research and development facilities would be compatible with the biorefinery and Lee County's land use plans for the area.

### 4.2.2 Visual Resources

Texas Site

Development of the biorefinery would not be expected to cause any cumulative impacts to the visual resources as the Texas site is adjacent major industrial facilities and sensitive properties (e.g., residences) would have minimal views of the site. The TXDOT road improvement projects would have minor impacts to the aesthetic quality in the area as these would be temporary activities.

Florida Site

Development of the biorefinery would not be expected to cause any cumulative impacts to aesthetics as the Florida site is adjacent to existing office/industrial land uses and it is unlikely that any sensitive properties (e.g., residences, schools, etc.) would have views of the site. Development of additional industrial and research and development facilities along Lee and Alico Roads, as planned by Lee County, would result in moderate changes to the aesthetic character of the areas from undeveloped, vegetated land to office-type buildings and potentially other structures of an industrial visual character.

### 4.2.3 Cultural Resources

Texas Site

There is a low potential for development of the biorefinery to impact cultural resources as there are no NRHP-listed sites within the APE and there is a low potential for the presence of archaeological artifacts due to historic ground disturbances onsite. It is unlikely that the road improvement projects would impact cultural resources as they would likely affect relatively small land areas that have historically been disturbed considering they would be adjacent to existing roads; as such, no cumulative impacts are expected.

Florida Site

There is a low potential for development of the biorefinery to impact cultural resources as there are no NRHP-listed sites within the APE and there is a low potential for the presence of archaeological artifacts due to historic ground disturbances onsite. Additional industrial and research and development projects in the area could impact cultural resources; however, additional development along Lee Road would occur on land similar in nature to the Florida site (previously disturbed) in the same general area of the site; thus, the potential for impacts to cultural resources would also be considered low. It is currently unknown what the potential for impacts would be for additional developments along Alico Road; potential cumulative impacts could range from low to high depending on the extent of ground-disturbing activities and would likely be determined by the state of Florida's Division of Historical Resources.

### 4.2.4 Air Quality

In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change stated that warming of the earth's climate system is unequivocal, and that the warming is very likely due to anthropogenic greenhouse gas (GHG) concentrations (IPCC, 2007). The most abundant, anthropogenic GHG is $CO_2$, and fossil fuel burning is the primary contributor to increasing concentrations of $CO_2$. Because $CO_2$ is stable in the atmosphere and essentially uniformly mixed, climatic impact does not depend on the geographic location of sources. Therefore, an increase of $CO_2$ emissions at a specific source effectively alters $CO_2$ concentrations to the extent that it contributes to the global total of fossil fuel burning that increases global $CO_2$ concentrations. Anthropogenic emissions of $CO_2$ from fossil fuel combustion are recognized as a significant source of GHGs that enhance radiative forcing and contribute to global warming and climate change.

The biorefinery uses innovative biotechnology to produce ethanol fuel using algae and $CO_2$ sources. One of the primary objectives of this project is to improve the efficiency of the process and increase yields of ethanol, which could replace the use of conventional fossil fuels, while at the same time demonstrate low-cost carbon capture technology. Thus, to the extent that non-renewable energy sources (such as fossil fuels) would continue to be used and $CO_2$ emissions would continue to be released into the atmosphere, any associated impacts upon global climate change from these sources would also continue. Because the only direct emissions from the biorefinery would be from minor amounts of ethanol and oxygen, direct GHG emissions are expected to be limited to the transportation of materials and wastes. The emission levels from vehicles are expected to be minor as truck deliveries to the site are expected to range from 4 to 10 trucks a day. It is expected that the demonstration of the biorefinery could lead to GHG reduction by resulting in commercial-scale facilities that provide substantial $CO_2$ consumption

and generate biofuels that use less energy to produce than other current methods of biofuel production and emit less GHGs than conventional fossil fuels.

Texas Site

The biorefinery would emit low amounts of ethanol (less than 25 pounds per year) and the increase in vehicle usage from personnel and truck deliveries are expected to be minimal; the Texas biorefinery would be decommissioned after three years, so these impacts would be temporary. The TXDOT road improvements would result in increases in air pollutants and would temporarily exacerbate ozone levels in the region. The increase in vehicles in the area (from an increase in the population) and possibly from increased industrial activities in the region could also exacerbate the ozone nonattainment status in the Houston-Galveston-Brazoria area. The SIP currently includes ongoing efforts to control ozone in the area in order meet an attainment status (based on the 1997 ozone standard) by June 2019 (TCEQ, 2010).

Florida Site

The biorefinery would emit low amounts of ethanol (less than 25 pounds per year) and the increase in vehicle usage from personnel and truck deliveries are expected to be minimal. The potential for additional industrial developments and expansion of existing facilities along Alico Road and a general population increase in Lee County would increase the number of vehicles in the area and increase energy use. Also, the addition of a runway at the nearby regional airport could mean increased aircraft traffic. All of these new activities would contribute to an overall increase in air pollutants, including GHGs.

The EPA has proposed to strengthen the NAAQS for ozone from the current level of 0.075 parts per million (8-hour average) to a level in the range of 0.060-0.070 parts per million (EPA is scheduled to issue a final, revised ozone standard by August 31, 2010). Depending on where in the proposed range the revised ozone standard is set, 9 to 30 counties in Florida could be designated nonattainment for ozone, including Lee County (if the new standard is set at 0.060 parts per million or 0.065 parts per million) (FDEP, 2010). As a result, Florida would be required to revise its SIP. The SIP revision would address all sources of VOCs and NOx, precursors to ozone formation. These sources include large and small industrial sources, cars and trucks, off-road equipment, and natural emissions.

### 4.2.5 Geology and Soils

Texas Site

Up to 26 acres of soils would be disturbed by development of the biorefinery and the majority of this land area would consist of impervious surfaces except for the gravel roads and parking lot. Onsite soil erosion would occur; however, implementation of a SWPPP and standard BMPs would minimize potential soil erosion impacts. It is not expected that the TXDOT road improvement projects would cause much of a permanent impact on geology and soils aside from the road widening creating additional impervious surfaces over soils in the road ROWs.

Florida Site

Up to 33 acres of soils would be disturbed by development of the biorefinery and the majority of this land area would consist of impervious surfaces except for the gravel roads and parking lot. On-site soil erosion would occur; however, implementation of a SWPPP and

standard BMPs would minimize potential soil erosion impacts. The majority of on-site soils are classified as farmland soils of unique importance; however, the site is not currently used for agricultural purposes and it is unlikely to be used future for agricultural purposes as Lee County is planning to develop this area for new industry. Development of the area for additional industrial and research and development projects would further disturb soil resources, including farmland soils of unique importance, and create impervious surfaces potentially over a large land area. Soils would not be available for agricultural production; however, farmland soils of unique importance are not required for cattle grazing land and crop production currently does not occur in the area. Overall cumulative impacts are expected to range from minor to moderate as soils would likely be disturbed from the potential development along Alico Road.

### 4.2.6 Groundwater

Texas Site

Development of the biorefinery would be expected to cause minor impacts to local groundwater resources primarily resulting from minimal amounts of potable water requirements to be supplied through the local public water supply system. A SWPPP would be implemented to reduce the potential for stormwater runoff contaminated with toxic materials to infiltrate into the groundwater. The TXDOT proposed road improvements would not be expected to impact groundwater resources as these projects would also follow NPDES guidelines to reduce the contamination of stormwater runoff.

Florida Site

Development of the biorefinery would be expected to have low impacts to local groundwater resources as a result of operation of the ASR well. Both the withdrawal of groundwater (at a rate of 50 gallons per minute) and injection of wastewater would occur in saline aquifers that have too great a salinity to be used as drinking water. The City of Fort Myers public water supply wells are drilled to approximately 800 feet below ground surface in the Upper Floridan aquifer, while the project would use water from depths below 1,500 feet in the Lower Floridan aquifer. Each of these aquifers are hydraulically distinct from each other. Potential impacts to groundwater quality from the injection of wastewater would be minimized through compliance with water quality regulations under the UIC permitting program as well as the fact that the wastewater would be injected at a depth below locations of usable drinking water supplies.

Currently, there are no known planned development projects in the area that would utilize deep groundwater resources in a similar manner to the biorefinery. It is unlikely that the additional industrial and research and development projects would draw saline water from the Lower Floridan Aquifer as Algenol's use of this water is a fairly unique project characteristic; however, it is possible that additional wastewater disposal wells could be developed. If this were to occur area groundwater quality could be reduced from additional wastewater injections; however, the FDEP's regulation of these wells under the UIC permitting program would be expected to minimize the overall cumulative effect, particularly with respect to drinking water supplies. The additional industrial and research and development projects may utilize potentially toxic materials that could contaminate groundwater; however, providing adequate stormwater management and pollution prevention measures would minimize the risk.

### 4.2.7 Surface Water

Texas Site

Development of the biorefinery would create impervious surfaces over the majority of the site which would increase stormwater generation rates and runoff to receiving waterbodies, though implementation of a SWPPP and standard BMPs would minimize the potential for contaminants to enter the receiving waters. Seawater for the photobioreactors would be obtained from a canal on Dow's property through an existing water intake structure at a rate of 3.6 million gallons per year; Dow's extensive canal system would have a more than adequate capacity to supply the seawater. The proposed TXDOT road improvements would also create additional impervious surfaces, which would lead to increases in stormwater runoff and water pollutants to receiving water bodies and increase the potential of localized flooding.

Florida Site

Development of the biorefinery would create impervious surfaces over the majority of the site which would increase stormwater generation rates and runoff to receiving waterbodies, though implementation of a SWPPP and standard BMPs would minimize the potential for contaminants to enter the receiving waters. The additional industrial and research and development projects along Lee and Alico Roads would also create large areas of impervious surfaces that would generate additional stormwater runoff to receiving waterbodies. For the properties along the east side of Lee Road a canal system for stormwater management has already been constructed in anticipation of development, which outflows into a ditch along Alico Road. The increases in impervious area would lead to increases in stormwater runoff and pollutants and increase the potential for flooding.

### 4.2.8 Floodplains and Wetlands

Texas Site

No floodplains would be impacted at the Texas site; therefore, no cumulative impacts to floodplains would result. Development of the site would require filling up to 26 acres of wetlands, which may be considered isolated and not under federal jurisdiction (a wetland delineation report has been submitted to USACE to determine the jurisdictional status of onsite wetlands; to date no response has been received from USACE). It is possible that the proposed TXDOT road improvement projects may impact some wetland areas though it would be unlikely as road widening would occur to existing roads and ROWs.

Florida Site

No floodplains would be impacted at the Florida site; therefore, no cumulative impacts to floodplains would result. Although NWI mapping shows wetlands located at the site, these wetlands do not currently exist (see Section 3.8 for more information) therefore, no cumulative impacts to wetlands would result from development of the biorefinery.

### 4.2.9 Biological Resources

Texas Site

Construction of the biorefinery at the Texas site would result in the removal of 26 acres of herbaceous and scrub-shrub vegetation and associated wildlife habitat, which is considered to

generally be of low quality. The planned TXDOT road improvement projects would not be expected to impact similar habitats as these projects would primarily occur along/within existing road right-of-ways where land has already been disturbed or developed. It is not expected that any state- or federally-protected species would be impacted at the Texas site.

Florida Site

Construction of the biorefinery at the Florida site would result in the removal of approximately 33 acres of herbaceous vegetation and associated wildlife habitat, which is considered to generally be of low quality. The planned industrial and research and development projects along Lee and Alico Roads would likely require the removal of similar vegetation and habitats as well and it is possible that all or the majority of this habitat type in the immediate vicinity of the Florida site could ultimately be removed for development. The habitat is generally considered low quality and is, therefore, not expected to result in significant impacts to biological resources; however, over time any wildlife utilizing it would be required to relocate or perish. It is not expected that any state- or federally-protected species would be impacted at the Florida site.

### 4.2.10 Waste Management and Hazardous Materials

Texas Site

It is expected that waste volumes generated at the biorefinery would be negligible and would not cause a noticeable difference in local waste management and disposal capacities. In addition, the storage and handling of hazardous materials would not be expected to cause any appreciable environmental impacts as protective measures, BMPs, and employee training would be expected to substantially minimize the potential for environmental releases of toxic materials. TXDOT's road improvement projects in the area would likely result in increased non-hazardous waste disposal needs in local disposal facilities during construction; however, operation of the roads would not result in additional wastes requiring disposal. These waste disposal needs would cause a cumulative impact in terms of reducing currently available waste disposal capacities; however, it is expected that the biorefinery's contribution would be negligible.

Florida Site

It is expected that waste volumes generated at the biorefinery would be negligible and would not cause a noticeable difference in local waste management and disposal capacities. In addition, the storage and handling of hazardous materials would not be expected to cause any appreciable environmental impacts as protective measures, BMPs, and employee training would be expected to substantially minimize the potential for environmental releases of toxic materials. Additional industrial and research and development projects in the area of the Florida site would result in additional non-hazardous and, possibly, hazardous waste disposal needs, which would cause a cumulative impact in terms of reducing currently available waste disposal capacities; however, it is expected that the biorefinery's contribution would be negligible.

### 4.2.11 Infrastructure

Texas Site

It is expected that local utilities would be capable of supporting the needs of the biorefinery within existing capacities. TXDOT's road improvements in the area would not be expected to cause an increased strain on local utility capacities.

Florida Site

It is expected that local utilities would be capable of supporting the needs of the biorefinery within existing capacities. Additional industrial and research and development projects in the area of the Florida site would result in additional needs for local utility services, which would cause a cumulative impact in terms of reducing currently available service capacities; however, it is expected that the biorefinery's contribution would be minor. As these additional projects are implemented, local utility providers may need to upgrade existing service infrastructure in the area (e.g., replacing existing potable water supply pipelines with larger diameter pipelines and adding new electrical substations).

### 4.2.12 Transportation and Traffic

Texas Site

It is expected that development of the biorefinery would cause minor traffic congestion as a result of employee traffic and materials and waste deliveries to and from the site (estimated at 85 daily trips total); however, current LOSs would be maintained as existing roadways would be adequate to handle the increase in vehicle trips. TXDOT's road improvements in the area would ultimately be expected to have a beneficial impact on traffic congestion as additional lanes would be developed for motorists to use.

Florida Site

It is expected that development of the biorefinery would cause minor traffic congestion as a result of employee traffic and materials and waste deliveries to and from the site (estimated at 78 daily trips total); however, current LOSs would be maintained as existing roadways would be adequate to handle the increase in vehicle trips. Additional industrial and research and development projects in the area of the Florida site could substantially increase local traffic congestion for employee commuting trips and materials deliveries. The state of Florida is planning on adding additional lanes to the interchange between Interstate 75 and Alico Road, which would help minimize overall congestion at this intersection. Considering that Lee County is planning for these additional developments in the area it is expected adequate infrastructure would be maintained or developed, as necessary, to maintain acceptable LOSs.

### 4.2.13 Public Health and Safety

Texas Site

It is not expected that the biorefinery would cause any substantial impacts to public safety and there would be no operations conducted at the biorefinery that would be expected to appreciably contribute to increased local noise levels. Overall, traffic would increase slightly and materials deliveries to and from the site via truck would cause increased sound levels during loading/unloading; however, relatively few instances of deliveries would occur (possibly 10

truck trips per day). The TXDOT road improvement projects would not be expected to cause adverse health and safety impacts and would likely have a beneficial impact on traffic safety; minor increases in local sound levels from vehicles along major roadway corridors would be expected as increased population and, thus, increased traffic volumes would occur.

Florida Site

It is not expected that the biorefinery would cause any substantial impacts to public safety and there would be no operations conducted at the biorefinery that would be expected to appreciably contribute to increased local noise levels. Overall, traffic would increase slightly and materials deliveries to and from the site via truck would cause increased sound levels during loading/unloading; however, relatively few instances of deliveries would occur (possibly three deliveries per day). Overall, additional industrial and research and development projects in the area may cause adverse public health and safety impacts depending on the specific nature of the facilities. It would be expected that the local noise environment would change substantially; however, it is expected that potential land use changes would be compatible to minimize impacts to nearby residential areas.

### 4.2.14 Socioeconomics and Environmental Justice

Texas Site

It is expected that development of the biorefinery would have an overall minor beneficial impact on the local economy and job markets as 25 full time employees would be required for operations and no adverse impacts would be expected. It is not expected that disproportionately adverse impacts on minority or low income populations would occur. The TXDOT road improvement projects would not be expected to cause any impacts to socioeconomics and environmental justice.

Florida Site

It is expected that development of the biorefinery would have an overall minor beneficial impact on the local economy and job markets as 25 full time employees would be required for operations and no adverse impacts would be expected. It is not expected that disproportionately adverse impacts on minority or low income populations would occur. Additional industrial and research and development projects in the area would be expected to have a beneficial impact on the local economy by creating jobs and stimulating spending in local businesses. In addition, housing demand would likely increase, which could have a positive impact on local home values.

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# 5.0 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY; IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS; AND UNAVOIDABLE ADVERSE IMPACTS

## 5.1 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The CEQ regulations require consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). Short-term use of the environment, as used here, is that used during the life of the project, whereas long-term productivity refers to the period of time after the project has been decommissioned, the equipment removed, and the land reclaimed and stabilized. Construction and operation of the biorefinery would require short-term uses of land and other resources. These pertain to the activities that have been described throughout Chapters 3 and 4 and include such effects as: aesthetic impacts from the conversion of vegetated, undeveloped land to an industrial facility; impacts on air quality from fugitive dust emissions during construction and minor emissions from the biorefinery; erosion and sedimentation impacts on surface waters, which generally would be mitigated through the use of required control measures; loss of wetlands (for the Texas site), vegetation, and wildlife habitat caused by land-clearing activities; impacts on the capacity of public utility services such as drinking water and wastewater treatment systems; impacts to water resources from the use of groundwater (for the Florida site) and surface water (for the Texas site) for process water needs; and traffic impacts attributable to the transport of personnel and materials to/from the site.

With respect to long-term productivity, the Proposed Action would support DOE's objective of demonstrating and promoting innovative biotechnologies that can provide the nation with clean, reliable, and affordable energy without relying on foreign oil. The long-term benefit of the proposed project would be to demonstrate innovative biofuel manufacturing processes that use less energy than current conventional methods of biofuel production and which generate a fuel that emits less GHGs than conventional fossil fuels, while demonstrating low-cost carbon capture technology.

After the operational term of the biorefinery (three years for the Texas site option and approximately 25 years for the Florida site option), the biorefinery could be decommissioned and removed, and the site reclaimed and re-vegetated to resemble a similar habitat to the pre-disturbance conditions. This is the likely case for the Texas site option as it is expected to be decommissioned after demonstrating a three-year operational phase, though not as likely for the Florida site option as Lee County has plans to develop the project area into industrial and business parks. The short-term use of the project site for the proposed biorefinery would not affect the long-term productivity of the project area at either site option. Project aspects that would enhance long-term productivity in the region include the direct, indirect, and induced creation of jobs and contribution to the economic output of the project area.

## 5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed project would commit either the Texas site option or Florida site option as the location for the biorefinery for the foreseeable future. Site preparation would include the grading and filling of land to provide a developable site plan, which would impact wetlands (for the Texas site), vegetation, and wildlife habitat as described in Sections 3.8 and 3.9. Although arguably these resources would be reclaimed in the future, it is unlikely that they would be restored to their original conditions and functionality. Therefore, these commitments are considered irreversible.

*A resource commitment is **irreversible** when primary or secondary impacts from its use limit future use options and **irretrievable** when its use or consumption is neither renewable nor recoverable for use by future generations.*

The implementation of the Proposed Action would potentially result in the irretrievable commitment of building materials for construction of the biorefinery. Construction and operation of the biorefinery would require the irretrievable commitment of energy and small quantities of process chemicals and nutrients. Water resources used by the biorefinery would be returned to the environment by on-site treatment processes (for the Florida site) or by water treatment facilities.

The implementation of the Proposed Action would require the commitment of financial resources by Algenol, its investors and lenders, and DOE for the construction, demonstration, and start-up of the biorefinery. However, these commitments are consistent with the purpose of and need for the Proposed Action as described in Chapter 1.

## 5.3 UNAVOIDABLE ADVERSE IMPACTS

Construction and operation of the proposed biorefinery would cause unavoidable air emissions. However, during construction particulate emissions would be controlled by using standard dust mitigation techniques (e.g., spraying of water over exposed soils) and air emissions from the biorefinery are considered minor and would not exceed significance thresholds for either of the site options. Adverse impacts during construction also include: the increase of stormwater runoff and sedimentation in receiving waterbodies, which would be mitigated through state-implemented NPDES requirements; the increase in construction traffic and associated noise and emissions, which would be localized impacts; and the use of construction materials, such as steel and concrete, which would be unavoidable, but would represent a small fraction of available materials. During operation adverse impacts include the minor increase in traffic and associated noise and emission impacts from commuting personnel and the transport of materials and wastes; however, these impacts are expected to be minor as the estimated number of vehicles would be low. Adverse impacts from the increases in stormwater runoff and water pollutants due to additional impervious area would be reduced from adherence to stormwater management controls.

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U.S. Geological Survey (USGS), 2010a. Science in your watershed. Accessed July 6, 2010 at http://water.usgs.gov/wsc/cat/12040205.html

U.S. Geological Survey (USGS), 2010b. Science in your watershed. Accessed July 6, 2010 at http://water.usgs.gov/wsc/cat/03090204.html

# Appendix A – Public Correspondence

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

June 10, 2010

SUBJECT: Notice of Scoping – Algenol Biofuels Inc. Proposed Integrated Biorefinery for Producing Ethanol from Hybrid Algae, Freeport, Texas (DOE/EA 1786)

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels Inc. to support the final design, construction, and operation of a pilot-scale DIRECT TO ETHANOL™ integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing operations facility site in Freeport, Texas. A back-up site in Ft. Myers, Florida, is also being considered. Algenol Biofuels plans to use metabolically enhanced hybrid algae to actively carry out photosynthesis and utilize carbon dioxide to make ethanol inside each algal cell. Algenol's goal is to develop hybrid algae that produce ethanol at a rate equivalent to about 6,000 gallons per acre per year. Details of the proposed project and its location are contained in the attachment. Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provision of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR 1021). DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects that cannot be avoided should this proposed project be implemented.
- Evaluate viable alternatives to the proposed project.
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Characterize any irreversible and irretrievable commitments of resources that would be involved should this proposed project be implemented.

**Probable Environmental Effects/Issues Scoped for the Environmental Assessment**

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

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

**Development of a Reasonable Range of Alternatives**

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

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

**Public Scoping**

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

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

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

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

We look forward to hearing from you.

Sincerely,

Kristin Kerwin
NEPA Compliance Officer

Enclosure

**Attachment**

**Algenol Biofuels Inc. Pilot-Scale Integrated Biorefinery**
**Proposed Project Description and Location**

The U.S. Department of Energy (DOE) is proposing to provide up to $25 million to Algenol Biofuels Inc. (Algenol) to support the construction and operation of a pilot-scale integrated biorefinery, which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid blue-green algae. This project would be located either near Freeport, Texas (TX) on 26 acres of property (preferred site option) as shown in Figure 1 or in Fort Myers, Florida (FL) on approximately 40 acres of land (back-up site option) as shown in Figure 2. Algenol is seeking funding from DOE to accelerate the commercialization of its Direct to Ethanol® technology. This third generation biofuel technology makes low cost ethanol from $CO_2$ and seawater using hybrid blue-green algae (hybrid algae) in sealed, clear-plastic photobioreactors (i.e., closed-system translucent containers). The purpose of the proposed pilot-scale integrated biorefinery (hereafter referred to as the "Biorefinery") is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

Algenol's preferred site option is located near Freeport, Brazoria County, TX and is owned by Dow Chemical Company (Dow). The site consists of 26 acres of land north of Route 332, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 3). The property is located in unincorporated Brazoria County. Currently, the entire site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land, and industrial land to the west. A recent wetland survey by Dow noted an isolated wetland area on the site and a review to determine the jurisdictional status of the wetland has been requested of the U.S. Army Corps of Engineers. The closest residential area to the site is approximately 0.5 miles to the east on Oyster Creek Bend Road.

Algenol's back-up site option is located in Fort Myers, Lee County, FL and is owned by Alico Road Business Park, LP. The site consists of approximately 40 acres of land north of Alico Road approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 (Figure 4). The property is zoned for industrial use. Currently, the site consists of undeveloped land except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development. There are several large soil piles on the site, which consist of soils excavated for the development of the canals. Except for the soil piles and canals, the remainder of the site is vegetated primarily with grasses and some larger herbaceous vegetation (e.g., ragweed). Surrounding land uses include undeveloped land, similar in nature to the general characteristics of the site, to the east, south, and west. To the north of the site is the recently constructed Alico Business Park, which consists of industrial/office uses. Plans are currently in place by the property owners to develop the site and the surrounding area into one or more industrial/business parks. The closest residential area to the site is approximately 0.3 miles to the north on Fiddlesticks Boulevard. Algenol is currently developing a research and development facility and Process Development Unit (PDU) for testing hybrid

algae, photobioreactors and process control systems developed for commercial scale facilities. The R&D facility and PDU are being constructed on undeveloped land to the north of the site in existing buildings and adjacent land of the Alico Business Park and is unrelated to DOE's Proposed Action. The R&D facility and PDU are being developed by Algenol without DOE participation and regardless of DOE's decision on funding the Biorefinery.

Direct to Ethanol® technology involves over-expressing the genes in blue-green algae for fermentation enzymes. The resulting metabolically enhanced hybrid algae actively carry out photosynthesis and utilize $CO_2$ as the feedstock for making ethanol inside each algal cell. Ethanol is made inside the hybrid algae cell and diffuses through the cell wall into seawater and then evaporates, along with water into the empty space at the top of the photobioreactor. The ethanol water vapor condenses on the inner surface of the photobioreactor and is collected, concentrated, and distilled into fuel-grade ethanol.

The proposed pilot-scale biorefinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation, including an office/laboratory building, a greenhouse, storage/work areas, and water processing and ethanol separation equipment (Figure 5).

The photobioreactors would be placed inside a water-tight containment area lined with a pond liner with material characteristics similar to those used to line landfills. Stormwater over the geomembrane would be drained by gravity to sump pumps that would manage the stormwater consistent with approved permits. In the event of a spill of algae culture medium, the drainage would be diverted to a water sterilization system that would remove the biomass and sterilize the water using chlorine bleach. All sterilized water would be stored for reuse in the photobiorectors or evaporated in evaporation tanks.

Project location maps of the potential site options and a typical site layout of the proposed biorefinery are attached.

Figure 1 – Proposed site location map – Freeport, TX
Figure 2 – Proposed site location map – Fort Myers, FL
Figure 3 – Aerial photograph – Freeport, TX
Figure 4 – Aerial photograph – Fort Myers, FL
Figure 5 – Proposed facility – Proposed site layout

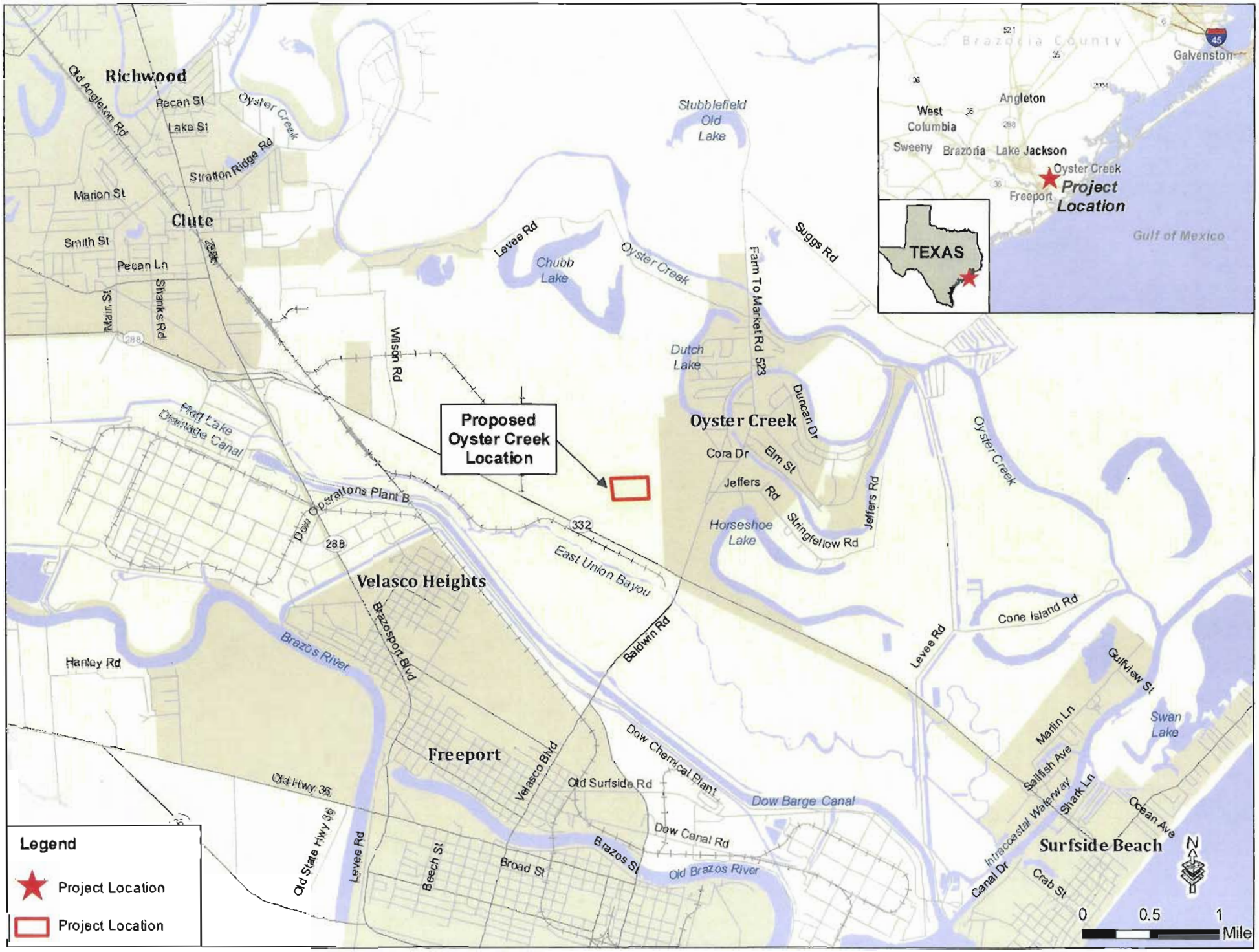



Figure 1

Oyster Creek General Location Map
Texas

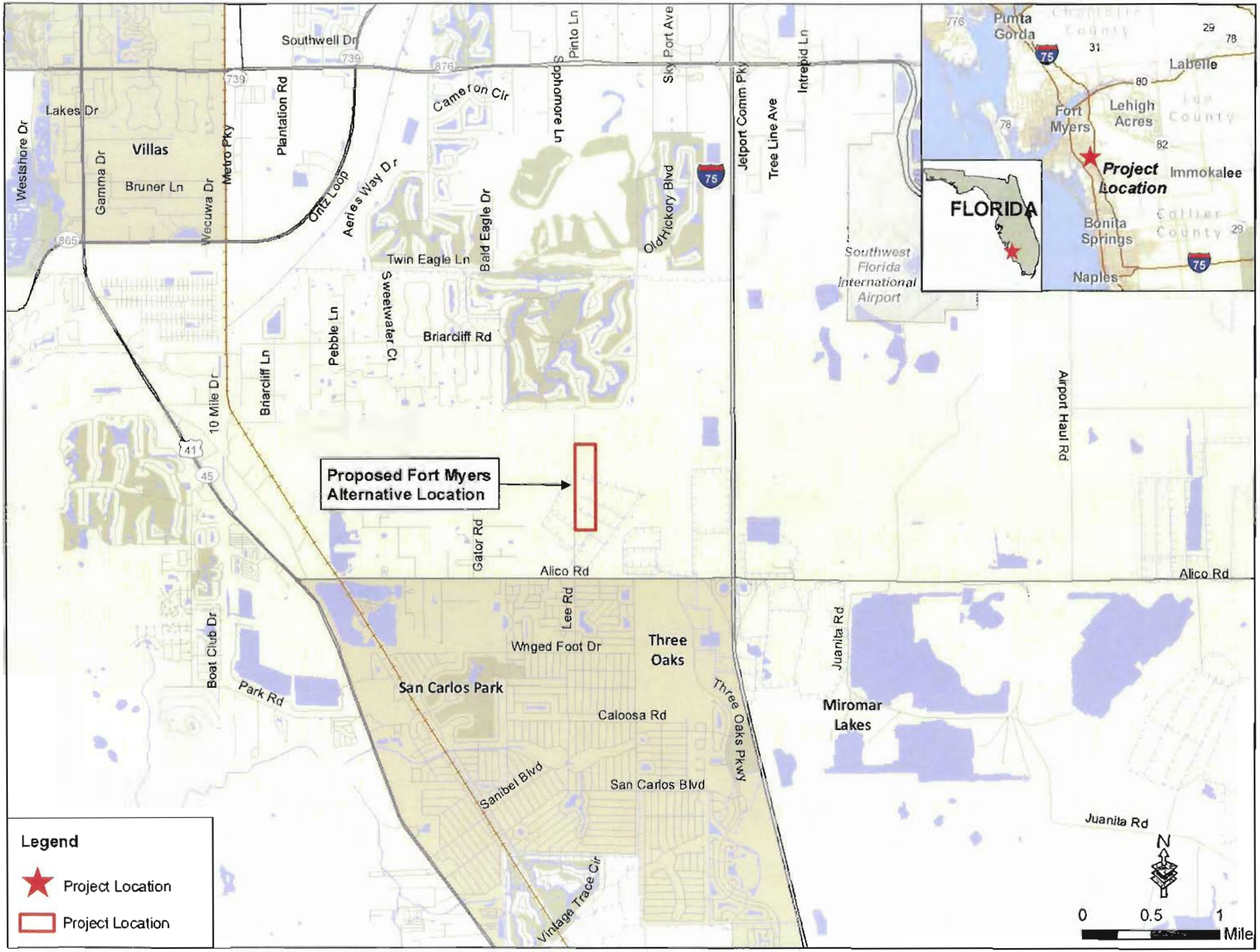



Figure 2

Fort Myers General Location Map
Florida

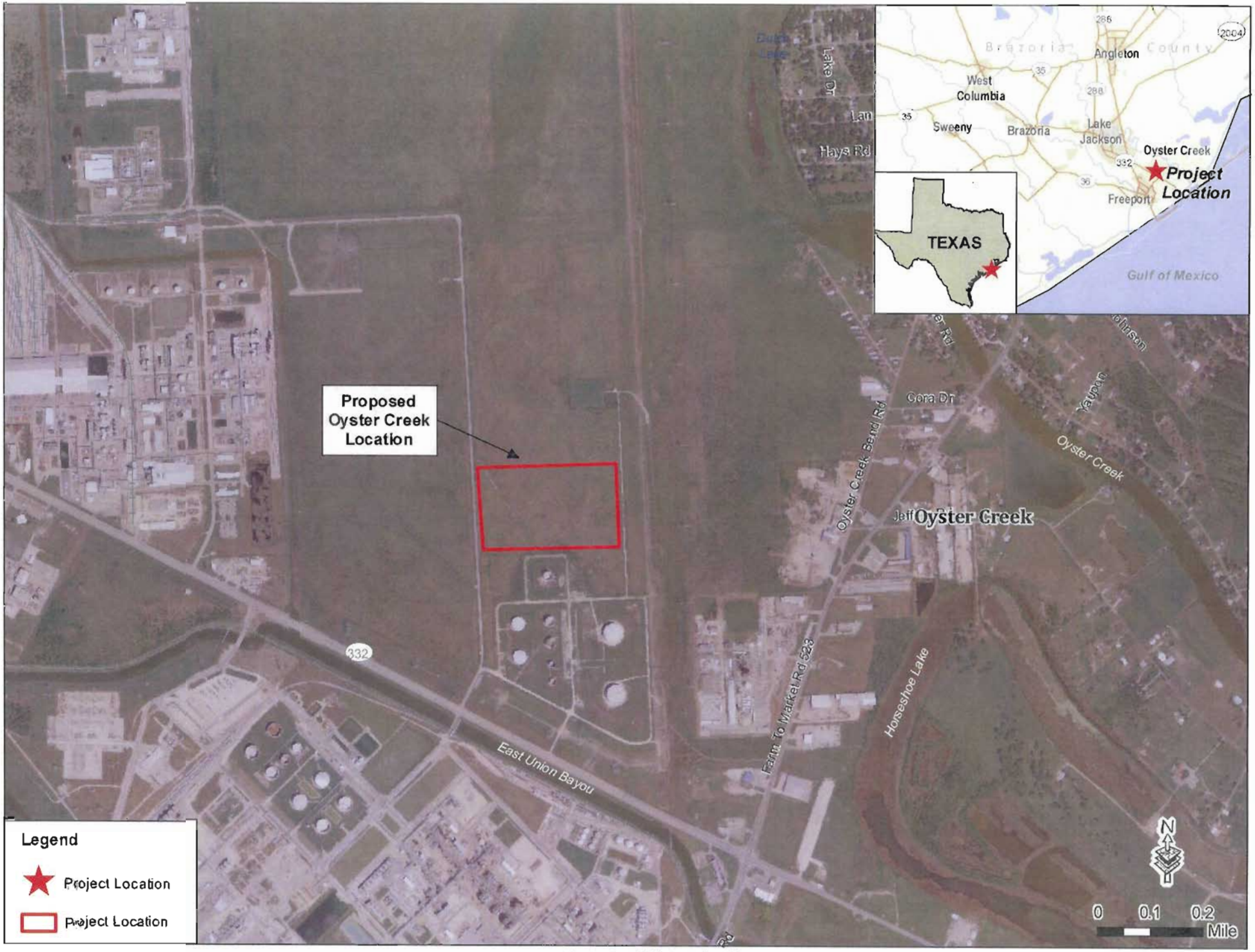



Figure 3

Oyster Creek Site Location Map
Texas

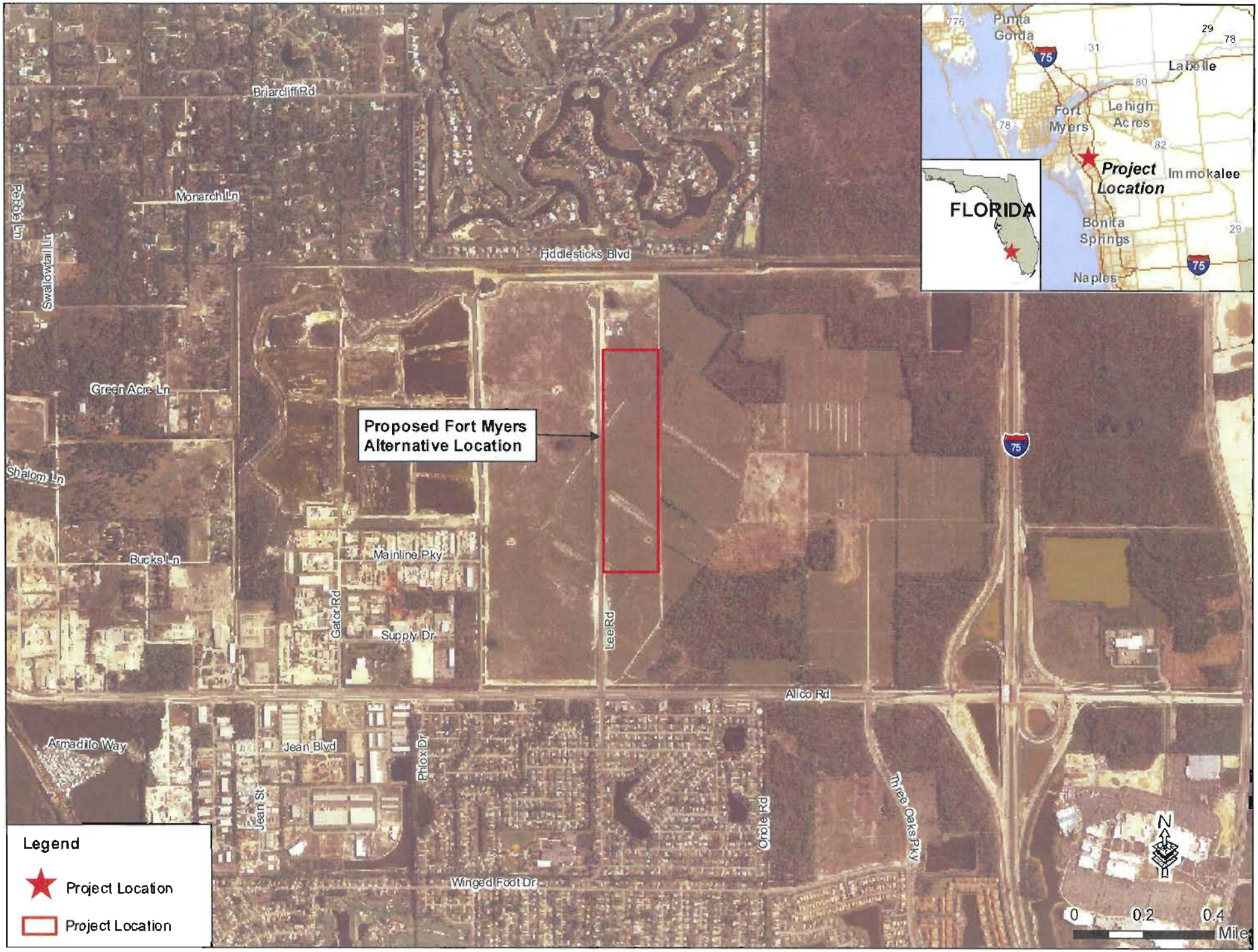
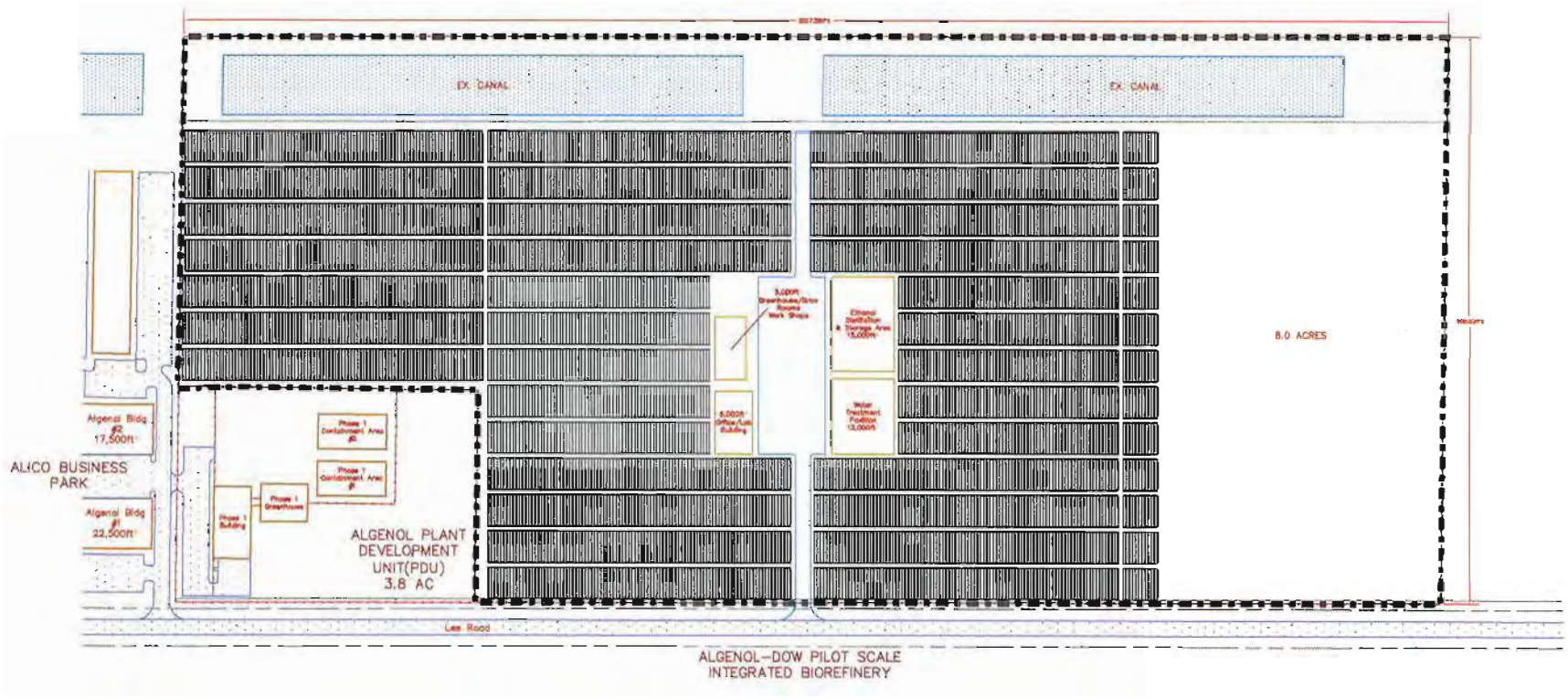



Figure 4

Fort Myers Site Location Map
Florida




Typical Facility Layout(site specific design to be developed)

Figure 5

# TEXAS DISTRIBUTION LIST

## CITY/COUNTY OFFICES

Mayor Larry L. McDonald, Freeport City Hall

Diane Williams, Chairperson; Planning Commission and City Council

Freeport Library

## STATE OFFICES/AGENCIES

Denise Stines Francis, State Single Point of Contact

Governor's Office of Budget, Planning, and Policy

Toby Baker, Governor's Advisor, Natural Resources and Agriculture

Texas Commission on Environmental Quality, Region 12, Houston

Richard A. Hyde, P.E., Deputy Director, Office of Permitting and Registration, Texas Commission on Environmental Quality

Clay Brewer, Acting Director of Wildlife, Texas Parks and Wildlife

Mark Wolfe, State Historic Preservation Officer, Texas Historical Commission

## FEDERAL OFFICES/AGENCIES

Stephen R. Spencer, Ph.D., Regional Environmental Officer, U.S. Department of the Interior, Albuquerque Regional Office

Michael P. Jansky, Regional Environmental Review Coordinator, U.S. Environmental Protection Agency, Region 6

U. S. Army Corps of Engineers, Galveston District
Regulatory Branch

Steve Parris, Field Supervisor, Clear Lake Ecological Services Field Office, U.S. Fish and Wildlife Service

# FLORIDA DISTRIBUTION LIST

## CITY/COUNTY OFFICES

Mayor Randy Henderson, Jr., City Hall, City of Fort Myers

Commissioner Ray Judah, Southwest Florida Regional Planning Commission, Lee County

Commissioner Tammy Hall, Southwest Florida Regional Planning Commission, Lee County

Fort Myers-Lee County Public Library

## STATE OFFICES/AGENCIES

Ms. Lauren P. Milligan, Environmental Manager, Florida Dept. of Environmental Protection

Jon Iglehart, District Director, Florida Dept. of Environmental Protection, South District

Nick Wiley, Executive Director, Florida Fish and Wildlife Conservation Commission

Laura Kammerer, Historic Preservationist Supervisor, Office of Cultural and Historical Programs

Sherman Wilhelm, Director of Aquaculture , Florida Department of Agriculture, Division of Aquaculture

## FEDERAL OFFICES/AGENCIES

Heinz Mueller, Chief of NEPA Program Office, U.S. Environmental Protection Agency, Region 4

Gregory L. Hogue, Regional Environmental Officer, U.S. Department of the Interior, Atlanta Regional Office

Paul Souza, Field Supervisor, South Florida Ecological Services Office, U. S. Fish and Wildlife Service

Tunis McElwain, Section Chief, Fort Meyers Permitting District, U.S. Army Corps of Engineers, Jacksonville District, Regulatory Division

## TRIBAL ORGANIZATIONS

Alan D. Emarthle, Tribal Historic Preservation Officer, Seminole Nation of Oklahoma

Mitchell Cypress, Chairperson, Seminole Indian Tribe of Florida

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

RE: Public Scoping for Algenol Biorefinery, (DOE/EA 1786)

Dear Ms. Jorgensen:

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

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

An EIS should be required. This project will consume $25 million in taxpayer funds which is a significant amount, and will potentially destroy wetlands. It will consume tax dollars to produce apparently the most expensive ethanol on the planet. The Citizens ask for a public hearing on this facility.

This project has the potential to cause and contribute to wetlands losses, toxic material releases, and unstated, large amounts of water usage.

**ECONOMICS**

The Citizens would also appreciate a discussion of the economics of the facility, since the proposed total $25 million cost for Algenol would be enough money to build an approximately 20 million gallon ethanol facility with corn as a feedstock.

The ethanol market is relatively glutted right now with plants closing and going bankrupt. But Enerkem proposes production of only 156 thousand gallons annually which is an initial construction cost of $160/gallon/capacity, compared to a $1.40/gallon/capacity cost for construction costs for corn based ethanol. On its face, this facility will produce ethanol so expensively that it cannot survive economically.

I base this financial analysis on the information sheet which states that the plant will produce 6000 gallons/acre, and it is a 26 acre site, assuming that the $25 million in DOE money is the total plant cost. If Dow is contributing funds also, the plant is even less viable economically. It will have run for 72 years to produce about 12 million gallons of ethanol at no cost just to make back the DOE money, which would not even include the costs of running the plant.

This $160/gallon construction cost is massively higher than any construction cost cited in published accounts of any type of ethanol plants.

**AIR EMISSIONS**

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

**FIRE AND EXPLOSION**

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

**TOXICS**

Please describe the toxicity of all raw materials and plant components, including but not limited to the catalysts, and the cradle to grave life story of these materials while coming to, residing at, and leaving the plant, including measures taken to prevent toxic releases. We note that chlorine will be stored in site. What form of chlorine will be stored, and in what amounts?

Please describe the toxicity of the

**WATER**

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

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

Yours, John Williams

**DEPARTMENT OF THE ARMY**
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON TX 77553-1229

July 7, 2010

Policy Analysis Section

SUBJECT: SWG-2010-00596; Algenol Biofuels, Inc.

Lisa Jorgenson
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401

Dear Ms. Jorgenson:

This concerns your request for public scoping comments for the proposed Algenol Biofuels, Inc.'s proposed Integrated Biorefinery for Producing Ethanol from Hybrid Algae. The project area is located on the DOW Chemical Company's plastics and chemical manufacturing operation facility in Freeport, Brazoria County, Texas.

Based on a desk review of the information you submitted, U.S.G.S. Topographic map, 1995 Digital Orthophoto Quarter-Quadrangle, Digital Q3 Flood Insurance Rate Map for Brazoria County, and the 1999 National Wetland Inventory Map, we conclude that the site may contain waters of the United States (U.S.), specifically wetlands. Pursuant to Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. The Corps recommends that a jurisdictional delineation be conducted in accordance with the 1987 Corps of Engineers Wetland Delineation Manual and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region and submitted to our office for verification to determine if a Department of the Army permit is required.

If you have any questions concerning this letter, please reference file number **SWG-2010-00596** and contact me at the letterhead address or by telephone at 409-766-3108 or email at jayson.m.hudson@swg.usace.army.mil.

Sincerely,

Jayson M. Hudson
Regulatory Project Manager
Policy Analysis Section

# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

July 27, 2010

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

Re: TCEQ Grant and Texas Review and Comment System (TRACS) #2010-386, City of Freeport, Brazoria County-Algenol Biofuels Inc. Proposed Integrated Biorefinery for Producing Ethanol from Hybrid Algae

Dear Ms. Jorgensen:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers following comments:

A review of the project for General Conformity impact in accordance with 40 CFR Part 93 and Title 30, Texas Administrative Code § 101.30 indicates that the proposed project is located in Brazoria County, which is currently classified as a severe ozone nonattainment area. Therefore, General Conformity rules apply.

The two criteria pollutants of concern as precursors to ozone formation are volatile organic compounds (VOCs) and nitrogen oxides ($NO_x$). An increase of 25 tons per year for VOCs or $NO_x$, resulting from the proposed project, could trigger general conformity analysis. However, the emissions from the proposed project are expected to be well below the 25 tons per year significance level. Therefore, a general conformity analysis will not be required.

Although any demolition, construction, rehabilitation or repair project will produce dust and particulate emissions, these actions should pose no significant impact upon air quality standards. Any minimal dust and particulate emissions should be easily controlled by the construction contractors using standard dust mitigation techniques.

We recommend the environmental assessment address actions that will be taken to prevent surface and groundwater contamination.

Any wastes generated by Algenol Biofuels Inc.'s proposed manufacture of ethanol would be subject to the requirements in 30 Texas Administrative Code (TAC) Chapter 335 (Industrial Solid Waste and Municipal Hazardous Waste).

Thank you for the opportunity to review this project. If you have any questions, please call Ms. Tangela Niemann at (512) 239-3786.

Sincerely,

Jim Harrison, Director
Intergovernmental Relations Division

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

July 29, 2010

Ms. Lisa Jorgensen
NEPA Document Manager
Golden Field Office
U.S. Department of Energy
1617 Cole Boulevard
Golden, CO 80401-3393

RE: U.S. Department of Energy - Energy Efficiency and Renewable Energy Technology Deployment, Demonstration and Commercialization - Scoping Notice on Algenol Biofuels, Inc. Proposed Integrated Biorefinery for Producing Ethanol from Hybrid Algae - Fort Myers, Lee County, Florida.
SAI # FL201006165291C

Dear Ms. Jorgensen:

The Florida State Clearinghouse has coordinated a review of the referenced project under the following authorities: Presidential Executive Order 12372; § 403.061(40), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The South Florida Water Management District (SFWMD) indicates that it issued an Environmental Resource Permit (ERP) for this project on June 18, 2010 - Application No. 100512-2 for a General Permit Modification to ERP No. 36-06202-P. SFWMD staff also notes that the proposed future use of groundwater for industrial process water will require a Water Use Permit.

Based on the information contained in the scoping notice, enclosed state agency comments and issuance of an ERP by the SFWMD, the state has no objections to the allocation of federal funds for the subject proposal and, therefore, the funding award is consistent with the Florida Coastal Management Program (FCMP). The state's final concurrence of the project's consistency with the FCMP was determined during the ERP permitting process in accordance with Section 373.428, *Florida Statutes*.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Jim Golden, SFWMD

| Project Information | |
|---|---|
| **Project:** | FL201006165291C |
| **Comments Due:** | 07/19/2010 |
| **Letter Due:** | 07/29/2010 |
| **Description:** | U.S. DEPARTMENT OF ENERGY - ENERGY EFFICIENCY AND RENEWABLE ENERGY TECHNOLOGY DEPLOYMENT, DEMONSTRATION AND COMMERCIALIZATION - SCOPING NOTICE ON ALGENOL BIOFUELS, INC. PROPOSED INTEGRATED BIOREFINERY FOR PRODUCING ETHANOL FROM HYBRID ALGAE - FORT MYERS, LEE COUNTY, FLORIDA. |
| **Keywords:** | DOE - ALGENOL BIOFUELS INTEGRATED ETHANOL BIOREFINERY, HYBRID ALGAE - LEE CO. |
| **CFDA #:** | 81.129 |

| Agency Comments: |
|---|
| **SW FLORIDA RPC - SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL** |
| The SWFRPC indicates that the proposal has been found to be Regionally Significant and Consistent with the adopted goals, objectives and policies of the Strategic Regional Policy Plan. |
| **COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS** |
| |
| **STATE - FLORIDA DEPARTMENT OF STATE** |
| No Comment/Consistent |
| **ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION** |
| The DEP has no comments on the project. |
| **SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT** |
| The District issued an Environmental Resource Permit (ERP) for this project on June 18, 2010 (Application No. 100512-2 for a General Permit Modification to ERP No. 36-06202-P). The proposed future use of groundwater for industrial process water will require a Water Use Permit. |

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

# Southwest Florida Regional Planning Council

1926 Victoria Avenue, Fort Myers, Florida 33901-3414
(239)338-2550 FAX (239)338-2560 SUNCOM (239)748-2550


July 13, 2010

RECEIVED
JUL 15 2010
DEP Office of
Intergovt'l Programs

Ms. Lisa Jorgensen
Department of Energy
1617 Cole Boulevard
Golden, CO 80401

RE: IC&R Project #2010-33
State Clearinghouse #FL2010006165291C
US Department of Energy - Energy Efficiency and Renewable Energy Technology Depolyment, Demonstration and Commercialization - Scoping Notice on Algenol Biofuels, Inc. Proposed Integrated Biorefinery for Producing Ethanol From Hybrid Algae - Fort Myers, Lee County, Florida.

Dear Ms. Jorgensen:

The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Preapplications, permit applications, and Environmental Impact Statements for compliance with regional goals, strategies, and actions, as determined by the Strategic Regional Policy Plan. The staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 29I-5, F.A.C.), and adopted regional clearinghouse procedures.

These designations determine Council staff procedure in regards to the reviewed project. The four designations are:

Less Than Regionally Significant and Consistent no further review of the project can be expected from Council.

Less Than Regionally Significant and Inconsistent Council does not find the project of regional importance, but will note certain concerns as part of its continued monitoring for cumulative impact within the noted goal area.

Regionally Significant and Consistent project is of regional importance, and appears to be consistent with Regional goals, objectives, and policies.

Regionally Significant and Inconsistent project is of regional importance and does not appear to be consistent with Regional goals, objectives, and policies. Council will oppose the project as submitted, but is willing to participate in any efforts to modify the project to mitigate the concerns.

The above referenced document has been reviewed by this office, based on the information contained in the document, and on local knowledge, has been found **Regionally Significant and Consistent** with adopted goals, objectives, and policies of the Strategic Regional Policy Plan, pending review of the environmental assessment.

Should you or any other party request this finding to be reconsidered, please contact Nichole L. Gwinnett, IC&R Coordinator, with this request, or any questions concerning staff review of this item. This recommendation will be discussed at the next scheduled Council meeting. Should Council action differ from the staff recommendation, you will be notified.

Sincerely,

SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL

Kenneth Heatherington
Executive Director

KH/NLG

cc: Lauren Milligan, Florida State Clearinghouse

**COUNTY:** LEE

2010-2941
SCH-106-DOE-EERETD

**DATE:** 6/14/2010
**COMMENTS DUE DATE:** 7/19/2010
**CLEARANCE DUE DATE:** 7/29/2010
**SAI#: FL201006165291C**

**MESSAGE:**

| STATE AGENCIES | WATER MNGMNT. DISTRICTS | OPB POLICY UNIT | RPCS & LOC GOVS |
|---|---|---|---|
| COMMUNITY AFFAIRS | SOUTH FLORIDA WMD | | |
| ENVIRONMENTAL PROTECTION | | | |
| X STATE | | | |

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

X Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.

Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

**Project Description:**

U.S. DEPARTMENT OF ENERGY - ENERGY EFFICIENCY AND RENEWABLE ENERGY TECHNOLOGY DEPLOYMENT, DEMONSTRATION AND COMMERCIALIZATION - SCOPING NOTICE ON ALGENOL BIOFUELS, INC. PROPOSED INTEGRATED BIOREFINERY FOR PRODUCING ETHANOL FROM HYBRID ALGAE - FORT MYERS, LEE COUNTY, FLORIDA.

**To: Florida State Clearinghouse**

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

**EO. 12372/NEPA**

- [x] No Comment
- [ ] Comment Attached
- [ ] Not Applicable

**Federal Consistency**

- [x] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

**From:**

Division/Bureau: Division of Historical Resources
Bureau of Historic Preservation

Reviewer: Katie Peter Sent for Laura A. Kammerer

Date: 6/29/10

RECEIVED
JUL 05 2010
DEP Office of
Intergovt'l Programs

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2010 JUN 21 P 2:30
BUREAU OF
HISTORIC PRESERVATION

# NOTICE OF AVAILABILITY

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

**Integrated Biorefinery for Producing Ethanol from Hybrid Algae**
**Freeport, TX or Fort Meyers, FL**
**DOE/EA 1786**

DOE's Golden Field Office has prepared a draft EA in accordance with the National Environmental Policy Act (NEPA). Algenol Biofuels Inc. is proposing to use Federal funding from DOE under the American Recovery and Reinvestment Act of 2009 to support the final design, construction, and operation of a pilot-scale DIERCT TO ETHANOL™ integrated biorefinery in either Freeport, TX or Fort Meyers, FL. The draft EA is available for review on the DOE Golden Field Office website:

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

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

## CITY/COUNTY OFFICES

City Hall – City of Fort Myers
2200 Second Street
Fort Myers, FL 33901

Kenneth Heatherington
Executive Director
Southwest Florida Regional Planning Commission
1926 Victoria Avenue
Fort Myers, FL 33901
SAI# FL201006165291C

Fort Myers-Lee County Public Library
2050 Central Avenue
Fort Myers, FL 33901

## STATE OFFICES/AGENCIES

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Environmental Manager
Florida State Clearinghouse
Florida Dept. of Environmental Protection
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Tallahassee, FL 32399-3000
SAI# FL201006165291C

Jon Iglehart, District Director
Florida Dept. of Environmental Protection, South District
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Fort Myers, Florida 33902-2549

Sally B. Mann, Director
Office of Intergovernmental Programs
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

Tom Champeau, Regional Director
Florida Fish and Wildlife Conservation Commission, Southwest Region
3900 Drane Field Road
Lakeland, FL 33811-1207

Mr. Nick Wiley, Executive Director
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

Laura Kammerer, Historic Preservationist Supervisor
Florida Department of State – Division of Historical Resources
500 South Bronough Street
Tallahassee, FL 32399-0250

Sherman Wilhelm, Director of Aquaculture
Florida Department of Agriculture, Division of Aquaculture
1203 Governors Square Boulevard, Fifth Floor
Tallahassee, FL 32301

Charlie Crist
Governor of Florida
The State Capitol
400 South Monroe Street
Tallahassee, FL 32399-0001

## FEDERAL OFFICES/AGENCIES

Mr. Heinz Mueller
Chief of NEPA Program Office
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

Mr. Gregory L. Hogue, Regional Environmental Officer
U.S. Department of the Interior, Atlanta Regional Office
75 Spring Street, SW, Suite 1144
Atlanta, GA 30303

Paul Souza, Field Supervisor
South Florida Ecological Services Office
U. S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960-3559

Tunis McElwain, Section Chief
Fort Meyers Permitting District
U.S. Army Corps of Engineers, Jacksonville District, Regulatory Division
1520 Royal Palm Square Blvd., Suite 310
Fort Myers, FL 33919

## TRIBAL ORGANIZATIONS

Mark Kahbeah
Kickapoo Tribe in Kansas
1107 Goldfinch Road
Horton, KS 66439

Mr. Mitchell Cypress, Chairperson
Seminole Indian Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Willard Steele, Tribal Historic Preservation Officer
Seminole Tribe of Florida
34725 West Boundary Road
Clewiston, FL 33440

## CITY/COUNTY OFFICES

Freeport City Hall
200 W. 2nd Street
Freeport, TX 77541

Jack Steele, Executive Director
Houston-Galveston Area Council
Gulf Coast State Planning Region (16)
P.O. Box 22777
Houston, TX 77227-2777

Freeport Library
410 Brazosport Boulevard
Freeport, TX 77541

## STATE OFFICES/AGENCIES

Ms. Denise Stines Francis, State Single Point of Contact
Governor's Office of Budget, Planning, and Policy
PO Box 12428
Austin, TX 78711

Mr. Toby Baker
Governor's Advisor, Natural Resources and Agriculture
PO Box 12428
Austin, TX 78711

Mr. Terry Zrubek
Governor's Advisor-Water
PO Box 12428
Austin, TX 78711

Rick Perry
Governor of Texas
Office of the Governor
PO Box 12428
Austin, TX 78711-2428

Texas Commission on Environmental Quality
Region 12, Houston
5425 Polk Ave., Ste. H
Houston, TX 77023-1452

Jim Harrison, Director
Texas Commission on Environmental Quality

Intergovernmental Relations Division
P.O. Box 13087
Austin, TX 78711-3087

Mr. Clay Brewer, Acting Director of Wildlife
Texas Parks and Wildlife
Wildlife Division
4200 Smith School Road, Austin, TX 78744

Mark Wolfe, State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711

**FEDERAL OFFICES/AGENCIES**

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U.S. Department of the Interior, Albuquerque Regional Office
Office of Environmental Policy and Compliance
1001 Indian School Road, NW, Suite 348
Albuquerque, NM 87104-2303

Mr. Michael P. Jansky, Regional Environmental Review Coordinator
Office of Planning and Coordination
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Mail Code 6EN-XP
Dallas, TX 75202-2733

Jayson M. Hudson
Regulatory Project Manager
Department of the Army
Galveston District, Corps of Engineers
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Galveston, TX 77553-1229

Dr. Benjamin Tuggle, Regional Director
U.S. Fish and Wildlife Service
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Albuquerque, NM 87103-1306

Allan Strand, Field Supervisor
Corpus Christi ESFO
U.S. Fish and Wildlife Service, Southwest Region
c/o TAMU-CC
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Corpus Christ, TX 78412-5837

Edith Erfling
Acting Field Supervisor

U.S. Fish and Wildlife Service
Division of Ecological Services
Clear Lake Field Office
17629 El Camino Real #211
Houston, TX 77058-3051

Mr. Steve Parris, Field Supervisor
U.S. Fish and Wildlife Service
Division of Ecological Services
Clear Lake Field Office
17629 El Camino Real #211
Houston, TX 77058-3051

## Tribal Organizations

Mr. Alan D. Emarthle
Tribal Historical Preservation Officer
Seminole Nation of Oklahoma
PO Box 1768
Seminole, OK 74868

Don L. Paterson, President
Tonkawa Tribe of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653-4449

Michael Burgess, Chairman
The Comanche Nation of Oklahoma
PO Box 908
Lawton, OK 73502

Leslie Standing, President
Wichita and Affiliated Tribes
PO Box 729
Anadarko, OK 73005

Juan Garza, Chairman
Kickapoo Traditional Tribe of Texas
HCR1, Box 9700
Eagle Pass, TX 78852

Gilbert L. Salazar, Chairman
Kickapoo Tribe of Oklahoma
PO Box 70

McCloud, OK 74851

Donald Tofpi, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015-0369

Carolos Bullock, Chairman
The Alabama-Coushatta Tribe of Texas
571 State Park Road 56
Livingston, TX 77351

Arlan Whitebird, Chairman
Kickapoo Tribe in Kansas
1107 Gold Finch Road
Horton, TX 66439

Frank Paiz
Yselta del Sur Pueblo
PO Box 17579-Ysleta Station
El Paso, TX 79917

# Appendix B - DOE Consultation Letters and Responses

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

July 1, 2010

Mr. Clay Brewer, Acting Director of Wildlife
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

Dear Mr. Brewer,

The U. S. Department of Energy is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery (the "biorefinery"), which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid blue-green algae. Algenol is considering two potential sites for the proposed biorefinery: one in Freeport, Texas (Algenol's preferred site option) and the other in Fort Myers, Lee County, Florida (Algenol's back-up site option).

The Texas site option is located near Freeport, Brazoria County, TX and is owned by the Dow Chemical Company (Figure 1). The site consists of 26 acres of land north of Route 332, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Coordinates: 28°59.477′ North, 95°20.596′ West). Currently, the entire site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle (Figure 2). Surrounding land uses include a capped landfill and undeveloped land to the north; undeveloped land and industrial uses to the east; a Dow property containing tanks that store condensate to the south; and a private access road, undeveloped land, and industrial land to the west. A recent wetland survey noted an isolated wetland area on the site and a permit application to determine the jurisdictional status of the wetland has been submitted to the U.S. Army Corps of Engineers.

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE does not anticipate any adverse affects on federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures. DOE would like to open consultation and technical assistance on the Algenol project. If you have any such related information, require additional information, or have any questions or comments about that project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305

Email: lisa.jorgensen@go.doe.gov
Telephone: 720-356-1569

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

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

Sincerely,

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Figure 1. Project Location
Figure 2. Plot Plan on Aerial Photograph

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San Antonio

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Houston

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Fort Worth

Antonio Falcon, M.D.
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Karen J. Hixon
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Dan Allen Hughes, Jr.
Beeville

Margaret Martin
Boerne

S. Reed Morian
Houston

Lee M. Bass
Chairman-Emeritus
Fort Worth

Carter P. Smith
Executive Director

July 2, 2010

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

RE: Algenol Biofuels, Inc. Proposed integrated biorefinery for producing ethanol from hybrid algae, Freeport, Texas.

Dear Ms. Joregensen:

The Texas Parks and Wildlife Department (TPWD) has received your request for information regarding potential impacts to threatened and endangered species and for information on other issues of concern relating to the project referenced above. Under section 12.0011 of the Texas Parks and Wildlife Code, TPWD is charged with "providing recommendations that will protect fish and wildlife resources to local, state, and federal agencies that approve, permit, license, or construct developmental projects" and "providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources."

Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency on or after September 1, 2009 may be required by state law. For further guidance, see the Texas Parks and Wildlife Code, Section 12.0011 which can be found online at http://www.statutes.legis.state.tx.us/Docs/PW/htm/PW.12.htm#12.0011. For tracking purposes, please refer to TPWD project number 15201 in any return correspondence

Project Description

Algenol Biofuels, Inc. proposes to construct and operate a pilot-scale integrated biorefinery, which would produce ethanol directly from carbon dioxide and seawater using hybrid blue-green algae. The preferred location for this would be on 26 acres of property near Freeport, Texas. The alternative location would be located in Fort Myers, Florida. The preferred location consists of 26 acres of land north of Route 332, approximately 0.7 miles northwest of the intersection of Routes 332 and 523. Currently, the site consists of undeveloped pasture land that is periodically harvested to use as feed for cattle. Surrounding land uses included a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a DOW property containing tanks that store condensate to the south and a private access road, undeveloped land, and industrial land to the west.

The proposed pilot-scale biorefinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation, including an office/laboratory building, a greenhouse, storage/work areas, and water processing and ethanol separation equipment.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.state.tx.us

Federal regulation

*Migratory Bird Treaty Act*

The Migratory Bird Treaty Act (MBTA) provides for a year round closed season for non-game birds and prohibits the taking of migratory bird nests and eggs, except as permitted by the U.S. Fish and Wildlife Service.

> **Recommendations:** Construction activities such as, but not limited to, tree felling as well as vegetation clearing, trampling, or maintenance should occur outside the April 1- July 15 migratory bird nesting season of each year the project is authorized and lasting for the life of the project. To comply with the MTBA, the proposed site should be surveyed for migratory bird nest sites prior to construction or future maintenance activities. Since raptors nest in late winter and early spring, all construction activities as identified above should be excluded from a minimum zone of 100 meters around any raptor nest during the period of February 1- July 15.

Please contact the U.S. Fish and Wildlife Service Southwest Regional Office (Region 2) at (505) 248-6879 for further information.

Wetland Impacts

Based upon the project information provided, wetland areas were identified on the property.

> Recommendation: TPWD requests that Algenol Biofuels, Inc. mitigate for all wetland impacts and prepare a wetland mitigation plan. The wetland mitigation plan should be developed in consultation with TPWD.
>
> Coordination of all impacts to the aquatic resources should be coordinated with Jamie Schubert with our Coastal Program; he can be reached at 281-534-0135.

State Regulations

*Parks and Wildlife Code*

Texas has listed additional animal species not protected by the Endangered Species Act as "State-Threatened" (ST). Any take (incidental or otherwise) of ST animals is prohibited. However, state law only protects the species, and not its habitat. The ST species may only be handled/relocated by permitted individuals authorized by TPWD. There are penalties and restitution values associated with unauthorized take of state-listed species. ***Protection of State-Listed Species - Texas Parks and Wildlife Department Guidelines*** is attached

Determining the actual presence of a species in a given area depends on many variables including daily and seasonal activity cycles, environmental activity cues, preferred habitat, transiency and population density (both wildlife and human). The absence of a species can be demonstrated only with great difficulty and then only with repeated negative observations, taking into account all the variable factors contributing to the lack of detectable presence.

The Texas Natural Diversity Database (TXNDD) is intended to assist users in avoiding harm to rare species or significant ecological features. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Absence of information in the database does not imply that a species is absent from that area. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presences, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and **cannot be used as presence/absence data**. They represent species that could potentially be in your project area. This information cannot be substituted for on-the-ground surveys. The TXNDD is updated continuously based on new, updated and undigitized records; for questions regarding a record, please contact txndd@tpwd.state.tx.us.

Review of the TXNDD revealed the following occurrences of rare and protected species within 1.5 miles of the proposed project.

*State Listed Threatened*
Bald Eagle (*Haliaeetus leucocephalus*)

**TPWD County Lists**

The TPWD county lists for rare species may be obtained from the following link: http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx. These lists provide information regarding rare species that have potential to occur within each county. Rare species could potentially be impacted if suitable habitat is present at or near the project site.

Recommendation. Using the county lists of rare species, the portions of the proposed project with potential to support rare species should be field surveyed to determine the extent and quality of the suspect habitat and potential impacts.

Recommendation. If rare species or their habitat would be impacted by the proposed project, the applicant should coordinate with TPWD and the USFWS, as appropriate, to determine avoidance, minimization, and mitigation strategies.

Recommendation. Construction crews should be informed of the rare species that have potential to occur in the project county and should avoid disturbance to

sensitive species if encountered during construction. Only personnel with a TPWD scientific collection permit are allowed to handle and move state listed species. For further information on the required permit please contact Chris Maldonado at (512) 389-4647.

Comment. Further consultation with TPWD would be warranted upon detection of a Texas listed rare, threatened, or endangered species within or near the proposed project at any time prior to or during construction.

Revegetation

**Recommendations:** TPWD recommends that Algenol Biofuels, Inc. reseed disturbed soils with a mixture of grasses and forbs native to Brazoria County. To enhance native grasses available to wildlife in the project area, TPWD recommends that Bermuda grass be avoided to the extent possible in reseeding efforts, though TPWD understands that slopes may require certain grasses to control erosion. As an introduced species that can be extremely invasive, its use in federally funded projects may be inconsistent with Executive Order 13112 on Invasive Species.

For assistance in determining the best native seed mix for the project area, please contact our staff. Runoff control measures should be maintained until native plants have been reestablished on disturbed areas.

TPWD advises review and implementation of these recommendations. If you have any questions, please contact me at (361) 576-0022.

Sincerely,

Amy Turner

Amy Turner
Wildlife Habitat Assessment Program
Wildlife Division

/ajt:15201

Attachment

Protection of State-Listed Species
Texas Parks and Wildlife Department Guidelines

## Protection of State-Listed Species

State law prohibits any take (incidental or otherwise) of state-listed species. State-listed species may only be handled by persons possessing a **Scientific Collecting Permit** or a **Letter of Authorization** issued to relocate a species.

- **Section 68.002 of the Texas Parks and Wildlife (TPW) Code** states that species of fish or wildlife indigenous to Texas are endangered if listed on the United States List of Endangered Native Fish and Wildlife or the list of fish or wildlife threatened with statewide extinction as filed by the director of Texas Park and Wildlife Department. Species listed as Endangered or Threatened by the Endangered Species Act are protected by both Federal and State Law. The State of Texas also lists and protects additional species considered to be threatened with extinction within Texas.

- **Animals** - Laws and regulations pertaining to state-listed endangered or threatened animal species are contained in **Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code** and **Sections 65.171 - 65.176 of Title 31 of the Texas Administrative Code (TAC).** State-listed animals may be found at **31 TAC §65.175 & 176.**

- **Plants** - Laws and regulations pertaining to endangered or threatened plant species are contained in **Chapter 88 of the TPW Code and Sections 69.01 - 69.9 of the TAC.** State-listed plants may be found at **31 TAC §69.8(a) & (b).**

## Prohibitions on Take of State Listed Species

**Section 68.015 of the TPW Code** states that no person may capture, trap, take, or kill, or attempt to capture, trap, take, or kill, endangered fish or wildlife.

**Section 65.171 of the Texas Administrative Code** states that except as otherwise provided in this subchapter or **Parks and Wildlife Code, Chapters 67 or 68**, no person may take, possess, propagate, transport, export, sell or offer for sale, or ship any species of fish or wildlife listed by the department as endangered or threatened.

"Take" is defined in **Section 1.101(5) of the Texas Parks and Wildlife Code** as:

> *"Take," except as otherwise provided by this code, means collect, hook, hunt, net, shoot, or snare, by any means or device, and includes an attempt to take or to pursue in order to take.*

## Penalties

The penalties for take of state-listed species (**TPW Code, Chapter 67 or 68**) are:

- 1$^{ST}$ Offense = Class C Misdemeanor:
  $25-$500 fine

- One or more prior convictions = Class B Misdemeanor
  $200-$2,000 fine and/or up to 180 days in jail.

- Two or more prior convictions = Class A Misdemeanor
  $500-$4,000 fine and/or up to 1 year in jail.

Restitution values apply and vary by species. Specific values and a list of species may be obtained from the TPWD Wildlife Habitat Assessment Program.

# Element Occurrence Record

**Scientific Name:** *Haliaeetus leucocephalus* **Occurrence #:** 120 **Eo Id:** 4018

**Common Name:** Bald Eagle **TX Protection Status:** T

**Global Rank:** G4 **State Rank:** S3B,S3N

## Location Information:

| Watershed Code: | Watershed Description: |
|---|---|
| 12040205 | Austin-Oyster |

| County Code: | County Name: | Mapsheet Code: | Mapsheet Name: | State: |
|---|---|---|---|---|
| TXBRZR | Brazoria | 29095-A3 | Oyster Creek | TX |
| | | 29095-A4 | Lake Jackson | TX |
| | | 28095-H3 | Freeport | TX |
| | | 28095-H4 | Jones Creek | TX |

### Directions:

TERRITORY EAST-NORTHEAST OF CLUTE ON OYSTER CREEK AND BIG SLOUGH

## Survey Information:

**First Observation:** 2000 **Survey Date:** **Last Observation:** 2001

**Eo Type:** **EO Rank:** **EO Rank Date:**

**Observed Area (acres):**

## Comments:

**General Description:**

**Comments:** TPWD NEST #020-8A

**Protection Comments:**

**Management Comments:**

## Data:

**EO Data:** NEST #020-8A: 2000, ACTIVE NEST WITH ONE YOUNG FLEDGED; 2001, ACTIVE NEST WITH TWO YOUNG FLEDGED

## Site:

BRAZOS-SAN BERNARD-COLORADO RIVERS MEGASITE

# Element Occurrence Record

## Managed Area:

Managed Area Name:

Managed Area Type:

## Reference:

Full Citation:

ORTEGO, BRENT. 2001. PERFORMANCE REPORT. PROJECT NO. 10: BALD EAGLE NEST SURVEY AND MANAGEMENT. FEDERAL AID GRANT NO. W-125-R-12. SEPTEMBER 30, 2001.

ORTEGO, BRENT. 2002. MAPS CLARIFYING QUESTIONS ABOUT BALD EAGLE TERRITORY LOCATIONS FROM THE 2001 SURVEY. RECEIVED JUNE 13, 2002.

POLASEK, LEN G. 2000. PERFORMANCE REPORT. PROJECT NO. 10: BALD EAGLE NEST SURVEY AND MANAGEMENT. FEDERAL AID GRANT NO. W-125-R-11. AUGUST 31, 2000.

## Specimen:

## ELEMENT OCCURRENCE RECORD

**Element Occurrence Record (EOR)** Spatial and tabular record of an area of land and/or water in which a species, natural community, or other significant feature of natural diversity is, or was, present and associated information; may be a single contiguous area or may be comprised of discrete patches or subpopulations

**Occurrence #** Unique number assigned to each occurrence of each element when added to the NDD

## LOCATION INFORMATION

**Watershed Code** Eight digit numerical code determined by US Geological Survey (USGS)

**Watershed** Name of watershed as determined by USGS

**Quadrangle** Name of USGS topographical map

**Directions** Directions to geographic location where occurrence was observed, as described by observer or in source

## SURVEY INFORMATION

**First/Last Observation** Date a particular occurrence was first/last observed; refers only to species occurrence as noted in source and does not imply the first/last date the species was present

**Survey Date** If conducted, date of survey

**EO Type** State rank qualifiers:

- **M** Migrant – species occurring regularly on migration at staging areas, or concentration along particular corridors; status refers to the transient population in the State
- **B** Qualifier indicating basic rank refers to the breeding population in State
- **N** Qualifier indicating basic rank refers to the non-breeding population in State

**EO Rank**

| | | | |
|---|---|---|---|
| **A** | Excellent | **AI** | Excellent, Introduced |
| **B** | Good | **BI** | Good, Introduced |
| **C** | Marginal | **CI** | Marginal, Introduced |
| **D** | Poor | **DI** | Poor, Introduced |
| **E** | Extant/Present | **EI** | Extant, Introduced |
| **H** | Historical/No Field Information | **HI** | Historical, Introduced |
| **X** | Destroyed/Extirpated | **XI** | Destroyed, Introduced |
| **O** | Obscure | **OI** | Obscure, Introduced |

**EO Rank Date** Latest date EO rank was determined or revised

**Observed Area** Acres, unless indicated otherwise

## COMMENTS

**Description** General physical description of area and habitat where occurrence is located, including associated species, soils, geology, and surrounding land use

**Comments** Comments concerning the quality or condition of the element occurrence at time of survey

**Protection Comments** Observer comments concerning legal protection of the occurrence

**Management Comments** Observer comments concerning management recommendations appropriate for occurrence conservation

## DATA

**EO Data** Biological data; may include number of individuals, vigor, flowering/fruiting data, nest success, behaviors observed, or unusual characteristic, etc.

## SITE

**Site Name** Title given to site by surveyor

## MANAGED AREA INFORMATION

**Managed Area Name** Place name or (on EOR printout) name of area when the EO is located within or partially within an area identified for conservation, such as State or Federal lands, nature preserves, parks, etc.

**Alias** Additional names the property is known by

**Acres** Total acreage of property, including non-contiguous tracts

**Manager** Contact name, address, and telephone number for area or nearest area land steward

Please use one of the following citations to credit the source for the printout information:

Texas Natural Diversity Database. [year of printouts]. Wildlife Diversity Program of Texas Parks & Wildlife Department. [day month year of printouts].

Texas Natural Diversity Database. [year of printouts]. Element occurrence printouts for [scientific name] *records # [occurrence number(s)]. Wildlife Diversity Program of Texas Parks & Wildlife Department. [day month year of printouts]. *Use of record #'s is optional.

Revised 1 Apr 2008

# Code Key for Printouts from
# Texas Parks and Wildlife Department
# Texas Natural Diversity Database (TXNDD)

This information is for your assistance only; due to continuing data updates, vulnerability of private land to trespass and of species to disturbance or collection, **please refer all requesters to our office to obtain the most current information available.** Also, please note, identification of a species in a given area does not necessarily mean the species currently exists at the point or area indicated.

## LEGAL STATUS AND CONSERVATION RANKS

**FEDERAL STATUS** (as determined by the US Fish and Wildlife Service)

| | |
|---|---|
| **LE** | Listed Endangered |
| **LT** | Listed Threatened |
| **PE** | Proposed to be listed Endangered |
| **PT** | Proposed to be listed Threatened |
| **PDL** | Proposed to be Delisted (Note: Listing status retained while proposed) |
| **SAE, SAT** | Listed Endangered on basis of Similarity of Appearance, Listed Threatened on basis of Similarity of Appearance |
| **DL** | Delisted Endangered/Threatened |
| **C** | Candidate. USFWS has substantial information on biological vulnerability and threats to support proposing to list as threatened or endangered. Data are being gathered on habitat needs and/or critical habitat designations. |
| **C*** | C, but lacking known occurrences |
| **C**** | C, but lacking known occurrences, except in captivity/cultivation |
| **XE** | Essential Experimental Population |
| **XN** | Non-essential Experimental Population |
| **Blank** | Species is not federally listed |

**TX PROTECTION** (as determined by the Texas Parks and Wildlife Department)

| | |
|---|---|
| **E** | Listed Endangered |
| **T** | Listed Threatened |
| **Blank** | Species not state-listed |

**GLOBAL RANK** (as determined by NatureServe)

| | |
|---|---|
| **G1** | Critically imperiled globally, extremely rare, typically 5 or fewer viable occurrences |
| **G2** | Imperiled globally, very rare, typically 6 to 20 viable occurrences |
| **G3** | Very rare and local throughout range or found locally in restricted range, typically 21 to 100 viable occurrences |
| **G4** | Apparently secure globally |
| **G5** | Demonstrably secure globally |
| **GH** | Of historical occurrence through its range |
| **GU** | Possibly in peril range-wide, but status uncertain |
| **G#G#** | Ranked within a range as status uncertain |
| **GX** | Apparently extinct throughout range |
| **Q** | Rank qualifier denoting taxonomic assignment is questionable |
| **#?** | Rank qualifier denoting uncertain rank |
| **C** | In captivity or cultivation only |
| **G#T#** | "G" refers to species rank; "T" refers to variety or subspecies rank |

**STATE (SUBNATIONAL) RANK** (as determined by the Texas Parks and Wildlife Department)

| | |
|---|---|
| **S1** | Critically imperiled in state, extremely rare, vulnerable to extirpation, typically 5 or fewer viable occurrences |
| **S2** | Imperiled in state, very rare, vulnerable to extirpation, typically 6 to 20 viable occurrences |
| **S3** | Rare or uncommon in state, typically 21 to 100 viable occurrences |
| **S4** | Apparently secure in State |
| **S5** | Demonstrably secure in State |
| **S#S#** | Ranked within a range as status uncertain |
| **SH** | Of historical occurrence in state and may be rediscovered |
| **SU** | Unrankable – due to lack of information or substantially conflicting information |
| **SX** | Apparently extirpated from State |
| **SNR** | Unranked – State status not yet assessed |
| **SNA** | Not applicable – species id not a suitable target for conservation activities |
| **?** | Rank qualifier denoting uncertain rank in State |

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

July 1, 2010

Mr. Steve Parris, Field Supervisor
Clear Lake Ecological Services Field Office
U.S. Fish and Wildlife Service
17629 El Camino Real #211
Houston, TX 77058-3051

Dear Mr. Parris,

The U. S. Department of Energy is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery (the "biorefinery"), which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid blue-green algae. Algenol is considering two potential sites for the proposed biorefinery: one in Freeport, Texas (Algenol's preferred site option) and the other in Fort Myers, Lee County, Florida (Algenol's back-up site option).

The Texas site option is located near Freeport, Brazoria County, TX and is owned by the Dow Chemical Company (Figure 1). The site consists of 26 acres of land north of Route 332, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Coordinates: 28°59.477′ North, 95°20.596′ West). Currently, the entire site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle (Figure 2). Surrounding land uses include a capped landfill and undeveloped land to the north; undeveloped land and industrial uses to the east; a Dow property containing tanks that store condensate to the south; and a private access road, undeveloped land, and industrial land to the west. A recent wetland survey noted an isolated wetland area on the site and a permit application to determine the jurisdictional status of the wetland has been submitted to the U.S. Army Corps of Engineers.

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE does not anticipate any adverse affects on federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures. DOE would like to open consultation and technical assistance on the Algenol project. If you have any such related information, require additional information, or have any questions or comments about that project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305

Email: lisa.jorgensen@go.doe.gov
Telephone: 720-356-1569

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

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

Sincerely,

Lisa L. Jorgensen

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Figure 1. Project Location
Figure 2. Plot Plan on Aerial Photograph

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

June 25, 2010

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
PO Box 12276
Austin, TX 78711

Dear Mr. Wolfe,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery that will produce ethanol from carbon dioxide and seawater using blue-green algae. Two sites are being considered for the proposed biorefinery. The preferred location is near Oyster Creek in Freeport, Texas, and the alternate location is in Fort Myers, Florida. The proposed facility would consist of 17 acres of enclosed 1,200 gallon photobioreactors (i.e. closed system containers), and supporting areas for testing, algae growth, and ethanol separation.

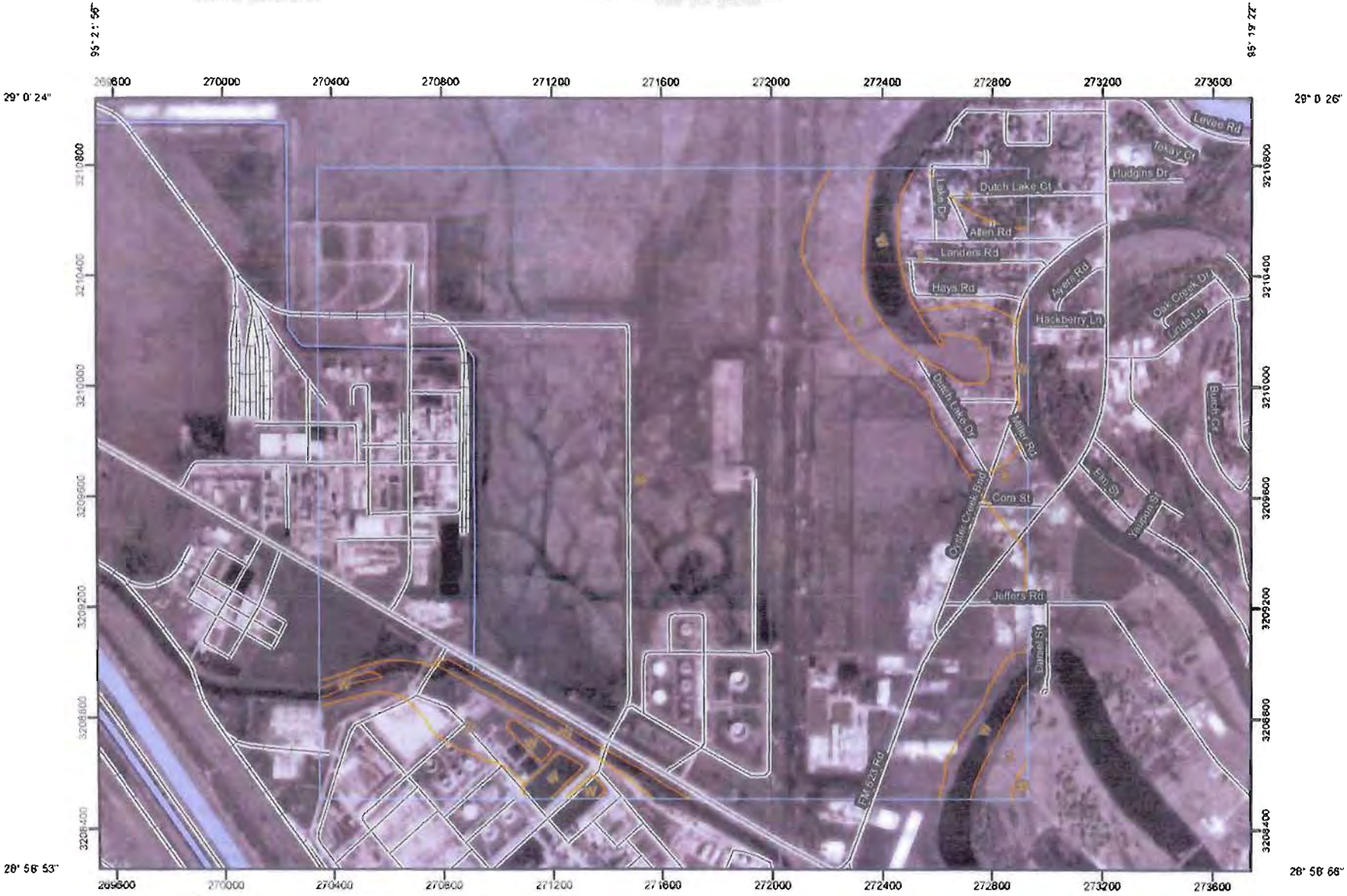
The proposed facility would be constructed on 26 acres owned by the Dow Chemical Company (Dow), north of the existing Dow Chemical Plant. The prospective site is .07 miles northwest of the intersection of Routes 332 and 523 (coordinates: 28°59.477′ North, 95°20.596′ West) near Freeport in Brazoria County, as shown on the attached map (Exhibit 1). Currently, the entire site consists of undeveloped pastureland that is harvested periodically for cattle feed. Surrounding land uses include a capped landfill to the north; undeveloped land and industrial uses to the east; Dow property used to store condensate tanks to the south; and a private access road, undeveloped land, and industrial areas to the west. The site was formerly used as a landing strip for a small airport.

Based on site observations and aerial images (Exhibit 2), DOE has determined that no buildings or structures 50 years old or older are present within the APE. A review of the Atlas on the Texas Historical Commission website revealed no historic properties or archeological sites within the APE. Soils over the entire project site consist of *Surfside Clay* (Exhibit 3). The site is located in a heavily industrialized area. Soils at the location have likely been disturbed by previous industrial activities, as well as activities associated with the former airport. Additionally, DOE is not aware of any Native American tribes with claims in the project area.

DOE has determined that no historic properties would be affected by this proposed project. In compliance with 36 CFR Part 800.4(d) (1), the Department asks the State Historic Preservation Office for its concurrence of this finding.

DOE's Golden Office is preparing a draft environmental assessment (EA) for this project. DOE will include correspondence with your office in an appendix to the EA. DOE will send you a

Soil Map—Brazoria County, Texas
(Oyster Creek Soil Survey Map)



## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Units

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

**Special Line Features**
- Gully
- Short Steep Slope
- Other

**Political Features**
- Cities

**Water Features**
- Oceans
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

## MAP INFORMATION

Map Scale: 1:19,900 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Brazoria County, Texas
Survey Area Data: Version 8, Oct 26, 2009

Date(s) aerial images were photographed: 1995

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Brazoria County, Texas (TX039) | | | |
|---|---|---|---|
| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
| 2 | Asa silt loam | 43.0 | 3.0% |
| 3 | Asa silty clay loam | 94.7 | 6.5% |
| 21 | Ijam clay | 40.9 | 2.8% |
| 36 | Pledger clay | 12.1 | 0.8% |
| 39 | Surfside clay | 1,192.4 | 82.0% |
| W | Water | 71.5 | 4.9% |
| Totals for Area of Interest | | 1,454.6 | 100.0% |

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



June 25, 2010

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
PO Box 12276
Austin, TX 78711

Dear Mr. Wolfe,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery that will produce ethanol from carbon dioxide and seawater using blue-green algae. Two sites are being considered for the proposed biorefinery. The preferred location is near Oyster Creek in Freeport, Texas, and the alternate location is in Fort Myers, Florida. The proposed facility would consist of 17 acres of enclosed 1,200 gallon photobioreactors (i.e. closed system containers), and supporting areas for testing, algae growth, and ethanol separation.

The proposed facility would be constructed on 26 acres owned by the Dow Chemical Company (Dow), north of the existing Dow Chemical Plant. The prospective site is .07 miles northwest of the intersection of Routes 332 and 523 (coordinates: 28°59.477′ North, 95°20.596′ West) near Freeport in Brazoria County, as shown on the attached map (Exhibit 1). Currently, the entire site consists of undeveloped pastureland that is harvested periodically for cattle feed. Surrounding land uses include a capped landfill to the north; undeveloped land and industrial uses to the east; Dow property used to store condensate tanks to the south; and a private access road, undeveloped land, and industrial areas to the west. The site was formerly used as a landing strip for a small airport.

Based on site observations and aerial images (Exhibit 2), DOE has determined that no buildings or structures 50 years old or older are present within the APE. A review of the Atlas on the Texas Historical Commission website revealed no historic properties or archeological sites within the APE. Soils over the entire project site consist of *Surfside Clay* (Exhibit 3). The site is located in a heavily industrialized area. Soils at the location have likely been disturbed by previous industrial activities, as well as activities associated with the former airport. Additionally, DOE is not aware of any Native American tribes with claims in the project area.

DOE has determined that no historic properties would be affected by this proposed project. In compliance with 36 CFR Part 800.4(d) (1), the Department asks the State Historic Preservation Office for its concurrence of this finding.

DOE's Golden Office is preparing a draft environmental assessment (EA) for this project. DOE will include correspondence with your office in an appendix to the EA. DOE will send you a

copy of the draft EA and respond to any specific comments you may have. At this time, we anticipate implementing a 15-day public comment period for this proposed project.

Please forward the results of your review and any requests for additional information, to Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado
Email: lisa.jorgensen@go.doe.gov
Phone: 720-356-1569

Sincerely,

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Exhibit 1. Proposed project location map
Exhibit 2. Aerial view of the proposed project location map
Exhibit 3. Soil map of Brazoria County Texas

NO HISTORIC
PROPERTIES AFFECTED
PROJECT MAY PROCEED
by
for Mark Wolfe
State Historic Preservation Officer
Date 7/30/10
Track# 201015222

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

July 1, 2010

Mr. Nick Wiley, Executive Director
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

Dear Mr. Wiley,

The U. S. Department of Energy is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery (the "biorefinery"), which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid blue-green algae. Algenol is considering two potential sites for the proposed biorefinery: one in Freeport, Texas (Algenol's preferred site option) and the other in Fort Myers, Lee County, Florida (Algenol's back-up site option).

The Florida site option is located in Fort Myers, Lee County, FL and is owned by Alico Road Business Park, LP (Figure 1). The site consists of approximately 40 acres of land north of Alico Road, approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 (Coordinates: 26°30.127′ North, 81°48.715′ West). Currently, the site consists of undeveloped land except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development (Figure 2). There are several large soil piles on the site, which consist of soils excavated for the development of the canals. Except for the soil piles and canals, the remainder of the site is vegetated primarily with grasses and some larger herbaceous vegetation (e.g., ragweed [*Ambrosia artemisiifolia*]).

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE does not anticipate any adverse affects on federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures. DOE would like to open consultation and technical assistance on the Algenol project. If you have any related information, require additional information, or have any questions or comments about this project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgensen@go.doe.gov
Telephone: 720-356-1669

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

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

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Attachments
Figure 1. Project Location Map
Figure 2. Plot Plan on Aerial Photograph

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

July 1, 2010

Mr. Paul Souza, Field Supervisor
South Florida Ecological Services Field Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960-3559

Dear Mr. Souza,

The U. S. Department of Energy is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery (the "biorefinery"), which would produce ethanol directly from carbon dioxide ($CO_2$) and seawater using hybrid blue-green algae. Algenol is considering two potential sites for the proposed biorefinery: one in Freeport, Texas (Algenol's preferred site option) and the other in Fort Myers, Lee County, Florida (Algenol's back-up site option).

The Florida site option is located in Fort Myers, Lee County, FL and is owned by Alico Road Business Park, LP (Figure 1). The site consists of approximately 40 acres of land north of Alico Road, approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 (Coordinates: 26°30.127′ North, 81°48.715′ West). Currently, the site consists of undeveloped land except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development (Figure 2). There are several large soil piles on the site, which consist of soils excavated for the development of the canals. Except for the soil piles and canals, the remainder of the site is vegetated primarily with grasses and some larger herbaceous vegetation (e.g., ragweed [*Ambrosia artemisiifolia*]).

An environmental assessment (EA) is currently being prepared for the proposed biorefinery by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE does not anticipate any adverse affects on federal or state listed wildlife species based on the proposed construction procedures, avoidance, and mitigation measures. DOE would like to open consultation and technical assistance on the Algenol project. If you have any related information, require additional information, or have any questions or comments about this project, please contact Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305

Email: lisa.jorgensen@go.doe.gov
Telephone: 730-356-1569

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

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

Sincerely,

Lisa L. Jorgensen

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Figure 1. Project Location Map
Figure 2. Plot Plan on Aerial Photograph

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

June 25, 2010

Ms. Kammerer
State Historic Preservation Officer
Attn: Review and Compliance Section
R.A. Gray Building, 4th Floor
500 South Bronough Street
Tallahasse, FL 32399-0250

Dear Ms. Kammerer,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery that will produce ethanol from carbon dioxide and seawater using blue-green algae. Two sites are being considered for the proposed biorefinery. The preferred location is near Oyster Creek in Freeport, Texas, and the alternate location is in Fort Myers, Florida. The proposed facility would consist of 17 acres of enclosed 1,200 gallon photobioreactors (i.e. closed system containers), and supporting areas for testing, algae growth, and ethanol separation.

If the Florida location is selected, the proposed facility would be constructed on a 40 acre site located approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 in Fort Meyers, (coordinates: 26°30.127′ North, 81°48.715′ West), as shown in the attached map (Exhibit 1). Exhibit 2 presents an aerial view of the site. The property is currently zoned for industrial use and consists of undeveloped land and a stormwater management canal system located along the eastern site boundary. The majority of the site is covered by grasses and other herbaceous vegetation; however, excavated soil piles from the canal system construction remain on the site. Surrounding land use includes undeveloped areas, similar in nature to the general characteristics of the proposed site and a newly constructed business park (Alico) is located north of the site. Additional business parks are planned in the surrounding area. Algenol is currently developing an unrelated research and development (R&D) facility and Process Development Unit (PDU) north of the proposed site, adjacent to the Alico Business Park. The DOE is not involved in development of the R&D facility and PDU.

Based on site observations and aerial images, DOE has determined that no buildings or structures 50 years old or older are present within the APE. A review of the National Register of Historic Places revealed no historic properties or archeological sites within the APE. Soils within the project's site boundary consist of *Boca Fine Sand*, *Pompano Fine Sand*, *Pompano Fine Sand Depressional*, and *Immokalee Sand* (Exhibit 3). Aerial and soil maps show prior disturbance from irrigation and canal development in the past. Additionally, DOE is submitting consultation letters to the Seminole Tribe of Florida and Seminole Nation of Oklahoma, as both of these organizations have been identified as having land area claims in Lee County.

DOE has determined that no historic properties would be affected by the proposed project. In compliance with 36 CFR Part 800.4(d) (1), the Department asks the State Historic Preservation Office for its concurrence of this finding.

DOE's Golden Office is preparing a draft environmental assessment (EA) for this project. DOE will include correspondence with your office in an appendix to the EA and will send you a copy of the draft EA and respond to any specific comments you may have. At this time, we anticipate implementing a 15-day public comment period for this proposed project.

Please forward the results of your review and any requests for additional information, to Ms. Lisa Jorgensen of the Golden Field Office as soon as possible at the following:

Ms. Lisa Jorgensen
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado
Email: lisa.jorgensen@go.doe.gov
Phone: 720-356-1569

Sincerely,

Lisa Jorgensen

Attachments
Exhibit 1. Proposed project location map
Exhibit 2. Aerial view of the proposed project location map
Exhibit 3. Soil map of Lee County, Florida


81° 49' 31"
81° 48' 8"
26° 31' 2"
26° 31' 3"
417900
418200
418500
418800
419100
419400
419700
420000
2933100
2932800
2932500
2932200
2931900
2931600
2931300
2931000
2930700
2930400
2930100
26° 29' 19"
Briar Patch Ln
Triple Crown Ct
Kilmarnock Dr
Abbotsford Ter
Carberry Ct
Glenisle Way
Pipers Gln
Queensferry Dr
Gullane Ct
Fiddlesticks Blvd
Mainline Pkwy
Link Ct
Supply Dr
Alico Rd
Toledo Dr
Valencia Rd
Almeria Rd
Capri Dr
Phlox Dr
Johnston Dr
Bear Hollow Cir
Lee Rd
Aloha Rd
Bahamas Rd
Tahiti Rd
Plantation Dr
Malaga Rd
Knight Dr
Oriole Rd
Map Scale: 1:15,200 if printed on A size (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 500 1,000 2,000 3,000

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Units

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

**Special Line Features**
- Gully
- Short Steep Slope
- Other

**Political Features**
- Cities

**Water Features**
- Oceans
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

## MAP INFORMATION

Map Scale: 1:15,200 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lee County, Florida
Survey Area Data: Version 8, Jan 25, 2010

Date(s) aerial images were photographed: 6/26/2007

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Lee County, Florida (FL071) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| 7 | Matlacha-Urban land complex | 100.8 | 9.2% |
| 10 | Pompano fine sand | 465.3 | 42.4% |
| 13 | Boca fine sand | 7.7 | 0.7% |
| 14 | Valkaria fine sand | 17.5 | 1.6% |
| 26 | Pineda fine sand | 6.4 | 0.6% |
| 27 | Pompano fine sand, depressional | 120.9 | 11.0% |
| 28 | Immokalee sand | 354.5 | 32.3% |
| 40 | Anclote sand, depressional | 8.6 | 0.8% |
| 99 | Water | 16.2 | 1.5% |
| **Totals for Area of Interest** | | **1,097.8** | **100.0%** |

FLORIDA DEPARTMENT OF STATE
**Dawn K. Roberts**
Interim Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Lisa Jorgensen
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

July 16, 2010

RE: DHR Project File Number: 2010-3227
*Algenol Biofuels, Inc. – Proposed Construction and Operation off a Pilot-Scale Integrated Biorefinery Near Alico Road and Interstate 75*
Fort Myers, Lee County

Dear Ms. Jorgensen:

This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*. The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties*.

Based on the information provided, it is the opinion of this office that the above-referenced undertaking will have no effect on historic properties.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *sedwards@dos.state.fl.us*, or at 850.245.6333 or 800.847.7278.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

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

July 29, 2010

Frank Paiz, Governor
Yselta del Sur Pueblo
P.O. Box 17579-Ysleta Station
El Paso, TX 79917

Dear Frank Paiz,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

An environmental assessment (EA) is currently being prepared for the proposed Project by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE will include correspondence with your tribe in an appendix to the EA. This letter as well as the draft EA, when it is available, will be posted in the DOE Golden Field Office

online reading room: http://www.eere.energy.gov/golden/reading room.aspx. At this time we anticipate a 15-day public comment period for this proposed project. You will receive a notice of the availability of the draft EA. Please contact DOE if you would like to receive a hardcopy of the draft EA.

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Javier Loera
Tribal Historic Preservation Officer
Yselta del Sur Pueblo
P.O. Box 17579-Ysleta Station
El Paso, TX 79917

**Ysleta del Sur Pueblo**

Tribal Council – Javier Loera – (War Captain/Tribal Historic and Preservation Officer) E-mail jloera@ydsp-nsn.gov

117 South Old Pueblo Road * P.O. Box 17579 * El Paso, Texas 79917 * (915) 859-8053 * Fax: (915) 859-4252

August 31, 2010

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305

Dear Ms. Jorgensen:

This letter is in response to the U.S. Department of Energy's (DOE) proposal to provide Federal funding to Algenol Biofeuls, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas. Algenol's second site choice is located in Fort Myers, Lee County, Florida.

The Ysleta del Sur Pueblo does not have any comments nor does it request consultation on this project due to its location being outside of our Pueblo's Native American Graves Protection and Repatriation Act (NAGPRA) area of interest and/or relevance.

Thank you for allowing us the opportunity to comment on this project.

Sincerely,

Javier Loera

Javier Loera
War Captain/Tribal Historic and Preservation Officer
Ysleta del Sur Pueblo
E-mail: jloera@ydsp-nsn.gov

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

July 29, 2010

Michael Burgess, Chairman
The Comanche Nation of Oklahoma
P.O. Box 908
Lawton, OK 73502

Dear Michael Burgess,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

An environmental assessment (EA) is currently being prepared for the proposed Project by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE will include correspondence with your tribe in an appendix to the EA. This

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Jimmy Arterberry
Historic Preservation Officer
The Comanche Nation of Oklahoma
P.O. Box 908
Lawton, OK 73502

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

July 29, 2010

Leslie Standing, President
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

Dear Leslie Standing,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Stratford Williams
Tribal Historic Preservation Officer
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

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

July 29, 2010

Juan Garza, Chairman
Kickapoo Traditional Tribe of Texas
HCR1, Box 9700
Eagle Pass, TX 78852

Dear Juan Garza,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

An environmental assessment (EA) is currently being prepared for the proposed Project by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE will include correspondence with your tribe in an appendix to the EA. This letter as well as the draft EA, when it is available, will be posted in the DOE Golden Field Office

online reading room: http://www.eere.energy.gov/golden/reading room.aspx. At this time we anticipate a 15-day public comment period for this proposed project. You will receive a notice of the availability of the draft EA. Please contact DOE if you would like to receive a hardcopy of the draft EA.

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

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Don Spaulding
Tribal Administrator
Kickapoo Traditional Tribe of Texas
HCR1, Box 9700
Eagle Pass, TX 78852

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

July 29, 2010

Gilbert L. Salazar, Chairman
Kickapoo Tribe of Oklahoma
P.O. Box 70
McCloud, OK 74851

Dear Gilbert L. Salazar,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

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U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgensen@go.doe.gov

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Darren Shields
Environmental Director
Kickapoo Tribe of Oklahoma
P.O. Box 70
McCloud, OK 74851

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

July 29, 2010

Donald Tofpi, Chairman
Kiowa Tribe of Oklahoma
Post Office Box 369
Carnegie, OK 73015-0369

Dear Donald Tofpi,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

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NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgensen@go.doe.gov

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

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

July 29, 2010

Don L. Paterson, President
Tonkawa Tribe of Oklahoma
1 Rush Buffalo Road
Tonkawa OK. 74653-4449

Dear Don L. Paterson,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

TONKAWA TRIBE OF OKLAHOMA

# NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT

• 1 RUSH BUFFALO ROAD, TONKAWA, OKLAHOMA 74653 •
• PHONE (580) 628-2561 • FAX: (580) 628-9903 •
WEB SITE: www.tonkawatribe.com

Ms. Lisa Jorgensen
NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305

lisa.jorgensen@go.doe.gov

Date: August 20, 2010

Regarding the proposed construction projects listed we submit the following:

RE: Algenol Biofuels, Inc., Pilot-scale nitrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas.

The Tonkawa Tribe has no specifically designated historical or cultural sites identified in the above listed project area. However if any human remains, funerary objects, or other evidence of historical or cultural significance is inadvertently discovered then the Tonkawa Tribe would certainly be interested in proper disposition thereof.

We appreciate notification by your office of the many projects on-going, and as always the Tonkawa Tribe is willing to work with your representatives in any manner to uphold the provisions of NAGPRA to the extent of our capability.

Respectfully,

NAGPRA Representative

Concurrence: Tonkawa Tribe Business Committee

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

July 29, 2010

Carlos Bullock, Chairman
The Alabama-Coushatta Tribe of Texas
571 State Park Road 56
Livingston, Texas 77351

Dear Carlos Bullock,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

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NEPA Document Manager
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401-3305
Email: lisa.jorgensen@go.doe.gov

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Mr. Bryant Celestine
Tribal Historic Preservation Officer
The Alabama-Coushatta Tribe of Texas
571 State Park Road 56
Livingston, Texas 77351

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

July 29, 2010

Arlan Whitebird, Chairman
Kickapoo Tribe in Kansas
1107 Gold Finch Road
Horton, TX 66439

Dear Arlan Whitebird,

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to Algenol Biofuels, Inc. to support the final design, construction, and operation of a pilot-scale integrated biorefinery on the Dow Chemical Company's plastics and chemical manufacturing facility site in Freeport, Texas (Figure 1). Algenol's second site choice is located in Fort Myers, Lee County, FL on property owned by Alico Road Business Park, LP.

The proposed facility would produce ethanol directly from carbon dioxide (CO2) and seawater using hybrid blue-green algae. The purpose of the proposed pilot-scale integrated biorefinery is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization.

The proposed pilot scale refinery would consist of approximately 17 acres of plastic fully enclosed 1200-gallon proprietary photobioreactors and would include supporting areas for testing, algae growth, and ethanol separation (Figure 1).

The preferred Freeport, Texas site consists of 26 acres of land north of Route 322, approximately 0.7 miles northwest of the intersection of Routes 332 and 523 (Figure 2). Currently the site consists of undeveloped pastureland that is periodically harvested to use as feed for cattle. Surrounding land uses include a capped landfill and undeveloped land to the north, undeveloped land and industrial uses to the east, a Dow property containing tanks that store condensate to the south, and a private access road, undeveloped land and industrial land to the west. Figure 3 shows an aerial view of the proposed Freeport, TX site.

Algenol, with assistance from The Dow Chemical Company and Potomac Hudson Engineers, has corresponded with the Texas State Historical Preservation Office in order to provide details regarding the site and its previous uses, including a runway for a small airport that previously occupied a portion of the site and required excavation and other activities disturbing the site. Based on this information the Texas State Historic Preservation Office has confirmed that a Phase I Cultural Survey will not be required.

An environmental assessment (EA) is currently being prepared for the proposed Project by the Department's Golden Field Office to meet the requirements of the *National Environmental Policy Act*. DOE will include correspondence with your tribe in an appendix to the EA. This letter as well as the draft EA, when it is available, will be posted in the DOE Golden Field Office

online reading room: http://www.eere.energy.gov/golden/reading room.aspx. At this time we anticipate a 15-day public comment period for this proposed project. You will receive a notice of the availability of the draft EA. Please contact DOE if you would like to receive a hardcopy of the draft EA.

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

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

Thank you in advance for your consideration.

Sincerely,

Lisa Jorgensen
NEPA Document Manager

Figure 1. Proposed facility—Proposed site layout
Figure 2. Proposed site location map—Freeport, TX
Figure 3. Aerial photograph—Freeport, TX

Cc: Mark Kahbeah
Tribal Historic Preservation Officer
Kickapoo Tribe in Kansas
1107 Gold Finch Road
Horton, TX 66439

1107 Goldfinch Road • Horton, Kansas 66439
phone 785.486.2131 • fax 785.486.2801

## SUBJECT: SECTION 106 RESPONSE

**REGARDING:** final design, construction and operation of a point scale

**LOCATION:** Freeport, Texas Fort Meyers, Lee County FL

**DATE OF MAILING:** July 29 2010

**TO:** Lisa Jorgensen

☑ No further Section 106 consultation is required Concurrence of "no effect" or "no adverse effect" to historic structures or culturally significant sites (as defined in 36 CFR 800) is granted.

☐ You may proceed with construction, but if there are any burial sites or other cultural properties discovered in the area, please notify this office immediately and your state or local historical agency.

☐ Additional information is required, including:

_____

_____

**FROM:**

Kickapoo Tribe in Kansas (Consulting Party)

Mark Kahbeah (Designated Contact)

Mark Kahbeah (Signature)

August 3 2010 (Date)

1107 Goldfinch Road • Horton, Kansas 66439
phone 785.486.2131 • fax 785.486.2801

## SUBJECT: SECTION 106 RESPONSE

**REGARDING:** Algenol BioFuels, INC

**LOCATION:** Freeport Texas

**DATE OF MAILING:** 29 July 10

**TO:** Lisa Jorgensen

☑ No further Section 106 consultation is required Concurrence of "no effect" or "no adverse effect" to historic structures or culturally significant sites (as defined in 36 CFR 800) is granted.

☐ You may proceed with construction, but if there are any burial sites or other cultural properties discovered in the area, please notify this office immediately and your state or local historical agency.

☐ Additional information is required, including:

_____

_____

**FROM:**

Kickapoo Tribe in Kansas (Consulting Party)

Mark Kahbeah (Designated Contact)

Mark Kahbeah (Signature)

2 Aug 10 (Date)

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

July 1, 2010

Mr. Alan D. Emarthle, Tribal Historical Preservation Officer
Seminole Nation of Oklahoma
PO Box 1768
Seminole, OK 74868

Dear Mr. Emarthle,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery that will produce ethanol from carbon dioxide and seawater using blue-green algae. Two sites are being considered for the proposed biorefinery. The preferred location is near Oyster Creek in Freeport, Texas, and the alternate location is in Fort Myers, Florida. The proposed facility would consist of 17 acres of enclosed 1,200 gallon photobioreactors (i.e. closed system containers), and supporting areas for testing, algae growth, and ethanol separation.

The proposed Florida location would be constructed on a 40 acre site located approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 in Fort Meyers, (coordinates: 26°30.127′ North, 81°48.715′ West), as shown in the attached maps. The property is currently zoned for industrial use and consists of undeveloped land and a stormwater management canal system located along the eastern site boundary. The majority of the site is covered by grasses and other herbaceous vegetation; however, excavated soil piles from the canal system construction remain on the site. Surrounding land use includes undeveloped areas, similar in nature to the general characteristics of the proposed site and a newly constructed business park (Alico) is located north of the site. Additional business parks are planned in the surrounding area. Algenol is currently developing an unrelated research and development (R&D) facility and Process Development Unit (PDU) north of the proposed site, adjacent to the Alico Business Park. The DOE is not involved in development of the R&D facility and PDU.

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

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

Ms. Lisa Jorgensen
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado
Email: Lisa.Jorgensen@go.doe.gov
Phone: 720-356-1569

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

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

Sincerely,

Lisa L. Jorgensen

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Figure 1 – Site Location Map
Figure 2 – Aerial Site Location Map

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

July 1, 2010

Mr. Mitchell Cypress, Chairperson
Seminole Indian Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Mr. Cypress,

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Algenol Biofuels, Inc. (Algenol) for the construction and operation of a pilot-scale integrated biorefinery that will produce ethanol from carbon dioxide and seawater using blue-green algae. Two sites are being considered for the proposed biorefinery. The preferred location is near Oyster Creek in Freeport, Texas, and the alternate location is in Fort Myers, Florida. The proposed facility would consist of 17 acres of enclosed 1,200 gallon photobioreactor (i.e. closed system containers), and supporting areas for testing, algae growth, and ethanol separation.

The proposed Florida location would be constructed on a 40 acre site located approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75 in Fort Meyers, (coordinates: 26°30.127′ North, 81°48.715′ West), as shown in the attached maps. The property is currently zoned for industrial use and consists of undeveloped land and a stormwater management canal system located along the eastern site boundary. The majority of the site is covered by grasses and other herbaceous vegetation; however, excavated soil piles from the canal system construction remain on the site. Surrounding land use includes undeveloped areas, similar in nature to the general characteristics of the proposed site and a newly constructed business park (Alico) is located north of the site. Additional business parks are planned in the surrounding area. Algenol is currently developing an unrelated research and development (R&D) facility and Process Development Unit (PDU) north of the proposed site, adjacent to the Alico Business Park. The DOE is not involved in development of the R&D facility and PDU.

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

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

Ms. Lisa Jorgensen
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado
Email: lisa.jorgensen@go.doe.gov
Phone: 720-356-1569

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

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

Sincerely,

Lisa L. Jorgensen
NEPA Document Manager

Attachments
Figure 1 – Site Location Map
Figure 2 – Aerial Site Location Map

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

34725 WEST BOUNDARY ROAD
CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117



Ms. Lisa Jorgensen
U.S. Department of Energy
1617 Cole Boulevard
Golden, CO 80401-3393

**THPO#**: 006740

August 30, 2010

**Subject**: Algenol Biofuels, Inc. Proposed Construction and Operation of a Pilot-Scale Integrated Biorefinery in Lee County, Florida

Dear Ms. Jorgensen,

The Seminole Tribe of Florida's Tribal Historic Preservation Office (STOF-THPO) has received the Department of Energy's correspondence for the aforementioned project. Due to the fact that the project area is within the geographic area considered by the Seminole Tribe of Florida to be ancestral, aboriginal, or ceded (NHPA 1966, Section b1, and 36 CFR, Section 800.2), the STOF-THPO would like to request a Phase I archaeological survey be conducted and reviewed prior to making any further comment. We thank you for the notification of this proposed project. Please reference ***THPO-006740*** in any future documentation about this project.

Sincerely,

***Direct routine inquiries to:***

Willard Steele
Tribal Historic Preservation Officer
Seminole Tribe of Florida

Anne Mullins
Compliance Review Supervisor
annemullins@semtribe.com

ETY:am

-----Original Message-----
From: Jorgensen, Lisa [mailto:lisa.jorgensen@go.doe.gov]
Sent: Wednesday, December 08, 2010 3:31 PM
To: Hicks, Kendal - North Fort Myers, FL
Subject: Unique Farmland De

Kendal-Pursuant to our telephone conversation today, I am providing information on the proposed Algenol biorefinery project in Fort Myers, Lee County, Florida. Attached is a map showing the site location. We would appreciate your help in determining DOE has any requirements with respect to the property being unique farmlands under FPPA.

The proposed project site is owned by Alico Road Business Park and consists of approximately 40 acres of land north of Alico Road approximately 1.1 miles northwest of the intersection of Alico Road and Interstate 75. Approximately 96.8 percent of the 40 acres is farmland soils of unique importance (USDA, 1984). Currently, the site consists of undeveloped land except for a canal system along the eastern site boundary that was constructed for stormwater management in anticipation of development. There are several large soil piles on the site, which consist of soils excavated for the development of the canals. Except for the soil piles and canals, the remainder of the site is vegetated primarily with grasses and some larger herbaceous vegetation (e.g., ragweed). Surrounding land uses include undeveloped land, similar in nature to the general characteristics of the site, to the east, south, and west. To the north of the site is the recently constructed Alico Business Park, which consists of industrial/office uses.

Plans are currently in place by the property owners to develop the site and the surrounding area into one or more business parks. The Lee County Comprehensive Plan, last amended in 2009, serves as the source of authority for land development regulations in the project area. Based on the land use plans, the project location would be within the Gateway/Airport community. Lands in this community are primarily designated as Industrial Development. It is expected that the project area would increase in urbanization with hi-tech/clean industry businesses based on goals set forth in the Lee Plan, and lands reserved under this land use category would provide centrally located areas for research and development, laboratories, industrial activities, and office space (Lee County, 2009).

Additional information on the Alico Business Park development can be found at the following website:

http://alicocommercial.com/Alico_Commercial_Group/Alico_Road_Business_Park.html

If you have any questions, please call me. I really appreciate your help in this matter.

Have a good day.

Lisa Jorgensen
NEPA Policy Advisor
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd., Bldg. 53
Golden, CO 80401
Telephone (720) 356-1569

-----Original Message-----
From: Hicks, Kendal - North Fort Myers, FL
Sent: Thursday, December 09, 2010 8:10 PM
To: Yamataki, Howard - North Fort Myers, FL
Subject: FW: Unique Farmland De

Howard,

Can you and your staff help this lady with her request for assistance?

Thanks!

Kendal Hicks, District Conservationist
Natural Resources Conservation Service (NRCS)
3434 Hancock Bridge Pkwy Suite 209B
N. Ft. Myers, Florida 33903
Office: (239) 997-7331 X3
Fax: (239) 997-7557 "Helping People Help the Land"

-----Original Message-----

From: Yamataki, Howard - North Fort Myers, FL

Sent: Monday, December 13, 2010 7:11 AM

To: Robbins, Rick - Gainesville, FL

Cc: Hicks, Kendal - North Fort Myers, FL; Figueroa, Martin - North Fort Myers, FL; Perez-Castro, Sherlynette - North Fort Myers, FL

Subject: FW: Unique Farmland De

Rick,

As per our discussion this morning, I am forwarding this request to you for the determination.

To Kendal and staff: I learned through Rick there has been some refinement made on the Unique Farmland determinations as of early this year. Many of our flatwood and slough map units are now Unique even in the natural state. I guess this makes perfect sense, since in the past; this determination was based on present use. A more accurate application of the policy states if at least 10% of the acreage of a certain soil is used for crops in a county, the rest is assumed to be unique.

Rick - straighten me out if there is something I missed.

Howard

-----Original Message-----
From: Robbins, Rick - Gainesville, FL [mailto:rick.a.robbins@fl.usda.gov]
Sent: Monday, December 13, 2010 6:37 AM
To: Jorgensen, Lisa
Cc: Hicks, Kendal - North Fort Myers, FL; Figueroa, Martin - North Fort Myers, FL; Perez-Castro, Sherlynette - North Fort Myers, FL; Yamataki, Howard - North Fort Myers, FL
Subject: RE: Unique Farmland Determination

Hello Lisa,

Your request has been forwarded for my attention. Please review the attached zip file which contains Cover Letter, Farmland map, and Lee County Legend.

If you have any questions, please feel free to contact me.

Regards,

Rick

Rick Robbins
USDA-NRCS
Soil Scientist
2614 NW 43rd Street,
Gainesville, FL 32606
Phone: 352.338.9536
Email: rick.a.robbins@fl.usda.gov

-----Original Message-----
From: Jorgensen, Lisa [mailto:lisa.jorgensen@go.doe.gov]
Sent: Monday, December 13, 2010 10:51 AM
To: Robbins, Rick - Gainesville, FL
Subject: RE: Unique Farmland Determination
Rick- Thank you for the information you provided. As you can probably tell, we have never gone through this process before, so I am somewhat unclear on the purpose of the AD-1006 form. From talking to Kendall, it sounds like the NRCS uses the information in the form to track land conversion, not to make a decision whether the land can be converted. So I just wanted to get clarification on two points:

1) Once we submit the form, will we have to wait for a determination from NRCS before we can proceed with this project?

2) Is the map you provided, the map that should be included with the AD1006 form?

Thank you for all of your help.

Lisa Jorgensen

NEPA Policy Advisor
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd., Bldg. 53
Golden, CO 80401
Telephone (720) 356-1569

-----Original Message-----
From: Robbins, Rick - Gainesville, FL [mailto:rick.a.robbins@fl.usda.gov]
Sent: Monday, December 13, 2010 9:01 AM
To: Jorgensen, Lisa
Subject: RE: Unique Farmland Determination

Lisa,

Yes, it is an Agency mandate to track conversion of Prime/Unique Farmland soils to non-ag uses. The NRCS also tracks the "relative value" of the farmland being converted. There is no NRCS involvement unless Federal monies are used for the project. It is also Non-regulatory which means if we determine there is Unique Farmland it doesn't mean that we have any legal rights to the conversion.

1) I can usually turn around an AD-1006 in less than a day (depending on my workload). It should not affect your project's scheduling.

2) If possible, provide an ArcGIS shapefile which allows me to calculate the exact acreages of each soil within the parcel. If not, I can create an approximate boundary for the project. Overall, it seems to be a straight forward project since the boundaries are well defined.

If I receive the AD-1006 and shapefile soon, I should be able to return the final report this week. After this week, it gets problematic with the upcoming holidays.

Regards,

Rick

-----Original Message-----
From: Jorgensen, Lisa [mailto:lisa.jorgensen@go.doe.gov]
Sent: Wednesday, December 15, 2010 10:22 AM
To: susanw@ageiss.com
Subject: RE: Unique Farmland Determination

Rick- Attached are the AD-1006 Form and requisite information. Please let me know if additional information is needed. I hope we got it to you soon enough to turn around by the end of the week.

Thank you very much for your help.

Lisa Jorgensen
NEPA Policy Advisor
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd., Bldg. 53
Golden, CO 80401
Telephone (720) 356-1569

# Appendix C - Wetlands Delineation Study (Texas Site Option)

Wetland Delineation Report

# 35.51-Acre Tank Farm Tract
# The Dow Chemical Company

**Clute, TX**

**December 2, 2009**


***PREPARED BY***

ENTRIX, Inc.
5252 Westchester Street
Suite 250
Houston, Texas 77005
713-666-6223
www.entrix.com


***PREPARED FOR***

The Dow Chemical Company
2301 Brazosport Blvd.-B101
Freeport, TX 77541




December 2, 2009

Mr. Mark Larson
The Dow Chemical Company
2301 Brazosport Blvd.- B101
Freeport, TX 77541

**RE: Wetland Delineation Report**
**35.51-Acre Tank Farm Tract**
**The Dow Chemical Company**
Clute, TX

Dear Mark:

This letter report presents the results of a 35.51-acre wetland tract delineation (Subject Tract) conducted in close proximity to Highway 332 on The Dow Chemical Company (Dow) property near Clute, Brazoria County, Texas (**Figure 1**). ENTRIX understands that Dow desires to construct a new facility at the Subject Tract.

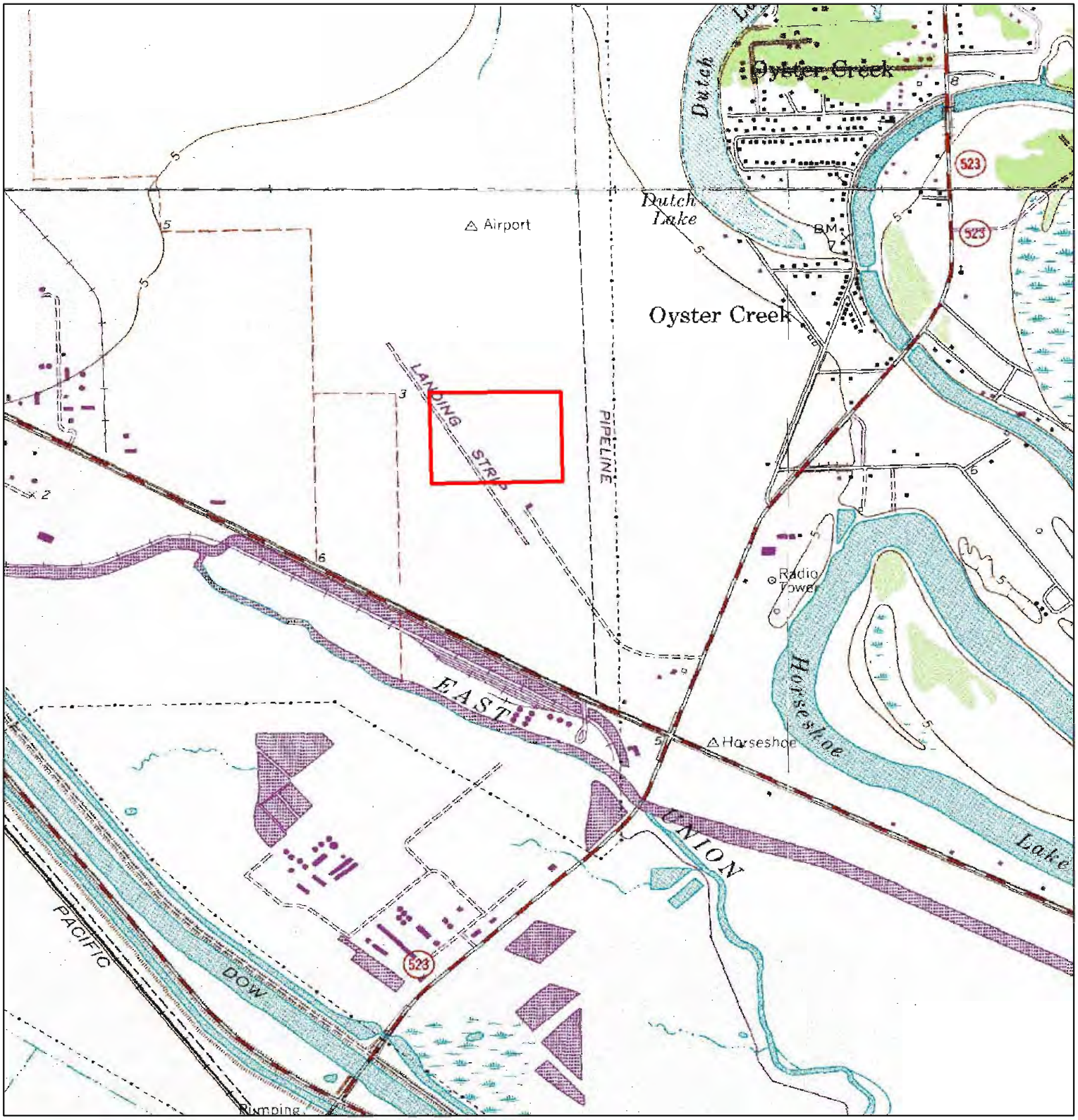
On September 24, 2009 a wetland delineation at the Subject Tract was conducted to determine:

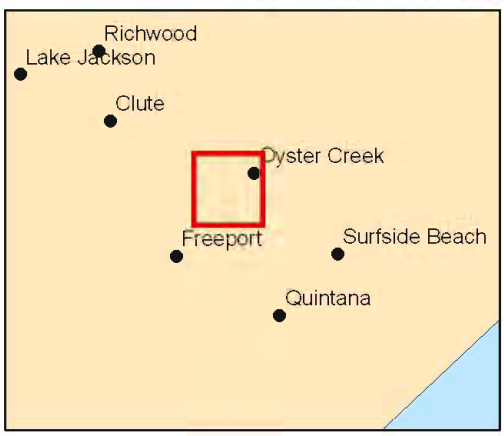
- The presence of wetlands,
- The jurisdictional vs. non-jurisdictional status of wetlands within the Subject Tract,
- The presence of additional "Waters of the U.S." as defined by Section 404 of the Clean Water Act, and
- Approximate boundaries of potential jurisdictional "Waters of the US" within the Subject Tract.

This letter summarizes the results of the Wetland Delineation.

## I. AREA DESCRIPTION

The Subject Tract is located in an undeveloped coastal prairie habitat complex. A mixture of herbaceous and scrub-shrub habitats are present on the Subject Tract. A Dow Chemical tank farm facility is located immediately south of the Subject Tract. Dow Pipeline Corridor "R" lies to the east, and an industrial facility access road lies to the west, and a Dow Chemical Company landfill lies to the north of the Subject Tract. Land use is classified as agricultural, with cattle ranching occurring on the Subject Tract.




0 0.25 0.5 Miles

N

**Legend**

Project area

# Figure 1

Site Vicinity
Wetland Determination
Proposed Algenol Pilot Plant
Dow Chemical Company
Oyster Creek, Texas

November 2009

ENTRIX
Down to Earth. Down to Business.℠

Global Positioning System (GPS) boundary coordinates of the Subject Tract in decimal degrees NAD 83 CONUS are:

| | |
|---|---|
| **NE Corner:** | **28.993443403˚ N**<br>**95.341180342˚ W** |
| **NW Corner:** | **28.993432340˚ N**<br>**95.345590369˚ W** |
| **SW Corner:** | **28.990380989˚ N**<br>**95.345510355˚ W** |
| **SE Corner:** | **28.990449911˚ N**<br>**95.341118888˚ W** |

## II. WETLAND DELINEATION METHODOLOGY

The evaluation of potential jurisdictional wetlands consisted of a site examination to determine whether the three wetland characteristics (hydrophytic vegetation, hydric soils, and wetland hydrology), as defined by the U.S. Army Corps of Engineers (COE) criteria for jurisdictional wetlands, were present.

Wetland determination methodology as set forth in the COE *Federal Manual for Identification of Jurisdictional Wetlands (*1987) (1987 Manual) was followed. Background soils information of the Subject Tract was obtained from the Brazoria County Soil Survey prepared by the USDA Natural Resources Conservation Service. The *National List of Vascular Plant Species That Occur In Wetlands: 1988 National Summary* (USFWS 1988) was used to determine the wetland status of plant species observed at the Subject Tract.

Reference material used in the field and during report preparation included:

- The Natural Resource Conservation Service's Soil Survey of Brazoria County and list of Hydric Soils in Brazoria County, Texas.
- Federal Emergency Management Agency (FEMA) Floodplain maps
- Munsell Soil Color Charts,
- US Army Corps of Engineers 1987 Wetlands Delineation Manual,
- *National List of Vascular Plant Species That Occur In Wetlands: 1988 National Summary* (USFWS 1988), and
- Various field identification books for plants.

ENTRIX relied upon field measurements, Trimble Pro XH Global Positioning System (GPS), and Digital Ortho Quarter Quad color infrared photo-imagery to determine potential jurisdictional wetland boundaries and acreage. Once obtained, GPS data were overlaid onto the TNRIS color infrared photo-imagery to develop a Geographic Information System (GIS) based exhibit.

The findings of the field determination are presented below. The field data sheets are included in **Attachment A**. GPS validation data is included in **Attachment B**.

ENTRIX
Down to Earth. Down to Business.℠

# III. RESULTS

## A. Vegetation

**Table 1** defines the Wetland Indicator Status as described in the publication: *National List of Vascular Plant Species That Occur In Wetlands: 1988 National Summary* (USFWS 1988). The following dominant vegetative species and indicator status were recorded in potential jurisdictional portions of the Subject Tract during the wetland delineation:

- Gulf cordgrass (*Spartina spartinae*), FACW+
- Jointed flatsedge (*Cyperus articulatus*), OBL
- Rattlebox (*Sesbania drummondi*), FACW+
- Bushy sea-oxeye (*Borrichia frutescens*), FACW+
- Camphor weed (*Pluchea odorata*), OBL
- Eastern false willow (*Baccharis halimifolia*), FACW-
- Giant bulrush (*Schoenoplectus robustus*), OBL
- Balloon vine, *Cardiospermum halicacabum*, FAC
- Cat-tail (*Typha latifolia*), OBL

A predominance of upland (FACW and OBL) vegetation was found within jurisdictional portions of the Subject Tract.

The following dominant vegetative species and indicator status were recorded in upland portions of the Subject Tract during the wetland delineation:

- Annual ragweed (*Ambrosia artemisiifolia*), FACU
- Bermuda grass (*Cynodon dactylon*), FACU+
- Annual sumpweed (*Iva annua*), FAC
- Southern dewberry (*Rubus trivialis*), FAC

## B. Soils

The 1987 *Manual* defines a hydric soil as a "soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation". Table 2 describes field hydric soil indicators as defined in the 1987 *Manual*.

The USDA-Natural Resources Conservation Service mapped soils at the Subject Tract as:

- Surfside Clay

Field verification of Surfside Series soils were confirmed during the wetland delineation. Table 2 describes field hydric soil indicators as defined in the 1987 *Manual*.

### Surfside Clay Series Description

Surfside Series soils consist of deep, nearly level, poorly drained, saline soils found in marshes. Surfside soils formed in recent clayey fluvial deposits. Slopes range from 0.1-0.6 percent.

**From 0-14 inches:** very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; many fine and medium roots; many strong brown stains along old root channels; saline; mildly alkaline; gradual smooth boundary.

**From 14-32 inches:** dark gray (10YR 4/1) clay, gray (10YR 4/1) dry; few fine distinct yellowish-brown (10YR 5/4) and few, fine faint gray mottles; moderate coarse prismatic structure parting to moderate medium and fine blocky; few prism faces thinly coated with light gray silt material; very hard, very firm, very sticky, and very plastic; few fine roots; saline; mildly alkaline; gradual smooth boundary.

Surfside Series soils were determined to be hydric based on the following indicators observed in the field:

- Gleyed or low-chroma colors (usually 10YR 3/1),
- Aquic moisture regime,
- Listed on Local Hydric Soils List, and

### C. Hydrology

The 1987 *Manual* definition of wetland hydrology "encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season". Table 3 describes 1987 *Manual* field indicators for wetland hydrology determinations. Test pits excavated within depressional areas of the Subject Tract indicate that the presence of both primary and/or sufficient secondary wetland hydrology indicators are met (i.e. meeting the duration period requirement (i.e., seasonally inundated or saturated from 12.5 - 25% of the growing season) or the 1987 *Manual* soil saturation criteria.

## IV. CONCLUSIONS

**Within the 35.51-acre Subject Tract, a total of 35.06 acres potential jurisdictional wetlands were documented** (**Figure 2**). A 0.45-acre upland area was located along the southern boundary of the Subject Tract.

Based upon a review of the FEMA floodplain maps for Brazoria County, the Subject Tract falls in the "X Zone", outside the 500-Year and 100-Year floodplains (**Figure 3**). A site elevation survey was conducted to determine: 1) if a hydrological connection was present between the Subject Tract and jurisdictional waters, and 2) flow patterns across the Subject Tract (**Figure 4**). Based upon the result of the elevation survey, rainwater sheetflow appears to predominantly collect in southeastern portions of the Subject Tract and, only at sufficiently high elevations outside of "normal circumstances", travels offsite through a series of drainages parallel to Dow Pipeline Corridor "R" to an upland drainage ditch associated with the northern side of Highway 332.

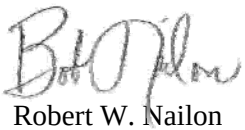
**Based upon the documented FEMA "X Zone" designation and the lack of any defined hydrological connection between the Subject Tract and jurisdictional "Waters of the U.S." from the elevation survey data, it is ENTRIX' opinion that wetlands associated with the 35.51-acre Subject Tract are "isolated" (non-jurisdictional) wetlands. Furthermore, evidence of vegetative growth over the culvert opening and the lack of presence of any "ordinary high water mark" indicators (e.g. drift lines) within and around the culvert indicates that that water flow offsite only occurs if rainfall volumes are sufficient to allow flow offsite.**

Horizontal GPS accuracy for the wetland determination averaged 0.5 meters.

It should be understood that the scope of this determination was to determine whether or not, in our professional opinion, wetlands exist at the proposed project site, and is not a legal delineation of jurisdictional wetland boundaries. The COE has regulatory authority regarding wetland issues, including isolated vs. adjacent wetlands, and the COE is responsible for the final jurisdictional determination of wetlands at a given site. This wetland determination is not official until it has been approved by the COE.

Should you have any questions concerning the findings reported in this letter, please feel free to contact me at (713) 666-6223.

Sincerely,



Robert W. Nailon
Senior Wetlands Scientist

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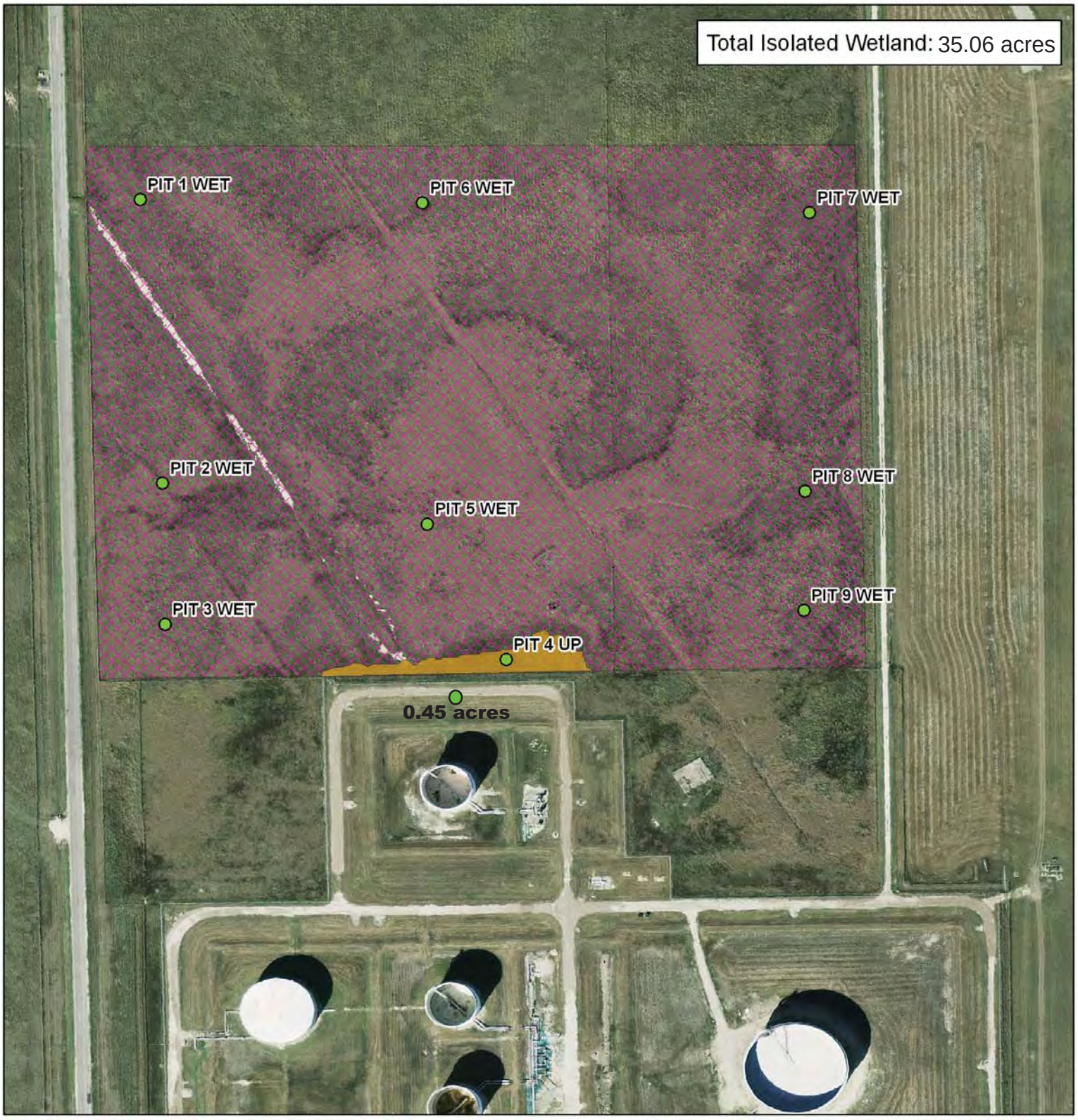



0 250 500 Feet

**Legend**

N

- Pit markers
- Wetland area
- Upland area

**Figure 2**

Wetland Delineation
35.51 Acres
Proposed Algenol Pilot Plant
Dow Chemical Company
Oyster Creek, Texas

November 2009

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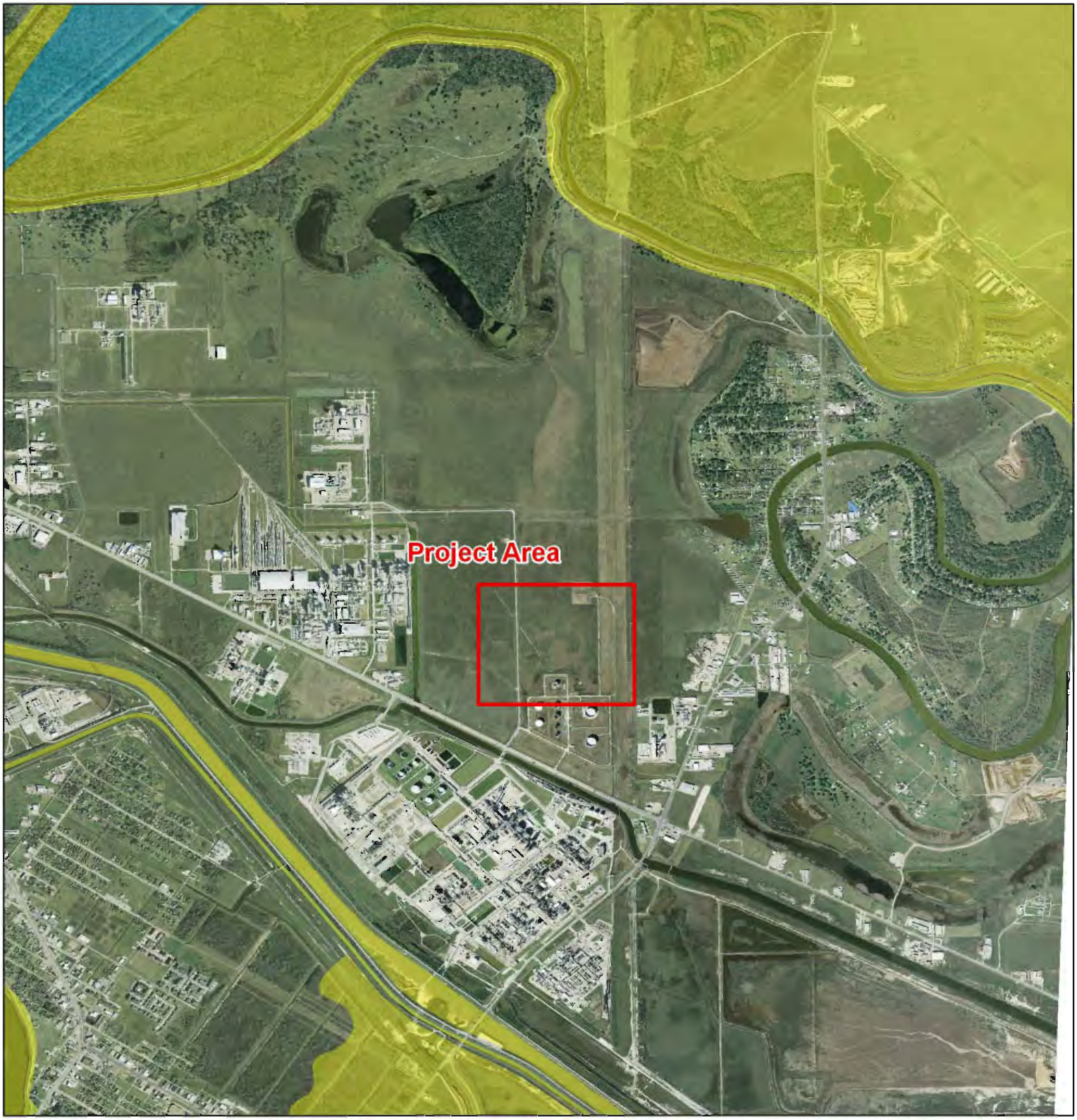


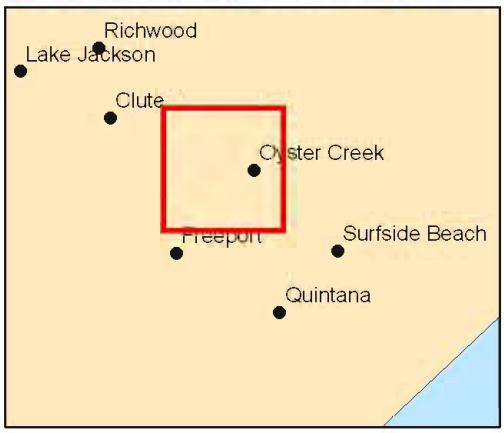


0 0.5 1 Miles

## Legend

**FEMA flood zone**

100 year

500 year

N

# Figure 3

FEMA Flood Zones
Wetland Determination
Proposed Algenol Pilot Plant
Dow Chemical Company
Oyster Creek, Texas

November 2009

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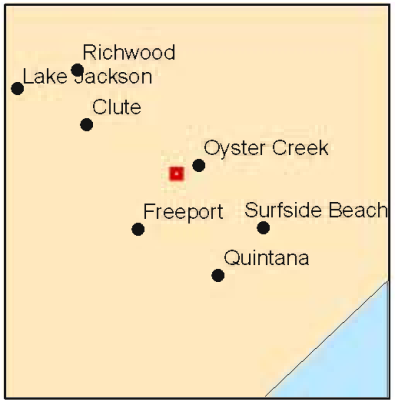


**Legend**

- Wetland area
- Upland area

Contours

- Major
- Minor

N

0 150 300 Feet

**Figure 4**

Project Area Contours
Wetland Determination
Proposed Algenol Pilot Plant
Dow Chemical Company
Oyster Creek, Texas

November 2009

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**Table 1 Plant Indicator Status Categories**

| Indicator Category | Indicator Symbol | Definition |
|---|---|---|
| Obligate Wetland Plants | OBL | Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1%) in non-wetlands. Examples: *Spartina alterniflora, Taxodium distichum*. |
| Facultative Wetland Plants | FACW | Plants that occur usually (estimated probability 67-99%) in wetlands, but also occurring in both wetlands and non-wetlands. Examples: *Fraxinus pennsylvanica*; *Sesbania drummondi*. |
| Facultative Plants | FAC | Plants with a similar likelihood (estimated probability of 33-67%) of occurring in both wetlands and non-wetlands. Examples:*Myrica cerifera*,*Celtis occidentalis* |
| Facultative Upland Plants | FACU | Plants that occur sometimes (estimated probability 1-33%) in wetlands, but occur more often (estimated probability 67-99%) in non-wetlands. Examples: *Sapium sebiferum*; *Quercus rubra*. |
| Obligate Upland Plants | UPL | Plants that occur rarely (estimated probability <1%) in wetlands, but almost always (>99% estimated probability) in non-wetlands. Examples: *Pinus echinata* |

## Table 2 Field Indicators For Hydric Soils

**1. Organic Soils**

A soil is an organic soil when: (1) More than 50% (by volume) of the upper 32 inches of soil is composed of organic material; or (2) organic soil material of any thickness rests on bedrock.

**2. Histic Epipedons**

A histic epipedon is an 8- to 16-inch layer at or near the surface of a mineral hydric soil that is saturated with water for 30 consecutive days or more in most years and contains a minimum of 20% organic matter when no clay is present or a minimum of 30% organic matter when clay content is 60% or greater.

**3. Sulfidic Materials**

When mineral soils emit an odor of rotten eggs, hydrogen sulfide is present. Such odors are detected only in waterlogged soils that are permanently saturated and have sulfidic material within a few centimeters of the soil surface.

**4. Aquic or Peraquic Moisture Regime**

An aquic moisture regime is a reducing one: i.e., it is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe. Soils with peraquic moisture regimes are characterized by the presence of groundwater always at or near the soil surface.

**5. Direct Observation of Reducing Soil Conditions**

Soils saturated for long or very long duration will usually exhibit reducing conditions. Under such conditions, ions of iron are transformed from a ferric valence state to a ferrous valence state. This condition can be detected in the field by a ferrous iron test performed by USDA soil scientists.

**6. Soil Colors**

The colors of various soil components are often the most diagnostic indicator of hydric soils. Colors of these components are strongly influenced by the frequency and duration of soil saturation, which leads to reducing soil conditions. Mineral hydric soils will be either gleyed (gray colors) or will have bright mottles (rust colored spots) and/or low matrix chroma. The soil matrix is the portion of the soil that has the predominant color.

**7. Soil Appearing on Hydric Soils List**

Using the National Technical Committee on Hydric Soils (NTCHS) criteria for hydric soils, the NTCHS developed both a local and national list of hydric soils. Listed soils possess reduced soil conditions for a significant portion of the growing season in a major portion of the root zone and are frequently saturated within 12 inches of the soil surface.

**8. Iron and Manganese Concretions**

During the oxidation-reduction process, iron and manganese in suspension are sometimes segregated as oxides into concretions or soft masses. These accumulations are usually black or dark brown. Concretions >2 mm in diameter occurring within 7.5 cm of the surface are evidence that the soil is saturated for long periods of time near the surface.

**9. Indicators for Coarse-textured or Sandy Hydric Soils**

a. High organic matter content in the surface horizon
b. Dark vertical streaking of subsurface horizon by organic matter
c. Wet spodosols
d. New sandbars

| Table 3 | Field Indicators For Wetland Hydrology |
|---|---|
| **1.** | **Visual observations of inundation** |
| 2. | Visual observations of soil saturation within 12 inches of the soil surface. |
| **3.** | **Oxidized rhizospheres (root channels) associated with living roots and rhizomes** |
| 4. | Water marks on vegetation (particularly woody species) |
| **5.** | **Drift lines** |
| 6. | Water-borne sediment deposits |
| **7.** | **Scoured (erosional) areas on soil surface** |
| 8. | Wetland drainage patterns |
| **9.** | **Morphological plant adaptations (e.g. buttressed tree trunks)** |
| 10. | FAC-Neutral test (comparative dominance of FAC, FACW, and OBL vegetative species versus FACU and UPL vegetative species) |

**DATA SHEETS AVAILABLE UPON REQUEST**

# Appendix D – Listed Species for Florida and the *Endangered and Threatened Species Review* for the Texas Site Option

## PREFACE

This document consolidates the official state of Florida list of endangered species, threatened species, and species of special concern. The Florida Fish and Wildlife Conservation Commission (FWC) maintains the state list of animals designated as endangered, threatened, or species of special concern, in accordance with Rules 68A-27.003, 68A-27.004, and 68A-27.005, respectively, Florida Administrative Code (F.A.C.), https://www.flrules.org/Default.asp. The state lists of plants, which are designated endangered, threatened, and commercially exploited, are administered and maintained by the Florida Department of Agriculture and Consumer Services (DOACS) via Chapter 5B-40, F.A.C. This list of plants can be obtained at http://www.fl-dof.com/forest_management/plant_conserve_list.html. The federal agencies that share the authority to list species as Endangered and Threatened are the National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS) and U. S. Fish and Wildlife Service (USFWS). The NOAA-NMFS is responsible for listing most marine species. The federal list of animals and plants is administered by the USFWS, and this list is published in 50 CFR 17 (animals) and 50 CFR 23 (plants). Additional information regarding federal listings can be located at the following websites;
NOAA-NMFS - http://www.nmfs.noaa.gov and
USFWS - http://endangered.fws.gov/wildlife.html#Species.

Please note that while the FWC has published a consolidated list of state and federally listed species in the past, we now only publish a list of species listed within the state of Florida. This list will be maintained and available at our agency website: http://www.myfwc.com. Lists of federally listed species can still be viewed at the USFWS and NOAA-NMFS websites mentioned above. It is our intent by providing the list in this manner that we will be able to maintain a current list that is more readily available to the public.

- **Common and scientific names listed first are as they appear in the Florida Administrative Code, Title 68A. Common and/or scientific names following this and located within parentheses ( ) are names as used by USFWS, or other commonly used names.**

Bradley J. Gruver, Ph. D
Listed Species Coordinator
Species Conservation Planning Section
Division of Habitat and Species Conservation
Florida Fish and Wildlife Conservation Commission

Cover Photos by FWC Staff: Key Largo Woodrat, Burrowing Owls, Okaloosa Darter, Schaus' swallowtail butterfly, Short-tailed Snake.

## NUMERICAL SUMMARY OF SPECIES LISTED BY THE STATE OF FLORIDA AS ENDANGERED, THREATENED, OR SPECIES OF SPECIAL CONCERN

| STATUS DESIGNATION | FISH | AMPHIBIANS | REPTILES | BIRDS | MAMMALS | INVERTEBRATES | TOTAL |
|---|---|---|---|---|---|---|---|
| E | 3 | 0 | 6 | 7 | 20 | 4 | **40** |
| T | 2 | 0 | 11 | 9 | 4 | 0 | **26** |
| SSC | 10 | 5 | 7 | 18 | 6 | 4 | **50** |
| **TOTAL** | **15** | **5** | **24** | **34** | **30** | **8** | **116** |

# OFFICIAL LISTS

| Common Name | Scientific Name | Status |
|---|---|---|
| | | |
| **FISH** | | |
| | | |
| Atlantic sturgeon (Gulf sturgeon) | *Acipenser oxyrinchus* (*Acipenser oxyrinchus desotoi*) | SSC (1) |
| Blackmouth shiner | *Notropis melanostomus* | E |
| Bluenose shiner | *Pteronotropis welaka* | SSC (1,2) |
| Crystal darter | *Crystallaria asprella* | T |
| Harlequin darter | *Etheostoma histrio* | SSC (1) |
| Key blenny | *Starksia starcki* | SSC (1) |
| Key silverside | *Menidia conchorum* | T |
| Lake Eustis pupfish | *Cyprinodon hubbsi* | SSC (1) |
| Okaloosa darter | *Etheostoma okalossae* | E |
| Rivulus (Mangrove rivulus) | *Rivulus marmoratus* | SSC (1) |
| Saltmarsh topminnow | *Fundulus jenkinsi* | SSC (1) |
| Shoal bass | *Micropterus cataractae* | SSC (1,2) |
| Shortnose sturgeon | *Acipenser brevirostrum* | E |
| Southern tessellated darter (tessellated johnny darter) | *Etheostoma olmstedi maculaticeps* | SSC (1) |
| Suwannee bass | *Micropterus notius* | SSC (1) |
| | | |
| **AMPHIBIANS** | | |
| | | |
| Flatwoods salamander | *Ambystoma cingulatum* | SSC |
| Florida bog frog | *Lithobates okaloosae* | SSC (2) |
| Georgia blind salamander | *Haideotriton wallacei* | SSC (1,2) |
| Gopher frog | *Lithobates capito* | SSC (1,2) |
| Pine barrens treefrog | *Hyla andersonii* | SSC (1) |
| | | |
| **REPTILES** | | |
| | | |
| American alligator | *Alligator mississippiensis* | SSC (1,3) |
| American crocodile | *Crocodylus acutus* | E |
| Alligator snapping turtle | *Macrochelys temminckii* | SSC (1) |
| Atlantic salt marsh water snake (Atlantic salt marsh snake) | *Nerodia clarkii taeniata* | T |
| Barbour's map turtle | *Graptemys barbouri* | SSC (1,2) |
| Bluetail mole skink | *Eumeces egregius lividus* | T |
| Eastern indigo snake | *Drymarchon corais couperi* | T |
| Florida brown snake | *Storeria victa* | T[1] |
| Florida Key mole skink | *Eumeces egregius egregius* | SSC (1) |

| Common Name | Scientific Name | Status |
|---|---|---|
| Florida pine snake | *Pituophis melanoleucus mugitus* | SSC (2) |
| Florida ribbon snake | *Thamnophis sauritus sackeni* | T[1] |
| Gopher tortoise | *Gopherus polyphemus* | T |
| Green seaturtle (Green sea turtle) | *Chelonia mydas* | E |
| Hawksbill seaturtle (Hawksbill sea turtle) | *Eretmochelys imbricata* | E |
| Kemp's ridley seaturtle (Kemp's ridley sea turtle) | *Lepidochelys kempii* | E |
| Key ringneck snake | *Diadophis punctatus acricus* | T |
| Leatherback seaturtle (Leatherback sea turtle) | *Dermochelys coriacea* | E |
| Loggerhead seaturtle (Loggerhead sea turtle) | *Caretta caretta* | T |
| Red rat snake | *Elaphe guttata* | SSC[1] (1) |
| Rim rock crowned snake | *Tantilla oolitica* | T |
| Sand skink | *Neoseps reynoldsi* | T |
| Short-tailed snake | *Stilosoma extenuatum* | T |
| Striped mud turtle | *Kinosternon baurii* | E[1] |
| Suwannee cooter | *Pseudemys suwanniensis* | SSC (1,2) |
| | | |
| **BIRDS** | | |
| | | |
| American oystercatcher | *Haematopus palliatus* | SSC (1,2) |
| Audubon's crested caracara | *Polyborus plancus audubonii* | T |
| Bachman's warbler | *Vermivora bachmanii* | E |
| Black skimmer | *Rynchops niger* | SSC (1) |
| Brown pelican | *Pelecanus occidentalis* | SSC (1) |
| Burrowing owl (Florida burrowing owl) | *Athene cunicularia* (*Athene cunicularia floridana*) | SSC (1) |
| Cape Sable seaside sparrow | *Ammodramus maritimus mirabilis* | E |
| Everglades snail kite | *Rostrhamus sociabilis plumbeus* | E |
| Florida grasshopper sparrow | *Ammodramus savannarum floridanus* | E |
| Florida sandhill crane | *Grus canadensis pratensis* | T |
| Florida scrub jay | *Aphelocoma coerulescens* | T |
| Ivory-billed woodpecker | *Campephilus principalis* | E |
| Kirtland's warbler | *Dendroica kirtlandii* | E |
| Least tern | *Sterna antillarum* | T |
| Limpkin | *Aramus guarauna* | SSC (1) |
| Little blue heron | *Egretta caerulea* | SSC (1,4) |
| Marian's marsh wren | *Cistothorus palustris marianae* | SSC (1) |
| Osprey | *Pandion haliaetus* | SSC[2] (1,2) |

| Common Name | Scientific Name | Status |
|---|---|---|
| Piping plover | *Charadrius melodus* | T |
| Red-cockaded woodpecker | *Picoides borealis* | SSC |
| Reddish egret | *Egretta rufescens* | SSC (1,4) |
| Roseate spoonbill | *Platalea ajaja* | SSC (1,4) |
| Roseate tern | *Sterna dougallii dougallii* | T |
| Scott's seaside sparrow | *Ammodramus maritimus peninsulae* | SSC (1) |
| Snowy egret | *Egretta thula* | SSC (1) |
| Snowy plover (Cuban snowy plover) | *Charadrius alexandrinus* | T |
| Southeastern American kestrel | *Falco sparverius paulus* | T |
| Tricolored heron | *Egretta tricolor* | SSC (1,4) |
| Wakulla seaside sparrow | *Ammodramus maritimus juncicola* | SSC (1) |
| White-crowned pigeon | *Patagioenas leucocephala* | T |
| White ibis | *Eudocimus albus* | SSC (2) |
| Whooping crane | *Grus americana* | SSC (5) |
| Wood stork | *Mycteria americana* | E |
| Worthington's marsh wren | *Cistothorus palustris griseus* | SSC (1) |
| | | |
| **MAMMALS** | | |
| | | |
| Anastasia Island beach mouse | *Peromyscus polionotus phasma* | E |
| Big Cypress fox squirrel | *Sciurus niger avicennia* | T |
| Choctawhatchee beach mouse | *Peromyscus polionotus allophrys* | E |
| Eastern chipmunk | *Tamias striatus* | SSC (1) |
| Everglades mink | *Mustela vison evergladensis* | T |
| Fin whale (Finback whale) | *Balaenoptera physalus* | E |
| Florida black bear | *Ursus americanus floridanus* | T[3] |
| Florida mastiff bat | *Eumops glaucinus floridanus* | E |
| Florida manatee (West Indian manatee) | *Trichechus manatus latirostris* (*Trichechus manatus*) | E |
| Florida mouse | *Podomys floridanus* | SSC (1) |
| Florida panther | *Puma concolor coryi* (*Puma* [*=Felis*] *concolor coryi*) | E |
| Florida saltmarsh vole (Florida salt marsh vole) | *Microtus pennsylvanicus dukecampbelli* | E |
| Gray bat | *Myotis grisescens* | E |
| Homosassa shrew | *Sorex longirostris eionis* | SSC (2) |
| Humpback whale | *Megaptera novaeangliae* | E |
| Indiana bat | *Myotis sodalis* | E |
| Key deer | *Odocoileus virginianus clavium* | E |

| Common Name | Scientific Name | Status |
|---|---|---|
| Key Largo Cotton Mouse | *Peromyscus gossypinus allapaticola* | E |
| Key Largo woodrat | *Neotoma floridana smalli* | E |
| Lower Keys marsh rabbit | *Sylvilagus palustris hefneri* | E |
| North Atlantic right whale | *Eubalaena glacialis* | E |
| Perdido Key beach mouse | *Peromyscus polionotus trissyllepsis* | E |
| Sanibel Island rice rat | *Oryzomys palustris sanibeli* | SSC (1,2) |
| Sei whale | *Balaenoptera borealis* | E |
| Sherman's fox squirrel | *Sciurus niger shermani* | SSC (1,2) |
| Sherman's short-tailed shrew | *Blarina carolonensis* [*=brevicauda*] *shermani* | SSC (2) |
| Silver rice rat (Rice rat, lower FL Keys) | *Oryzomys argentatus (Oryzomys palustris natator)* | E |
| Southeastern beach mouse | *Peromyscus polionotus niveiventris* | T |
| Sperm whale | *Physeter macrocephalus* | E |
| St. Andrews beach mouse | *Peromyscus polionotus peninsularis* | E |
| | | |
| INVERTEBRATES | | |
| | | |
| **CORALS** | | |
| | | |
| Pillar coral | *Dendrogyra cylindricus* | E |
| | | |
| **CRUSTACEANS** | | |
| | | |
| Panama City crayfish (Econfina crayfish) | *Procambarus econfinae* | SSC (1) |
| Sims sink crayfish (Santa Fe cave crayfish) | *Procambarus erythrops* | SSC (1) |
| Black Creek crayfish | *Procambarus pictus* | SSC (1) |
| | | |
| **INSECTS** | | |
| | | |
| Miami blue butterfly | *Cyclargus* [*=Hermiargus*] *thomasi bethunebakeri* | E |
| Schaus' swallowtail butterfly | *Heraclides aristodemus ponceanus* | E |
| | | |
| **MOLLUSKS** | | |
| | | |
| Florida tree snail | *Liguus fasciatus* | SSC (1) |
| Stock Island tree snail | *Orthalicus reses* [*not incl. nesodryas*] | E |

## KEY TO ABBREVIATIONS AND NOTATIONS

List Abbreviations

FWC = Florida Fish and Wildlife Conservation Commission
E = Endangered
T = Threatened
SSC = Species of Special Concern

Reasons for SSC listings prior to January 1, 2001 are indicated by the number in parenthesis under the following criteria:

(1) has a significant vulnerability to habitat modification, environmental alteration, human disturbance, or human exploitation which, in the foreseeable future, may result in its becoming a threatened species unless appropriate protective or management techniques are initiated or maintained;
(2) may already meet certain criteria for designation as a threatened species but for which conclusive data are limited or lacking;
(3) may occupy such an unusually vital or essential ecological niche that should it decline significantly in numbers or distribution other species would be adversely affected to a significant degree;
(4) has not sufficiently recovered from past population depletion, and
(5) occurs as a population either intentionally introduced or being experimentally managed to attain specific objectives, and the species of special concern prohibitions in Rule 68A-27.002, F.A.C., shall not apply to species so designated, provided that the intentional killing, attempting to kill, possession or sale of such species is prohibited.

List Notations

[1] Lower keys population only.

[2] Monroe County population only.

[3] Other than those found in Baker and Columbia Counties or in Apalachicola National Forest.

# Threatened and Endangered Species Review

## Tank Farm Tract

## Clute, Texas

*Prepared by*

ENTRIX
Down to Earth. Down to Business.℠

*Prepared for*

Dow Chemical Company

August 4, 2010

Ms. Yvonne Samson
The Dow Chemical Company
2301 Brazosport Blvd.- B101
Freeport, TX 77541

**RE: Threatened and Endangered Species Review**
**35.51-Acre Tank Farm Tract**
**The Dow Chemical Company**
Clute, TX

Dear Yvonne:

On behalf of The Dow Chemical Company, ENTRIX, Inc. (ENTRIX) is providing a review for potential federal and state-listed threatened and endangered species for the Subject Area associated with the proposed construction on the 35.51-acre tank farm tract. A threatened and endangered species desktop review was conducted by Robert Nailon, Senior Wetland Scientist and Amanda Harford, Staff Scientist for the Subject Area in close proximity to Highway 332 on The Dow Chemical Company (Dow) property near Clute, Brazoria County, Texas (**Figure 1**). ENTRIX understands that Dow desires to construct a new facility at the Subject Area.

On August 2, 2010 a desktop review of the federal and state-listed threatened and endangered species potentially inhabiting the Subject Area was conducted.

This letter summarizes the results of the Threatened and Endangered Species Review.

## I. FEDERAL LISTINGS FOR BRAZORIA COUNTY

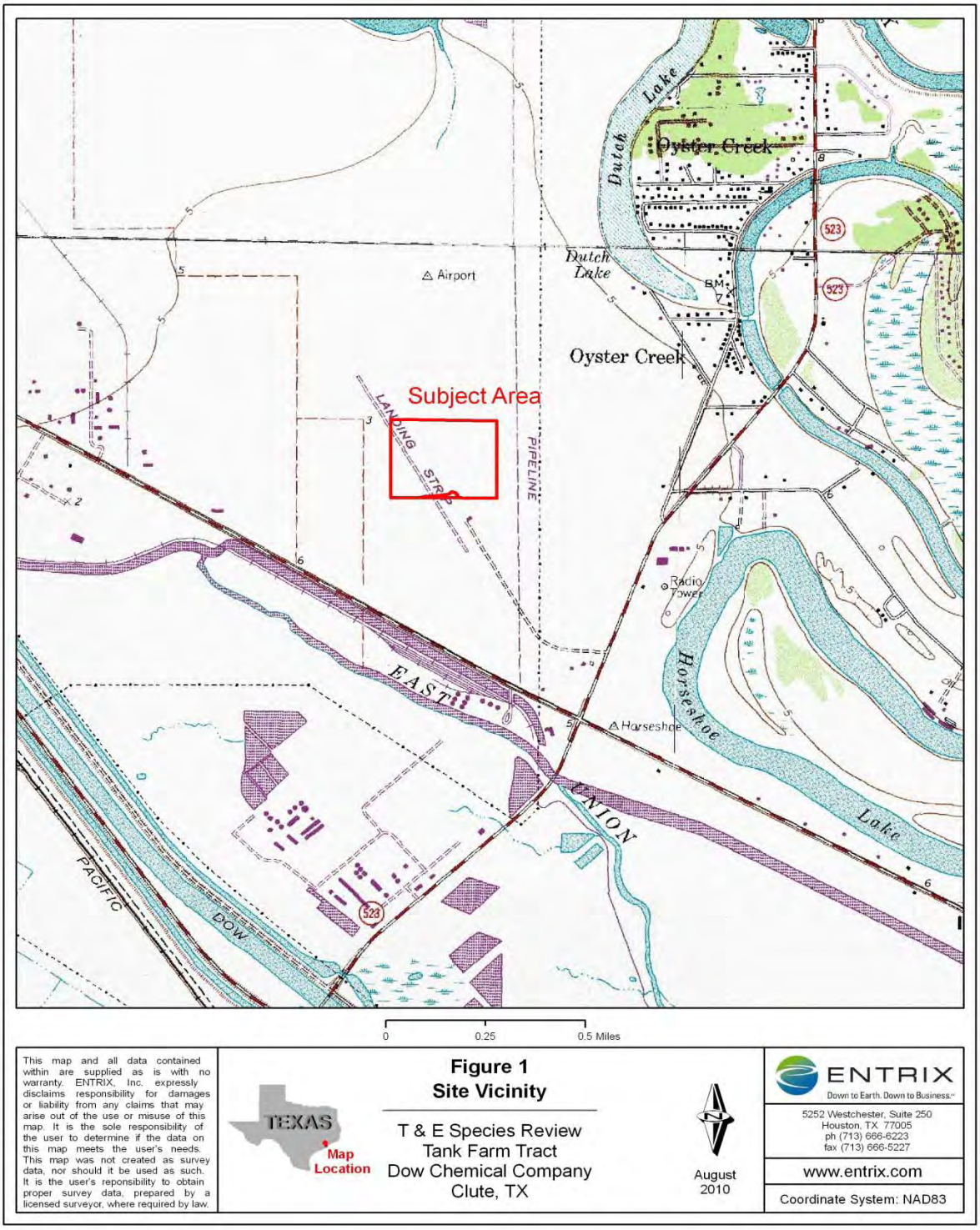
According to the U.S. Fish and Wildlife Service Threatened and Endangered Species List for Brazoria County, Texas, 15 species are federally listed in Brazoria County:

- Whooping crane (*Grus americana*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Brown pelican (*Pelecanus occidentalis*)
- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Northern aplomado falcon (*Falco femoralis septentrionalis*)
- Mountain plover (*Charadrius montanus*)
- Piping plover (*Charadrius melodus*)
- West Indian manatee (*Trichechus manatus*)
- American black bear (*Ursus americanus*)
- Hawksbill sea turtle (*Eretmochelys imbricata*)
- Leatherback sea turtle (*Dermochelys coriacea*)

- Kemp's Ridley sea turtle (*Lepidochelys kempii*)
- Green sea turtle (*Chelonia mydas*)
- Loggerhead sea turtle (*Caretta caretta*)
- Slender rush-pea (*Hoffmannseggia tenella*)

No other federally listed species were documented for Brazoria County by USFWS.

**Figure 1 Site Vicinity Map**



**Whooping Crane (*Grus americana*)**

The whooping crane is state- and federally listed as endangered. It is a migratory species that moves through the Great Plains to the Texas Gulf Coast to winter in coastal marshes. It winters in a small area of the state, including parts of Aransas, Calhoun, and Refugio Counties, but could potentially migrate through and stopover in Brazoria County marshes (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Bald Eagle (*Haliaeetus leucocephalus)***

The bald eagle is state-listed as threatened and federally de-listed. Its preferred nesting habitat in Texas is undisturbed coastal regions, or along river systems or lakeshores with large, tall trees. Wintering habitat is characterized by abundant food sources, usually associated with open water, and some rangeland areas. Roosting sites are often large old trees with horizontal limbs that provide unobstructed views to the surrounding areas (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Brown Pelican (*Pelecanus occidentalis*)**

The brown pelican is found largely in coastal and near-shore areas, where it roosts on islands and spoil banks. This species has a state status of endangered, but is federally de-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Arctic Peregrine Falcon (*Falco peregrinus tundrius*)**

The Arctic peregrine falcon is a migrant throughout the state of Texas from its far northern breeding range and winters along the coast and farther south. It occupies a wide range of habitats during migration, including urban environments, areas along coasts, and barrier islands. Stopovers for this low-altitude migrant include leading landscape edges such as lakeshores, coastlines, and barrier islands. This species is rare in Texas, but is not state-listed. It is federally de-listed (TPWD 2010). The Subject Area may contain suitable perching habitat during migration, but is not suitable stopover habitat.

**Northern Aplomado Falcon (*Falco femoralis septentrionalis*)**

The northern aplomado falcon is federally endangered, but not state-listed in Brazoria County. It is generally a non-migratory species that prefers palm or oak savannahs and open pine woodlands for both feeding and nesting. The species has been known to occur in Brazoria County, but is not known to permanently inhabit areas east of central Texas (UWFWS 2010). The Subject Area does not contain suitable habitat for this species.

**Mountain Plover (*Charadrius montanus*)**

The mountain plover is federally proposed as threatened, but is not state-listed in Brazoria County. It nests and feeds in open plain habitat and prefers short-grass prairie. It will often breed in close proximity to prairie dog towns (Cornell 2010). The Subject Area does not contain suitable habitat for this species.

**Piping Plover (*Charadrius melodus*)**

A wintering migrant along the Texas Gulf Coast, the piping plover inhabits beaches and bayside mud or salt flats. This species has a state and federal status of threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**West Indian Manatee (*Trichechus manatus*)**

The manatee is an opportunistic, aquatic omnivore which inhabits gulf and bay systems. It is state- and federally listed as endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**American Black Bear (*Ursus americanus*)**

Found in bottomland hardwoods and large tracts of inaccessible forested areas, the black bear has field characteristics similar to those of the Louisiana black bear. This species has a federal status of threatened due to similarity of appearance to the Louisiana black bear, but is not state-listed in Brazoria County (USFWS 2010). The Subject Area does not contain suitable habitat for this species, nor does suitable habitat exist nearby that could allow movement of this species through the Subject Area.

**Hawksbill Sea Turtle (*Eretmochelys imbricata*)**

This species occurs in gulf and bay systems and has a federal and state status of endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Leatherback Sea Turtle (*Dermochelys coriacea*)**

This species occurs in gulf and bay systems and has a federal and state status of endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)**

This species occurs in gulf and bay systems and has a federal and state status of endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Green Sea Turtle (*Chelonia mydas*)**
This species occurs in gulf and bay systems and has a federal and state status of threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Loggerhead Sea Turtle (*Caretta caretta*)**

This species occurs in gulf and bay systems and has a federal and state status of threatened (USFWS 2010; TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Slender Rush-pea (*Hoffmannseggia tenella*)**

Slender rush-pea is federally listed as endangered, but is not state-listed in Brazoria County. It grows in blackland prairies and creek banks associated with short or mid-length grasses. It is mostly known from southwest Texas counties, such as Nueces and Kleberg Counties (USFWS 2010). The Subject Area does not contain suitable habitat for this species.

## II. STATE LISTINGS FOR BRAZORIA COUNTY

State-listed species not included in the federally listed species described above include:

- Black rail (*Laterallus jamaicensis*)
- Eskimo curlew (*Numenius borealis*)
- Henslow's sparrow (*Ammodramus henslowii*)
- Reddish egret (*Egretta rufescens*)
- Snowy plover (*Charadrius alexandrinus*)
- Southeastern snowy plover (*Charadrius alexandrinus tenuirostris*)
- Western snowy plover (*Charadrius alexandrinus nivosus*)
- Sooty tern (*Sterna fuscata*)
- White-faced ibis (*Plegadis chihi*)
- White-tailed hawk (*Buteo albicaudatus*)
- Wood stork (*Mycteria americana*)
- American eel (*Anguilla rostrata*)
- Sharpnose shiner (*Notropis oxyrhynchus*)
- Smalltooth sawfish (*Pristis pectinata*)
- Jaguarundi (*Herpailurus yaguarondi*)
- Louisiana black bear (*Ursus americanus luteolus*)
- Ocelot (*Leopardus pardalis*)
- Plains spotted skunk (*Spilogale putorius interrupta*)
- Red wolf (*Canis rufus*)
- False spike mussel (*Quadrula mitchelli*)
- Pistolgrip (*Tritogonia verrucosa*)
- Rock pocketbook (*Arcidens confragosus*)
- Smooth pimpleback (*Quadrula houstonensis*)
- Texas fawnsfoot (*Truncilla macrodon*)
- Alligator snapping turtle (*Macrochelys temminckii*)
- Gulf saltmarsh snake (*Nerodia clarkii*)
- Texas diamondback terrapin (*Malaclemys terrapin littoralis*)
- Texas horned lizard (*Phrynosoma cornutum*)
- Timber/canebrake rattlesnake (*Crotalus horridus*)
- Coastal gay-feather (*Liatris bracteata*)
- Giant sharpstem umbrella-sedge (*Cyperus cephalanthus*)
- Texas meadow-rue (*Thalictrum texanum*)
- Texas windmill-grass (*Chloris texensis*)
- Threeflower broomweed (*Thurovia triflora*)

**Black Rail (*Laterallus jamaicensis*)**

This species is not federally listed and is considered rare, but not listed in Texas. It inhabits salt, brackish, and freshwater marshes, ponds, wet meadows, and swamps (TPWD 2010). The Subject Area could contain suitable habitat for this species, but as it is classified as an isolated wetland it is unlikely that the species inhabits the Subject Area.

**Eskimo Curlew (*Numenius borealis*)**

The Eskimo curlew is federally and state-listed as endangered, but is thought to be extinct. Historically, it migrated through Texas, using grasslands, pastures, fields, marshes, and mudflats (TPWD 2010). The Subject Area may contain suitable habitat for the Eskimo curlew, but impacts to the species are not expected as the it is generally considered extinct.

**Henslow's Sparrow (*Ammodramus henslowii*)**

Henslow's sparrows winter in fields or cut areas with brushy vegetation in patches. The species is not federally listed and is considered rare, but not listed in Texas (TPWD 2010). The Subject Area may contain minimal habitat for Henslow's sparrows, but impacts would be minimal due to the small area of upland habitat available within the Subject Area.

**Reddish Egret (*Egretta rufescens*)**

The reddish egret is a resident of the Texas Gulf Coast. Its habitat consists of brackish marshes, shallow salt ponds, and tidal flats. It nests on the ground or in trees or bushes on coastal islands. This species is state listed as threatened, but is not federally listed (TPWD 2010). The Subject Area does not contain suitable nesting or foraging habitat for this species.

**Snowy Plover (*Charadrius alexandrinus*)**

The snowy plover migrates through the state of Texas to winter along the coast. It generally inhabits beaches and bayside mud flats. Two subspecies, the southeastern snowy plover (*Charadrius alexandrinus tenuirostris*) and the western snowy plover (*Charadrius alexandrinus nivosus*), winter along the Texas coast. Neither subspecies is federally listed; both are considered rare in Texas, but not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Sooty Tern (*Sterna fuscata*)**

The sooty tern is state-listed as threatened. It feeds primarily on fish and squid and spends most of its time in the air feeding (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**White-faced Ibis (*Plegadis chihi*)**

This species prefers freshwater marshes, sloughs, and irrigated fields, but can be found in brackish and saltwater habitats. It nests in marshes, in low trees, on the ground in reeds, or on floating mats. The white-faced ibis is state-listed as threatened (TPWD 2010). The Subject Area may contain suitable foraging habitat for this species.

**White-tailed Hawk (*Buteo albicaudatus*)**

The white-tailed hawk inhabits coastal areas in prairies, cordgrass flats, or scrub-live oak savannahs. It can also be found further inland in other types of savannahs and prairies. This species is state-listed as threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Wood Stork (*Mycteria americana*)**

The wood stork forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including saltwater. It roosts communally in tall snags, sometimes in association with other

wading birds. It inhabits mud flats and other wetlands, even those associated with forested areas. This species has a state status of threatened (TPWD 2010). The Subject Area may contain suitable foraging habitat for this species.

**American Eel (*Anguilla rostrata*)**

The American eel inhabits coastal waterways with access to gulf systems. They prefer waterways with muddy bottoms and low flow and can travel overland in wet areas to find new areas to forage and breed. The species is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Sharpnose Shiner (*Notropis oxyrhynchus*)**

The sharpnose shiner is endemic to the Brazos River drainage and has expanded to the Colorado River drainage. This species is a Candidate for listing in the State of Texas, but is not yet listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Smalltooth Sawfish (*Pristis pectinata*)**

The smalltooth sawfish is a bay/estuarine species that prefers muddy or sandy bottoms and sheltered areas, such as mangroves, reefs, and seagrass beds. This species is federally and state-listed as endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Jaguarundi (*Herpailurus yaguarondi*)**

The jaguarondi prefers thickly vegetated areas close to water for both foraging and breeding. It is federally and state-listed as endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species, nor does suitable habitat exist nearby that could allow movement of this species through the Subject Area.

**Louisiana Black Bear (*Ursus americanus luteolus*)**

The Louisiana black bear prefers large inaccessible tracts of bottomland hardwood forests for foraging and breeding. It was known to occur in isolated areas of east Texas, but is now believed to be extirpated. Transients may move through eastern Texas from Louisiana at times. This species is federally and state-listed at threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species, nor does suitable habitat exist nearby that could allow movement of this species through the Subject Area.

**Ocelot (*Leopardus pardalis*)**

The ocelot inhabits dense chapparal thickets and thick scrub-shrub areas and avoids open areas. It is federally and state-listed as endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species, nor does suitable habitat exist nearby that could allow movement of this species through the Subject Area.

**Plains Spotted Skunk (*Spilogale putorius interrupta*)**

The plains spotted skunk inhabits open fields, prairies, croplands, forest edges, and woodlands, but prefers heavily vegetated areas to open areas. It is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area may contain suitable upland habitat in a small area along the south border.

**Red Wolf (*Canis rufus*)**

The red wolf was known to inhabit eastern Texas at one time and preferred brushy or wooded areas and coastal prairies. It is now thought to be extripated and is federally and state-listed as endangered (TPWD 2010). The Subject Area does not contain suitable habitat for this species, nor does suitable habitat exist nearby that could allow movement of this species through the Subject Area.

**False Spike Mussel (*Quadrula mitchelli*)**

The false spike mussel inhabits medium to large rivers, including the Brazos, Colorado, and Guadalupe. It is thought to be extirpated in Texas and is state-listed as threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Pistolgrip (*Tritogonia verrucosa*)**

The pistolgrip inhabits riverine systems in east and central Texas, including the Red River and San Antonio River basins. This mussel is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Rock Pocketbook (*Arcidens confragosus*)**

The rock pocketbook inhabits medium to large rivers, including the Red and Guadalupe Rivers. This mussel is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Smooth Pimpleback (*Quadrula houstonensis*)**

The smooth pimpleback inhabits small to medium rivers, streams, and reservoirs, such as the Brazos and Colorado River basins. This mussel is state-listed as threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Texas Fawnsfoot (*Truncilla macrodon*)**

This species inhabits rivers and larger streams with moderate flow. This mussel is state-listed as threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Alligator Snapping Turtle (*Macrochelys temminckii*)**

The alligator snapping turtle requires perennial water bodies and prefers deep channels in rivers, canals, lakes, and oxbows. This species is state-listed as threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Gulf Saltmarsh Snake (*Nerodia clarkii*)**

The gulf saltmarsh snake inhabits saline flats, coastal bays, and brackish river mouths. It is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*)**

This species inhabits coastal marshes, tidal flats, estuaries, and lagoons behind beaches. It can tolerate brackish and saltwater and may enter lowlands during high tide. It is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Texas Horned Lizard (*Phrynosoma cornutum*)**

The Texas horned lizard inhabits soil that may vary in texture from sandy to rocky and is found in open, arid and semi-arid regions with sparse vegetation. It burrows into the soil, uses rodent burrows, or hides under rocks when inactive. This species has a state status of threatened (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Timber/Canebrake Rattlesnake (*Crotalus horridus*)**

This snake occurs in swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland, limestone bluffs, and areas with sandy or black clay soils. It prefers dense ground cover. It has a state status of threatened (TPWD 2010). The Subject Area may contain suitable habitat for this species.

**Coastal Gay-feather (*Liatris bracteata*)**

This plant is endemic to Texas and inhabits coastal prairies, including salty prairies to upland prairies. It is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area may contain suitable habitat for this species.

**Giant Sharpstem Umbrella-sedge (*Cyperus cephalanthus*)**

This plant prefers saturated, fine sandy loam soils near deep prairie depressions. This species is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Texas Meadow-rue (*Thalictrum texanum*)**

This species is endemic to Texas and is found mostly in woodlands and woodland edges on soils with sandy loam surfaces. It can also be found on prairie mima mounds. It is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Texas Windmill-grass (*Chloris texensis*)**

This plant is endemic to Texas and prefers sandy to sandy loam soils in bare, coastal prairie remnants. It will often inhabit roadsides where mowing keeps other vegetation at bay. This species is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area does not contain suitable habitat for this species.

**Threeflower Broomweed (*Thurovia triflora*)**

This plant is endemic to Texas and is found in areas with sparse, low vegetation over saline clay soils. It is often found in between areas of salty prairie and tidal flats. It can also be found on prairie mima mounds. This species is rare in Texas, but is not state-listed (TPWD 2010). The Subject Area may contain suitable habitat for this species.

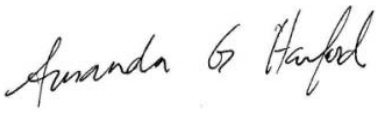
A review of state-listed species indicates that species that could potentially be present in the Tank Farm Tract Subject Area are:

- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Black rail (*Laterallus jamaicensis*)
- Eskimo curlew (*Numenius borealis*)
- Henslow's sparrow (*Ammodramus henslowii*)
- White-faced ibis (*Plegadis chihi*)
- Wood stork (*Mycteria americana*)
- Plains spotted skunk (*Spilogale putorius interrupta*)
- Timber/canebrake rattlesnake (*Crotalus horridus*)
- Coastal gay-feather (*Liatris bracteata*)
- Threeflower broomweed (*Thurovia triflora*)

The Arctic peregrine falcon is migratory; therefore, time spent within the Subject Area would be limited. The Eskimo curlew is considered extinct and would, therefore, not likely inhabit the Subject Area. All other species listed above could potentially inhabit the Subject Area. The white-faced ibis and wood stork would only use the Subject Area for foraging, not breeding or nesting. The black rail (*Laterallus jamaicensis*), Henslow's sparrow, plains spotted skunk, coastal gay-feather, and threeflower broomweed are considered rare, but are not state-listed in Texas. Due to these conditions, the species of concern most likely to occur within the Subject Area is the timber/canebrake rattlesnake (*Crotalus horridus*). None of the species described above were observed on-site during the course of performing a wetland delineation in September 2009.

Should you have any questions, please feel free to contact Bob Nailon at (713) 662-1977 or by e-mail at bnailon@entrix.com. You may also contact Amanda Harford at (713) 662-1920 or by e-mail at aharford@entrix.com.

Sincerely,



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**DOE/EA-1786**

# FINDING OF NO SIGNIFICANT IMPACT

# ALGENOL INTEGRATED BIOREFINERY FOR PRODUCING ETHANOL FROM HYBRID ALGAE FORT MEYERS, FLORIDA

**AGENCY:** U.S. Department of Energy, Golden Field Office

**ACTION:** Finding of No Significant Impact

**SUMMARY:** The U.S. Department of Energy (DOE) is proposing to authorize expenditure of federal funding by Algenol Biofuels, Inc. (Algenol) to design, construct and start-up a Direct to Ethanol pilot-scale integrated biorefinery (biorefinery or proposed project). Two potential sites were analyzed in the EA for the location of the biorefinery; the Dow Chemical Company's (Dow) plastics and chemical manufacturing facility in Freeport, Brazoria County, Texas and an industrial site in the Alico Road Business Park in Fort Myers, Florida. Algenol has since selected the site in Fort Myers, Florida, in part due to the time necessary to meet wetland requirements for the Texas site. The Florida property, which is approximately 40 acres owned by Alico Road Business Park, is fairly isolated from the general public and is already zoned for heavy industrial use. The biorefinery would produce approximately 100,000 gallons of ethanol per year, distill onsite the ethanol-water mixture to fuel-grade quality, and produce the ethanol from $CO_2$ and saline water using hybrid algae to actively carry out photosynthesis in sealed, clear-plastic photobioreactors (that is, closed-system translucent containers).

The purpose of the proposed project is to refine systems, equipment, and processes to maximize ethanol production with minimal costs to ensure the economic and technical viability of commercialization. The ultimate goal is to develop this technology for use in a commercial biorefinery. Funding of the proposed project would be consistent with DOE's goals under the objectives outlined in The Energy Policy Act of 2005, The Energy Independence and Security Act of 2007, and the American Recovery and Reinvestment Act of 2009, and would partially satisfy DOE's need to accelerate the construction and operation of pilot biorefinery facilities as well as validate refining technologies and help lay the foundation for full commercial-scale development of the biomass industry in the U.S. and reduce U.S. dependence on foreign oil.

This FONSI supports DOE's funding of the design, permitting, and construction of the Direct to Ethanol pilot-scale integrated biorefinery. All discussion, analysis, and findings related to the potential impacts of construction and operation of the Algenol project at both locations, including the Algenol committed mitigation measures, are contained in the Final *Environmental Assessment for the Algenol Integrated Biorefinery for Producing Ethanol From Hybrid Algae Freeport, Texas or Fort Meyers, Florida* (EA). All information related to the analysis of the

Texas site remains in the final EA to maintain the integrity of the NEPA decision-making process and the EA record. The final EA is hereby incorporated by reference.

DOE prepared this Finding of No Significant Impact (FONSI) in accordance with the *National Environmental Policy Act of 1969* (NEPA), the Council on Environmental Quality regulations for implementing NEPA, as amended, 40 CFR 1500 to 1508, and DOE NEPA regulations: 10 CFR 1021.322. **Although the EA analyzes both sites, this FONSI applies *only* to the Florida location and therefore, only discusses the analysis of the Florida site.**

**ENVIRONMENTAL IMPACTS:** In compliance with NEPA and DOE NEPA implementing regulations (10 CFR Part 1021) and procedures, the Final EA examined the potential impacts of DOE's proposed decision to authorize Algenol to expend federal funds for the proposed project and also examined a No-Action Alternative. Under the No-Action Alternative, DOE would not authorize expenditure of Recovery Act funds for the proposed project and Algenol would not design, construct, or start-up the proposed biorefinery.

The Final EA describes and analyzes potential impacts on the environment that could result from construction and start-up of the proposed biorefinery on the following resources: land use; visual and aesthetic resources; cultural resources; air quality; noise; geology and soils; water resources; biological resources; waste management and hazardous materials; utilities and energy; transportation and traffic; public and occupational health and safety; socioeconomics; and environmental justice, as well as any cumulative impacts of the proposed project. DOE determined that for the Florida location, there would be no adverse impacts or that the impacts would be small, temporary, or both for all resources.

Resource areas with minor impacts or that require applicant-committed measures are briefly discussed below. The EPA would regulate the hybrid algae under the *Toxic Substances Control Act* (TSCA) as microbial products of biotechnology. EPA indicated that the project would fall under EPA's "contained structure" exemption; thus, there would be no need to submit a TSCA application for the project. Algenol's development, use, transportation, and disposal of hybrid algae would take place in contained facilities or vessels, consistent with EPA's TSCA regulations.

For the Florida site, the proposed biorefinery would be considered a minor source of air emissions and would qualify for a "permit-by-rule" under Florida regulations, which is reserved for minor sources. Lee County is in attainment for all National Ambient Air Quality Standards (NAAQS). Minor impacts to the local air quality are expected as minimal amounts of emissions would be generated by the proposed biorefinery and associated vehicles.

It is expected that no impacts to state- or federally-protected species would occur due to the generally poor quality of on-site vegetative habitat, overall low diversity of wildlife observed at the site, and the recently disturbed nature of the site. If endangered species are detected prior to or during construction, Algenol would implement the appropriate measures, in consultation with state agencies, to ensure that endangered species and habitats would not be adversely impacted.

Because 96.8 percent of the site is composed of farmland of unique importance, DOE collaborated with the local Natural Resource Conservation Service (NRCS) to complete the required Farmland Conversion Impact Rating form. The NRCS assigned the site a score of 69 out of 260 points. A score of less than 160 points need not be given further consideration for protection and requires no further evaluation. Because the soils at the site are best suited for cultivating pasture grasses and are located in the center of a developing urban area, the impact to the farmland soils is negligible.

In response to the consultation letter DOE sent to the Seminole Tribe of Florida, the tribe deferred further commenting until they could review a Phase I archaeological survey to be conducted by Algenol. Algenol is committed to completing a Phase I archaeological survey and continuing consultation if necessary prior to construction.

DOE evaluated the cumulative impacts of the proposed project and other past, present, and reasonably foreseeable projects in the area. DOE concluded that Algenol's proposed project, in conjunction with other activities considered, would have no or minimal cumulative impacts on the environmental resources considered.

**PUBLIC PARTICIPATION IN THE EA PROCESS:** In accordance with applicable regulations and policies, DOE sent a Notice of Scoping on June 10, 2010, to federal, state, and local agencies; tribal governments; elected officials; businesses; organizations and special interest groups; and members of the general public for comments regarding the EA's scope. DOE published the Notice of Scoping online at the DOE Golden Field Office Public Reading Room. One public comment letter was received in response to the Notice of Scoping. All areas of concern contained in the letter were addressed to the extent practicable in the Final EA. These documents are provided in Appendix A of the Final EA.

For the Florida site, DOE initiated consultation with the Florida Division of Historical Resources, applicable U.S. Fish and Wildlife Service offices, and the Fish and Wildlife Conservation Commission, the Seminole Nation of Oklahoma and the Seminole Indian Tribe of Florida. The consultation letters and responses are provided in Appendix B of the Final EA.

DOE published the Draft EA online at the DOE Golden Field Office Public Reading Room for a 15-day review period ending September 7, 2010. Copies of the Notice of Availability (NOA) were mailed to stakeholders and the NOA was published online at the Golden Field Office Public Reading Room. DOE received no comments during the Draft EA comment period.

**DETERMINATION:** Based on the information presented in the Final EA (DOE/EA 1786), DOE determines that authorizing expenditure of federal funds by Algenol to support final design, construction, and start-up of the proposed biorefinery at the Ft. Myers, Florida location would not constitute a major federal action significantly affecting the quality of the human or natural environment as defined by NEPA. Therefore, the preparation of an Environmental Impact Statement is not required, and DOE is issuing this FONSI for the Fort Meyers, Florida location.

Alengol's commitment to obtain and comply with all appropriate federal, state, and local permits required for construction and operation of the biorefinery, and to minimize potential impacts through the implementation of best management practices and various applicant-committed measures is detailed in the Final EA, shall be incorporated and enforceable through DOE's financial assistance agreement.

The final EA is available for review at: http://www.eere.energy.gov/golden/Reading_Room.aspx.

For questions about this FONSI, contact:

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For further information about the DOE NEPA process, contact:

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Issued in Golden, Colorado this 28TH day of December, 2010

Derek G. Passarelli
Acting Golden Field Office Manager