# 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ACTION ALTERNATIVES

This chapter describes the No Action Alternative, the Proposed Action, and the six site alternatives. The No Action Alternative is described in Section 2.1, the characteristics of the Proposed Action—the siting, construction, and operation of the NBAF—that may have impacts on the affected environment are described in Section 2.2. Section 2.3 describes the development of and the reasonable site alternatives. Section 2.4 describes the alternatives considered but eliminated from detailed study. Section 2.5 provides a summary comparison of the potential environmental impacts associated with the proposed construction and operation of the NBAF. Section 2.6 discusses the Preferred Alternative that will be presented in the Final EIS.

## 2.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, the NBAF would not be constructed. The work currently being conducted at PIADC, which performs much of the research on FADs and zoonotic diseases in the U.S., would continue and BSL-4 research would continue to be performed outside of the U.S. If the No Action Alternative is selected, PIADC would continue operations and support existing research programs but not the expanded mission requirements associated with the NBAF. In other words, the No Action Alternative would not meet the purpose and need for the Proposed Action.

## 2.2 PROPOSED ACTION: REQUIREMENTS TO CONSTRUCT AND OPERATE THE NBAF

The *NBAF Conceptual Design and Feasibility Study* (NDP 2007a) described the programmatic, technical, and non-site-specific requirements for the NBAF to determine the feasibility of the project and to prepare a preliminary conceptual design. Based on that document and other sources as noted, a description of the construction and operation of the NBAF has been developed for the purposes of analyzing the potential environmental impacts associated with those activities.

### 2.2.1 Construction Requirements

The study emphasized that the NBAF should be located on a site of no less than 30 acres to include a main laboratory building, a current good manufacturing practice (cGMP) laboratory (needed for small-scale vaccine and reagent production), a central receiving facility, a guard house, and a central utility plant (CUP). The approximate area needed for the NBAF is between 500,000 and 520,000 square feet. The approximate percentage of the facility by component is provided in Table 2.2.1-1.

**Table 2.2.1-1 — NBAF Space Requirements**

| Space | Percent of Total Area |
|---|---|
| Office/Administration | 6.9 |
| BSL-2[a] | 6.0 |
| BSL-3[b] | 73.8 |
| BSL-4 | 10.9 |
| cGMP | 2.4 |

[a]BSL-2 includes laboratory and support areas.
[b]BSL-3 includes laboratory, 3Ag, and training and support areas.

The number and size of research laboratories were determined in part by the magnitude of the research that was to be conducted in the facility. Animal species, FAD and zoonotic agents, and transmission modes of each agent were important considerations in developing many of the design requirements and safety features of the NBAF and are presented in Table 2.2.1-2. Based on 70% utilization of the design maximum, projected research demands resulted in a facility design that could house approximately 200 to 300 animals at any given time, including cattle, swine, and sheep.

**Table 2.2.1-2 — FAD and Zoonotic Agents Characteristics**

| Agent | BMBL/APHIS Classification | | Species | Mode of Transmission |
|---|---|---|---|---|
| | Laboratory | Animal | | |
| Foot and Mouth Disease virus | BSL-3E | BSL-3Ag | Cattle, sheep, swine, goats, deer, and other cloven-hoofed animals | Aerosol, contact |
| Classical swine fever virus | BSL-3E | BSL-3Ag | Swine | Oral, contact |
| Vesicular stomatitis viruses | BSL-3E | BSL-3Ag | Horses, swine, cattle | Biting flies, oral |
| Rift Valley fever virus | BSL-3E | BSL-3Ag | Sheep, goats, cattle, camels; humans | Mosquitoes, aerosol; zoonotic |
| Nipah virus | BSL-4 | BSL-4 | Swine; humans | Oral, aerosol; zoonotic |
| Hendra virus | BSL-4 | BSL-4 | Horses, flying foxes; humans | Oral, aerosol; zoonotic |
| African swine fever virus | BSL-3E | BSL-3Ag | Swine | Ticks |

The NBAF would consist of two laboratory facilities and two outbuildings. One of the two laboratory buildings would be the primary research building containing the BSL-2, BSL-3E, BSL-3Ag, and BSL-4 laboratories with their associated support spaces. The other laboratory building would be a cGMP laboratory located adjacent to the primary research laboratory. Other outbuildings supporting the overall operation of the NBAF would include:

- Entry Guard House – Controls site access.
- Central Receiving Facility – Controls all deliveries to the site for transfer to the laboratory facilities; all external vehicle deliveries would be transferred to the NBAF internal vehicles for delivery.
- Parking – General surface parking for staff and visitors.

An interagency technical working group of experts and researchers from DHS, USDA, and DHHS determined that the program missions of biodefense and agro-defense required the following research capacities within the proposed laboratory facilities:

- Nine BSL-3Ag and two BSL-4 modules to conduct three BSL-3Ag and two BSL-4 agro-countermeasure research and development programs simultaneously.
- Supporting core laboratory pathology and analytical chemistry modules that would include electron microscopic and other imaging capabilities, a gamma irradiator to inactivate samples for shipment outside of biocontainment, and two BSL-2 laboratories to perform molecular experiments that do not require biocontainment facilities.
- Supporting laboratory modules to include insectary spaces necessary to support the research. The BSL-2 insectary is for the combined functions of breeding, rearing, manipulating, and holding/incubating of arthropod vectors used in the research programs. Other insectary research spaces within BSL-3E and BSL-3Ag would be used for holding infected live insects or arthropods and for virus transmission studies to and from both infected and non-infected large animals and small animals.
- A module to train veterinarians to recognize and diagnose FADs, which is one of the primary missions of Animal and Plant Health Inspection Service (APHIS). The proposed facility needs to have a modern infrastructure to accomplish this mission, including a distance learning capability. The training module would operate independently of the research operations but within the

containment confines, permitting the courses to operate anytime during the year and allow separate security requirements and practices of the research facility.

- A cGMP module is needed for small-scale vaccine and reagent production. For large-scale manufacturing an industry partner would be needed. The cGMP module would allow for production and testing of two vaccine candidates at any given time. Modular components (BSL-2) would include a viral production room, a vaccine sterile assembly and fill room, a vaccine lyophilization area, and a diagnostic reagent production room.

In addition to the components described, infrastructure improvements would be required depending on where the site would be located. These improvements would include new power substations; new or higher capacity water, sewer, and natural gas lines; sanitary sewer upgrades; or new access roads or service lanes.

#### 2.2.1.1 Biosafety Design

According to the Biosafety in Microbiological and Biomedical Laboratories (BMBL) (CDC and NIH 2007), "*the fundamental principles of biosafety are containment and risk assessment. The fundamentals of containment include the microbiological practices, safety equipment, and facility safeguards that protect laboratory workers, the environment, and the public from exposure to infectious microorganisms that are handled and stored in the laboratory. Risk assessment is the process that enables the appropriate selection of microbiological practices, safety equipment, and facility safeguards that can prevent laboratory-associated infections (LAI).*" The proposed NBAF would provide state-of-the-art operating procedures and biocontainment features to minimize the potential for LAIs and accidental release from the research laboratories (see Appendix B for a review of biocontainment laboratory safety).

One of the primary design goals central to the flexibility of the proposed main laboratory building was the "hotel concept." This concept was used to evaluate and determine the number of laboratories and animal rooms required to run the NBAF in a safe, cost-effective, and efficient manner. This hotel concept assumes that all rooms are designed and shared on an equal basis and that each room provides the primary biocontainment requirements to ensure isolation between each other. Primary biocontainment measures for the proposed NBAF would include, but are not limited to, high-efficiency particulate air (HEPA) filtration for air exhaust and air intake systems, biosafety cabinets (BSCs), pressurized biosafety suits, and decontamination stations. Safety and biocontainment protocols would be addressed in facility-specific standard operating procedures (SOPs) that would be developed according to USDA guidelines prior to commissioning and operation of the NBAF.

Another primary design goal was to provide an adequate level of redundant safety and biocontainment that would be integrated into every component of the building. All laboratory areas, animal areas, support areas, backup computer servers, and engineering systems would have 100% back-up and redundancy such as:

- Each critical zone would be designed as a sealed "box-within-a-box" with airlocks at all points of access.
- The hardened structural systems would mitigate progressive collapse to help withstand seismic and or other external threats.
- The electrical systems would have dual feeds and would be designed with fully integrated battery and diesel-electric power back-up systems for redundancy within each system. A power outage or component breakdown would instantly transfer function to a back-up system.
- BSL-3Ag and BSL-4 laboratories would have two HEPA filters installed in series.
- Heating and ventilation systems would be fully contained with each zone, have seamless access to back-up power, and have redundant components built into every critical system.
- Concentric-ring security zones would ensure that nothing enters or exits the building without passing multiple points of physical and electronic screening.

The facility functions serving our national security concerns would have multiple layers of security designed into every primary use and engineering support systems. This level of safety, redundancy, and security would help to provide instant and automatic safeguards to the staff and the community it serves to support the overarching design goal of providing a safe work environment.

#### 2.2.1.2 Construction Schedule and Activities

Construction of the proposed NBAF would start in early 2010 and take approximately 4 years to complete. The project would provide approximately 700 construction-related jobs per year.

A detailed description of construction activities would be prepared once a site has been selected. However, the effects of construction activities on the various resources have been considered in this DEIS based on assumptions derived from the *NBAF Conceptual Design and Feasibility Study* and other sources. The details of those assumptions are presented in Chapter 3 for each site alternative.

In all likelihood, the construction manager at risk or construction manager as constructor (CMc) methodology would be employed for construction operations. This is a proven process where the CMc functions as a collaborative member of the project team and would be responsible for providing expertise during the design process by checking estimates and performing constructability reviews. All work would be performed in accordance with good management practices and in accordance with all applicable federal, state, and local laws and regulations. All work would be planned and managed to ensure that standard worker safety goals are met. Construction of the proposed NBAF would be performed using approved construction industry methods. During site preparation and construction, noise levels would be consistent with standard office building construction activities. Vehicles (such as dump trucks) and heavy machinery (such as bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during the construction phase. These vehicles would operate primarily during daylight hours. If needed, temporary task lighting would be used. Engineering best management practices (BMPs) would be implemented at the building site as part of a Storm Water Pollution Prevention Plan (SWPPP) executed under a National Pollutant Discharge Elimination System construction permit. These BMPs may include the use of hay bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain excavated soil and surface water discharge during construction of the proposed NBAF.

During construction, good housekeeping practices would be followed. Construction materials would include inert building materials such as concrete, glass, masonry, wood, insulation, plastics, sheetrock, and metal beams and piping. These materials would be stored neatly within designated staging areas. Construction would also require the use of some chemicals such as paints, solvents, fertilizers, oil, grease, fuel, and welding gases. These chemicals would be stored in protected areas. During construction, the manufacturer's recommendations for proper use and disposal would be followed for chemicals and materials. Whenever possible, all of a product would be used before disposing of the container. Equipment maintenance and repair would be conducted in designated areas to control oil, grease, and fuel spills. In addition, fuel storage and dispensing during construction would occur in a designated staging area at the construction site.

Wastes generated by site preparation and construction activities are expected to be predominately non-hazardous. After construction of the facility, site soil and rock removed during construction would be returned and used as landscaping to the degree that it is practicable. Landscaping would use native trees, shrubs, and groundcover. Sustainable building practices would be employed where safety allows.

### 2.2.2 Operation of the Proposed NBAF

The proposed NBAF would be either a government owned–government operated (GOGO) or government owned–contractor operated (GOCO) facility. A GOCO partnership allows each partner to perform duties for which it is uniquely suited: the government establishes mission areas and the private sector implements the missions using best business practices. The GOCO model has been replicated many times over the past 50

years, primarily by the Department of Energy and its predecessor agencies. In the U.S., GOCO arrangements are used to manage laboratories, manufacturing and production plants, and numerous repositories. Sandia National Laboratories, originally managed by AT&T, has been managed by Lockheed Martin since 1993. In addition, the DHS National Biodefense Analysis and Countermeasures Center (NBACC) currently under construction at Fort Detrick, which will have BSL-2, BSL-3, and BSL-4 laboratories, will be operated as a GOCO facility. A program management plan (PMP) has been prepared to insure DHS management and supervision of activities at the NBACC. If it is decided that the NBAF would be GOCO, a PMP would be prepared for the facility.

If the Proposed Action is selected and the Record of Decision (ROD) is signed, DHS would develop site-specific SOPs for the NBAF. These SOPs would be modified as necessary for the specific requirements of the proposed NBAF at the selected site. The following sections present an overview of staffing, protocols for laboratory research and sample transportation, and a description of operations for the proposed NBAF.

Prior to conducting research with highly infectious agents, a laboratory facility and staff undergo many pre-operational testing and training activities. One of the first pre-operational test and training events to occur is the commissioning of a laboratory. The commissioning process for building construction projects is a quality control process to document, test, and verify that building systems meet the facility owner's functional, operational, and performance requirements. This process is essential in the construction of today's biocontainment laboratories due to the requirements for life safety and reliable environmental control and monitoring. To take full advantage of the commissioning process, the research and maintenance staff would actively participate with the commissioning team to learn how the variety of engineering systems and controls maintain the integrity of the biocontainment laboratory. The research and maintenance staff would draw upon this information to establish the SOPs for each staffing group.

Once the construction of the facility and commissioning is complete, the maintenance staff would establish the operations and maintenance SOPs based on the data compiled from the construction documents, commissioning process, regulatory agencies, and their own experience with simulated system failure scenarios. These scenarios would occur during the commissioning process to help prepare the maintenance and research staff to respond in a timely and effective manner should the failure occur during normal operation of the facility. One example of biocontainment laboratory operation and maintenance procedures that would be required is daily inspections of essential containment and life support systems that must be completed and documented before laboratory work is initiated to ensure that the laboratory is operating according to established parameters. Preparation of the operation and maintenance SOPs with the appropriate training typically occurs over a 3- to 6-month period after construction is completed.

Practical and effective protocols for emergency situations must be established. These protocols must include plans for medical emergencies, facility malfunctions, fires, animals escaping within the laboratory, and other potential emergencies. Training in emergency response procedures must be provided to emergency response personnel and other responsible staff according to institutional policies. Many of the training and testing requirements are to maintain certification and licensure to operate a laboratory, which generally take up to a year beyond the construction phase to complete. The BMBL is the primary guidance source to ensure a safe and effective testing and training program for successful state-of-the-art biocontainment laboratory facilities.

The use of hazardous biological agents or toxins that are regarded as select agents under Possession, Use, and Transfer of Select Agents and Toxins; Interim Final Rule (9 CFR 121) is regulated by the Secretary of the Department of Health and Human Services. The Centers for Disease Control and Prevention (CDC) is responsible for the management of the Select Agent Program. Research protocols involving the use of select agents require registration of the NBAF and inspection of its laboratories by the CDC or APHIS. CDC or APHIS would inspect the laboratories at least once over a 3-year period. This inspection is not required prior to approval of the application.

#### 2.2.2.1 Operating Staff

Once operational, the proposed NBAF would employ approximately 250 to 350 people. In addition to the scientific and administrative staff of the laboratory, the proposed NBAF would employ technicians, veterinary staff, building engineers, and security personnel. All laboratory staff would receive thorough pre-operational training, as well as ongoing training, in the handling of hazardous infectious agents, understanding biocontainment functions of standard and special practices for each biosafety level, and understanding biocontainment equipment and laboratory characteristics. Laboratory staff would be supervised by trained and experienced scientists. The NBAF safety and biosafety staff would review and approve of proposed protocols and SOPs for the laboratory prior to use. Laboratory staff working in the proposed NBAF would use the standards and procedures recommended for all institutions engaged in biological research.

#### 2.2.2.2 Waste and Materials Management

The solid and liquid wastes generated in the BSL-2, BSL-3, BSL-3E, BSL-3Ag, and BSL-4 laboratories would be considered biohazardous and treated by sterilization, chemical disinfection, and/or incineration. The efficiency in sterilizing and disinfecting waste would be verified by the use of heat and biological indicators. Materials and equipment that require removal from biocontainment areas also would be decontaminated prior to removal.

Decontamination is required for any substance exposed to a BSL-3E, BSL-3Ag, or BSL-4 agent. For a decontamination system to be effective, it must conform to the following design criteria:

- Ease of transport and loading into treatment equipment
- Worker protection and reduction of biohazard aerosol generation
- Decontamination based on proven consistent technologies
- Validated and repeatable
- Volume reduction for final disposal
- Compliant with local, state, and federal environmental requirements
- Cost-effective (capital and operating)
- Technical degree of automation to achieve effective labor savings
- Maintenance friendly

**Liquid Biowaste Treatment System**. A dedicated biowaste gathering and treatment system would be provided for BSL-3, BSL-3E, BSL-3Ag, and BSL-4 functions. Each of the laboratories and associated procedure rooms, animal rooms, and storage/centrifuge rooms are provided with a biological liquid waste collection and treatment system. All liquid waste would be treated through a batch sterilization process. The biowaste system would employ gravity drainage to the liquid effluent decontamination system using double-wall piping required in areas outside of containable space and which cannot be readily inspected. The effluent decontamination system tanks would be housed in a dedicated space located below the functional floor area served in a “biocontainable” service space.

**Carcass Disposal System.** A dedicated carcass disposal system would be utilized for BSL-3Ag and BSL-4 areas. The USDA ARS 242.1 Facilities Design Standards contains a requirement to provide for incineration of animal carcasses infected with BSL-3Ag agents and BSL-4 agents or to have an alternative solution presented for consideration based on a comparative analysis. Incinerators are being phased out due to permitting and maintenance issues, and replacement technologies are currently being investigated. Incineration is still, however, considered the most effective method for disposal of infected carcasses at many universities and research establishments.

BSL3-Ag is unique to agriculture because of the necessity to protect the environment from an economic, high risk pathogen in a situation where studies are conducted employing large agricultural animals or other similar situations in which the facility barriers now serve as primary containment. Pathological incinerators, or other

approved means, must be provided for the safe disposal of the large carcasses of infected animals. Redundancy and the use of multiple technologies need to be considered and evaluated. The latest biocontainment faciliites included multiple disposal methods as a safety feature to ensure a proven method of disposal is available at all times.

Sterilization is only part of the challenge in managing carcass disposal. Emissions and by-products generated from carcass sterilization must also be managed as part of the waste stream processes. Because of the emissions and by-products generated and the limited ability to attain permits to construct incinerators, DHS is evaluating various disposal systems that are described in more detail in Section 3.13.

Conventional solid waste would be generated during construction as well as during operation of the NBAF and would be appropriate for disposal at a municipal waste facility. Section 3.13 provides a more detailed description of the types of solid wastes generated by the NBAF and potential disposal methodologies.

#### 2.2.2.3 Sample Transportation

Regulations on transportation of biological agents are aimed at ensuring that the public and the workers in the transportation chain are protected from exposure to any agent that might be in the package. Protection is achieved through 1) the requirements for rigorous packaging that will withstand rough handling and contain all liquid material within the package without leakage to the outside, 2) appropriate labeling of the package with the biohazard symbol and other labels to alert the workers in the transportation chain to the hazardous contents of the package, 3) documentation of the hazardous contents of the package should such information be necessary in an emergency situation, and 4) training of workers in the transportation chain to familiarize them with the hazardous contents so as to be able to respond to emergency situations. Regulations that apply to transportation of samples include Department of Transportation (DOT) 49 CFR Parts 171-178, Hazardous Materials Regulations, Public Health Service 42 CFR Part 72, Interstate Transportation of Etiologic Agents. Samples transported to the NBAF would be provided by commercial suppliers, research collaborators, or other parties seeking sample identification. Samples may contain either previously identified or unidentified microorganisms or strains. As a requirement of transport, in accordance with federal regulations, the package originator must identify the contents and provide the required shipping documentation detailing the package contents to the transporter and receiver. Thus, the receiver would know what level of protection to apply (e.g., Biological Safety Cabinets [BSC], Personal Protective Equipment, and medical treatments). At a minimum, incoming packages to the NBAF would be opened in a Class II BSC. Section 3.11.9, Traffic and Transportation, addresses sample transportation to and from the proposed NBAF, and Appendix E to the Health and Safety Section, describes the potential consequences of transportation-related release of pathogens.

Samples would be shipped to the NBAF by commercial package delivery services in accordance with International Air Transport Association packing instructions. All samples would be packaged and shipped in accordance with DOT and CDC requirements for transporting potentially biohazardous samples. All shipped packages would be received at the NBAF central delivery warehouse before delivery to the NBAF. Strict chain-of-custody procedures for samples would be followed. After the package is transported to the NBAF, the package would then be logged into the NBAF inventory. The external packaging material would be inspected, removed, and disposed of according to the NBAF waste handling procedures. The interior packing with the intact sample would be placed safely and securely in the appropriate BSL laboratory under a chain-of-custody procedure until the authorized researcher was ready to process the samples. Unpacking of the primary container would be done only in a BSC. The samples would be stored for preservation within a locked freezer or refrigerator, according to the requirements dictated by the nature of the sample. Inventories of all samples and cultures would be maintained in accordance with CDC standard practices and requirements.

Samples containing select agents would be handled in accordance with USDA and CDC select agent rules. Select agents would be accepted only if a responsible official is notified in advance of shipment and after the

CDC/APHIS Form 2 has been completed in accordance with regulations, registration is verified, and the requesting responsible official has been notified in advance of the shipment. Proper transfer documentation is approved prior to shipment by the sending and receiving institutions, as well as the by CDC and/or APHIS. Upon arrival, the NBAF personnel would notify the responsible investigator or designee of the shipment arrival per select agent transfer procedures dictated by APHIS and/or by CDC. Any select-agent-certified NBAF personnel may accept the sample. The sample would be logged in by the NBAF personnel and in accordance with the NBAF receiving procedures.

Samples shipped from the NBAF would follow a similar procedure for receiving samples. The documentation would be approved by the receiving institution, the NBAF, and APHIS and/or CDC prior to sending the select agent. For select agents, an authorized employee would be onsite at the NBAF to inspect and close the package in the presence of the sender. The packaging and appropriate documentation (i.e., Institutional Biosafety Committee [IBC] select agents' checklist, CDC/APHIS Form 2, and permits) must conform to DOT and CDC requirements for transport of biological materials. The sender would remain with the package until the DOT-approved commercial carrier arrived to take possession.

#### 2.2.2.4 Chemicals Storage and Use

The proposed NBAF would house the laboratory chemicals necessary to conduct the planned research, training, and diagnostic activities; maintain the equipment; care for animals; and clean the facilities and equipment. The chemicals would range from floor cleaners, which are often skin irritants, to hazardous laboratory chemicals. The types of chemicals that would pose physical hazards are flammable or combustible liquids, peroxides, oxidizers, and pyrophorics. Those chemicals that would pose health hazards are corrosives/irritants, flammables, sensitizers, toxics, teratogens, and carcinogens. If NBAF operations permit, chemicals would be stored using a HAZMAT Pharmacy concept. This provides centralized logistics for hazardous materials, reduces quantities needed on hand, and minimizes risks of incidents. All laboratory personnel would be adequately trained in the proper use, storage, and disposal of these chemicals. Chemical handling and storage would be conducted according to all appropriate guidelines and protocols.

#### 2.2.2.5 Pollution and Spill Prevention

A site-specific Pollution Prevention Plan would be developed for the NBAF and would include specific procedures for spill prevention and cleanup. The specific procedures address prevention elements such as proper storage, operating procedures, inspection, and training to prevent or lessen the possibility of spills, as well as biocontainment features such as biocontainment walls in storage facilities.

The NBAF would develop a Spill Prevention Control and Countermeasures Plan (SPCC) addressing the protection of surface water and a SWPPP. The SPCC addresses operating procedures to prevent spills, control measures to contain spills, and countermeasures to contain, cleanup, and mitigate the effects of a spill reaching a water body. The specific requirements for a SWPPP vary from state to state and would include measures to prevent pollutants from reaching water bodies due to stormwater runoff. These plans would be reviewed and revised as necessary.

#### 2.2.2.6 Research Protocols

**Institutional Biosafety Committee (IBC).** The use of any biological agent requires the review and approval of the IBC of USDA/APHIS. IBC membership, responsibilities, and roles are defined in the NIH Guidelines for Research Involving Recombinant DNA Molecules (NIH 2002). The focus of the IBC is adherence to well-established biological safety practices that protect the researchers and the surrounding community. The IBC is vested with the authority to approve the use of a biological agent, deny approval, or take action to stop work. Possession of and any work involving select agents, whether they are BSL-3 or BSL-4 agents, requires registration of the facility by APHIS and/or the CDC. The registration process includes identity of the agent(s), the location of use and storage of the agent(s), and a detailed description of laboratory containment

provisions and security measures. IBC approval of SOPs is required, and the laboratories would be inspected by the CDC at least once over a given 3-year period.

The IBC is comprised of committee members with overlapping and interdisciplinary expertise, including microbiologists, infectious disease specialists, safety experts, and community representatives. Notifications for Use of Biological Agents received by the IBC are critically reviewed by experts focusing on the safe use of the biological agent(s) at the appropriate biosafety level.

**APHIS Animal Research Policy and Institutional Animal Care and Use Committee.** The APHIS Institutional Animal Care and Use Committee (IACUC) reviews all protocols and proposals for research, testing, and education that involve the use of vertebrate animals to be certain that care and use of animals is in compliance with the *Animal Welfare Act* as amended (7 USC, 2131-2156), *Guide for Care and Use of Laboratory Animals* (Institute for Laboratory Animal Research 1996), guidelines of the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC), and state and local regulations. The IACUC is comprised of at least five members with mandatory membership of a doctor of veterinary medicine with training or experience in laboratory animal science and medicine and who has program authority and responsibility for activities involving animals at the NBAF. The IACUC may approve, require proposal modifications, or withhold approval of all research and testing protocols related to the care and use of vertebrate animals. In approving protocols, the IACUC ensures that

- Animal pain, distress, and functional or sensory impairment are minimized.
- All survival surgery is performed using aseptic procedures.
- Adequate veterinary care is planned for and provided.
- The type and number of animals are appropriate and necessary as an essential part of the protocol.
- Anesthetics, analgesics, tranquilizers, and euthanasia procedures are used appropriately when necessary.

The NBAF animal facilities are subject to inspections and site visits from the National Institutes of Health (NIH), USDA, and AAALAC. AAALAC is a private, nonprofit organization that promotes the humane treatment of animals in science through a voluntary accreditation program. Inspections can include review of IACUC protocols, minutes of all IACUC meetings, all animal use, and care records. Access to animal housing facilities and laboratories is required for inspectors.

### 2.2.3 Decommissioning of the Proposed NBAF

Once the proposed NBAF has reached its life expectancy, DHS may choose to decommission the facility and transition the property for future use according to current agreements. Development of standards for biosafety laboratories and associated equipment has focused on the construction and operation of new or existing facilities. Standard laboratory procedures and decontamination protocols would be performed according to the BMBL to ensure worker safety and to ensure health and safety of the general public. It is anticipated that site-specific protocols and a decontamination and decommissioning plan would be developed for this action, should it occur. The plan would address such factors as decontamination methodologies; disposition of used equipment and re-use, disposal, or salvaging site materials; and post-decontamination monitoring.

## 2.3 SITE ALTERNATIVES

DHS investigated a number of options to meet the mission requirements of HSPD-9. In Fiscal Year 2006, Congress appropriated money for site selection and other pre-construction activities for the NBAF. DHS developed a site selection process because Congress did not designate a specific site upon which to build and construct the NBAF. This section describes that process and the results of the investigations that led to the development of and selection of reasonable alternatives to achieve the purpose and need of the NBAF and, accordingly, such reasonable alternatives are considered for examination in this DEIS.

### 2.3.1 Alternative Site Selection Process

DHS issued a Public Notice soliciting Expressions of Interest (EOIs) for potential sites for the NBAF in the Federal Business Opportunities on January 17, 2006, and the *Federal Register* on January 19, 2006. DHS received 29 EOIs by the March 31, 2006, due date stated in the Public Notices Soliciting EOIs. DHS conducted an initial evaluation of the 29 EOIs, using the four evaluation criteria set forth in the Public Notice Soliciting EOIs. These evaluation criteria were developed by an interagency working group to ensure that NBAF would meet the purpose and need of the project and the interdependent needs of DHS and USDA to adequately protect the nation against biological threats to animal agriculture. The four evaluation criteria were

1. Proximity to Research Capabilities
2. Proximity to Workforce
3. Acquisition/Construction/Operations
4. Community Acceptance

DHS developed and implemented a rigorous process for the first round evaluation of the 29 EOIs received against DHS's evaluation criteria and associated sub-criteria. Three committees comprised of federal employees evaluated the EOIs, assessing their strengths, weaknesses, and deficiencies against the four evaluation criteria and associated sub-criteria. A Steering Committee, also comprised of only federal employees, made recommendations to the DHS Selection Authority, who selected those sites that had sufficient qualifications with regard to the evaluation criteria (and would therefore be further considered in a second round of evaluations) and eliminated some sites for further consideration due to weaknesses and/or deficiencies with respect to the following evaluation criteria:

1. Lack of proximity to existing BSL-3 or BSL-4 research programs that could be linked to NBAF mission requirements.
2. Difficulty in demonstrating ability to attract world-class researchers and scientists or skilled technical workforce with necessary experience.
3. Insufficient infrastructure, utilities, or other siting difficulties.
4. Insufficient community support for siting of NBAF.

After DHS's First Round evaluation of the 29 EOIs, 18 potential sites for the proposed NBAF from 12 consortia remained under consideration in a second round of the site selection process. The DHS selection authority requested that the consortia proposing the 18 remaining sites provide additional information, limited to the broader categories of information falling within the originally published evaluation criteria in DHS's Public Notice soliciting EOI. In December 2006, DHS sent Additional Information Requests to the consortia proposing the 18 remaining sites. In the December 2006 letter, DHS also communicated its preference for certain evaluation criteria that would be considered by the federal employee evaluation committee in the second round of DHS's site selection process.

These DHS preferences were that

1. The proposed site be within a comprehensive research community that has existing research programs in areas related to NBAF mission requirements;
2. The proposed site be within proximity to skilled research and technical staff with expertise in operations conducted at biological and agricultural research facilities and be within proximity to training programs for such expertise;
3. Title to at least a 30-acre site would be deeded at no or minimal cost to the U.S. Government and all NBAF construction (BSL-3 and BSL-4 laboratories) could occur at the 30-acre site;
4. In-kind contributions (e.g., support to the NEPA process, deeded land, new utilities, roads, chilled and steamed water) would be donated by proposing consortia;
5. The proposed site is environmentally suitable; and

6. The proposing consortia could demonstrate that local and national stakeholder community members' support, or at least do not oppose, locating the NBAF at the proposed site.

Upon receipt of this additional information from the consortia, a federal team consisting of USDA and DHS employees conducted site visits to all the remaining sites. The intent of the site visits was to 1) verify the information provided and representations made in the EOI submissions and additional information submitted and 2) enable evaluation committee representatives to view any observable physical conditions and constraints at the proposed site and, if applicable, view the site's utilities and infrastructure.
Based on federal employee evaluation team's analysis of the additional information and observations on the site visits, the evaluation team recommended to the DHS Selection Authority which sites should advance for further evaluation. The DHS selection authority determined that five sites met the evaluation criteria and DHS preferences and would therefore be advanced as reasonable alternatives to be studied in the Environmental Impact Statement (EIS). Figure 2.3.1-1 below is an illustration of the previously described steps in the site selection process.

**Figure 2.3.1-1 — Site Selection Process**

Although not part of the competitive site selection process, Plum Island was determined to be a reasonable site to advance for study in the EIS, making a total of six sites for consideration. The four reasons for including Plum Island as a reasonable alternative were

1. Plum Island (while currently owned by DHS) appears to meet the NEPA requirement that the proposing Federal agency evaluate the range of all "reasonable alternatives" to a proposed action, where reasonable alternatives are defined as those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant";
2. Plum Island currently performs much of the existing research and houses the existing workforce assessing potential threats to animals from foreign animal diseases and zoonotic diseases;
3. Plum Island currently fulfills a portion of the goals and mission identified for the NBAF and meets some of the NBAF criteria, including having a skilled workforce in a BSL-3 environment; and
4. Plum Island could reasonably be internally evaluated throughout the EIS process, given that DHS already owns Plum Island and did not believe it appropriate to respond to its own Request for Expressions of Interest.

The six sites published in the *Federal Register* on July 31, 2007, for the NBAF EIS process are shown in Table 2.3.1-1.

**Table 2.3.1-1 — Six Site Alternatives**

| Location | Site Name |
|---|---|
| Athens, Georgia | Milledge Avenue Site |
| Manhattan, Kansas | Manhattan Campus Site |
| Flora, Mississippi | Flora Industrial Park Site |
| Plum Island, New York | Plum Island Site |
| Butner, North Carolina | Umstead Research Farm Site |
| San Antonio, Texas | Texas Research Park Site |

Additionally, the "No Action" Alternative is defined as leaving PIADC open and performing at its current mission capability with construction of previously planned improvements, but without the construction of NBAF, and utilizing international laboratories when available for BLS-4 research.

### 2.3.2. South Milledge Avenue Site; Athens, Georgia

The South Milledge Avenue Site is located west of the South Milledge Avenue and Whitehall Road intersection in Clarke County, Georgia (Figure 2.3.2.-1). The site is part of the University of Georgia Whitehall Farm and is located near the University of Georgia Livestock Instructional Area. The site is a 67-acre tract of land consisting of open pastureland and wooded land and is utilized by the University of Georgia Equestrian Team. The topography is rolling terrain, which slopes towards the southwest. The site has been undeveloped land since at least 1936 and is currently zoned government use. The preliminary site design is shown in Figure 2.3.2-2.

### 2.3.3 Manhattan Campus Site; Manhattan, Kansas

The Manhattan Campus Site is on the campus of Kansas State University (KSU) immediately adjacent to the Biosecurity Research Institute (Figure 2.3.3-1). The site location consists of approximately 48.4 acres southeast of the intersection of Kimball Avenue and Denison Avenue. The site has been used for animal research since the 1970s. The site includes several structures, including five research buildings, a residential structure, and a storage building for recycling materials. The preliminary site design is shown in Figure 2.3.3-2. The site has been part of KSU since at least the 1920s and is utilized for various agricultural purposes since the 1970s. The site is currently zoned as University District and was annexed to the City of Manhattan in 1994. The 48.4-acre site could be expanded to 70 acres.

### 2.3.4 Flora Industrial Park Site; Flora, Mississippi

The Flora Industrial Park Site is located in Madison County, Mississippi, and is owned by the Madison County Economic Development Authority (Figure 2.3.4-1). Flora Industrial Park is a mixed-use commercial park 45 miles from the Jackson-Evers International Airport. Additional land is available surrounding the site for support facilities. The site is located on the east side of U.S. Highway 49, north and east of the intersection with North 1st Street. The Flora Industrial Park Site is approximately 150 acres of idle pasture land with two small ponds and a few scattered wooded areas. An overhead power transmission line is present through the south-central and west-central portions of the site. The site is currently zoned limited industrial. The preliminary site design is shown in Figure 2.3.4-2. Based on historical information, it appears that the site has been cultivated and pasture land previously occupied by two small tenant houses and one hay barn (Terracon 2007b). Adjoining properties appear to have been predominantly agricultural and rural residential until construction of the southwest-adjoining Primos Manufacturing Company in the early 2000s.

### 2.3.5 Plum Island Site; Plum Island, New York

Plum Island is an 840-acre island located about 12 miles southwest of New London, Connecticut, and 1.5 miles from the northeast tip of Long Island, New York (i.e., Orient Point). The island is technically located in the Village of Greenfield, Town of Southold, Suffolk County, New York. However, the island has limited association with the town and is currently the responsibility of the U.S. government. Although PIADC does not meet the project purpose and need identified in Chapter 1, construction of a completely new facility on Plum Island would be a suitable alternative. The Plum Island Site consists of approximately 24 acres of land located directly to the east of the existing PIADC, which is on the western shore of Plum Island (Figure 2.3.5-1). Although one of the requirements listed in the original EOI stated that a minimum of 30 acres would be required, the Plum Island Site would not require the full 30 acres. Existing facilities associated with PIADC would be available for use with the NBAF and would reduce the amount of space required. The 24-acre site has no existing structures. Dense underbrush with gravel roads are found within the southwestern and northeastern portions. The southeastern portion of the island has previously been used

for sand mining and is generally void of vegetation. The northwestern portion of the island has minor vegetation. A potable water line bisects the site from east to west, and an underground electric service borders the site on the north side. Based on a review of the historical information, the Plum Island Site was formerly utilized as a dumping area for miscellaneous non-infectious wastes associated with PIADC, but the site has since been remediated. The preliminary site design is shown in Figure 2.3.5-2.

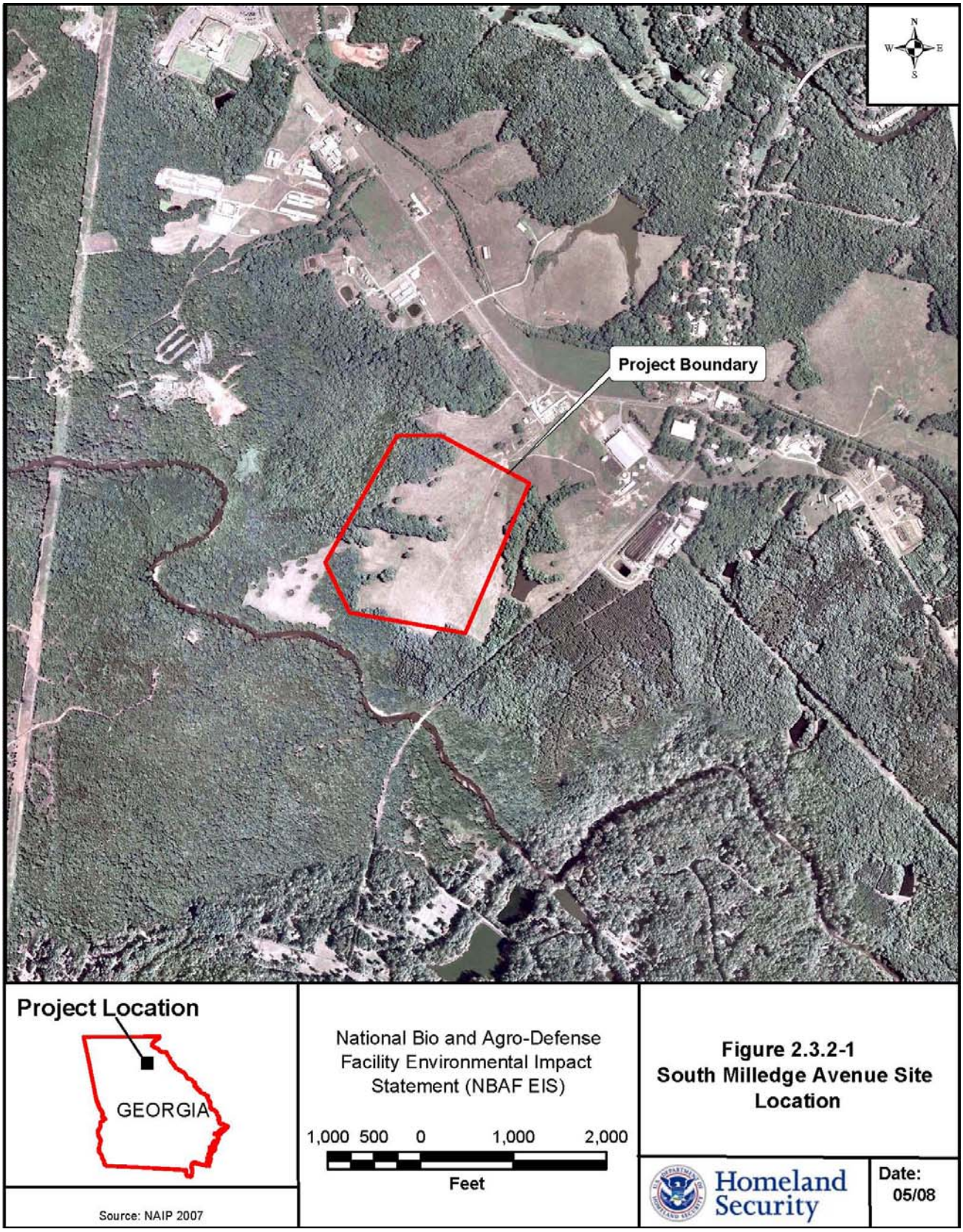


**Figure 2.3.2-1 — South Milledge Avenue Site Location**

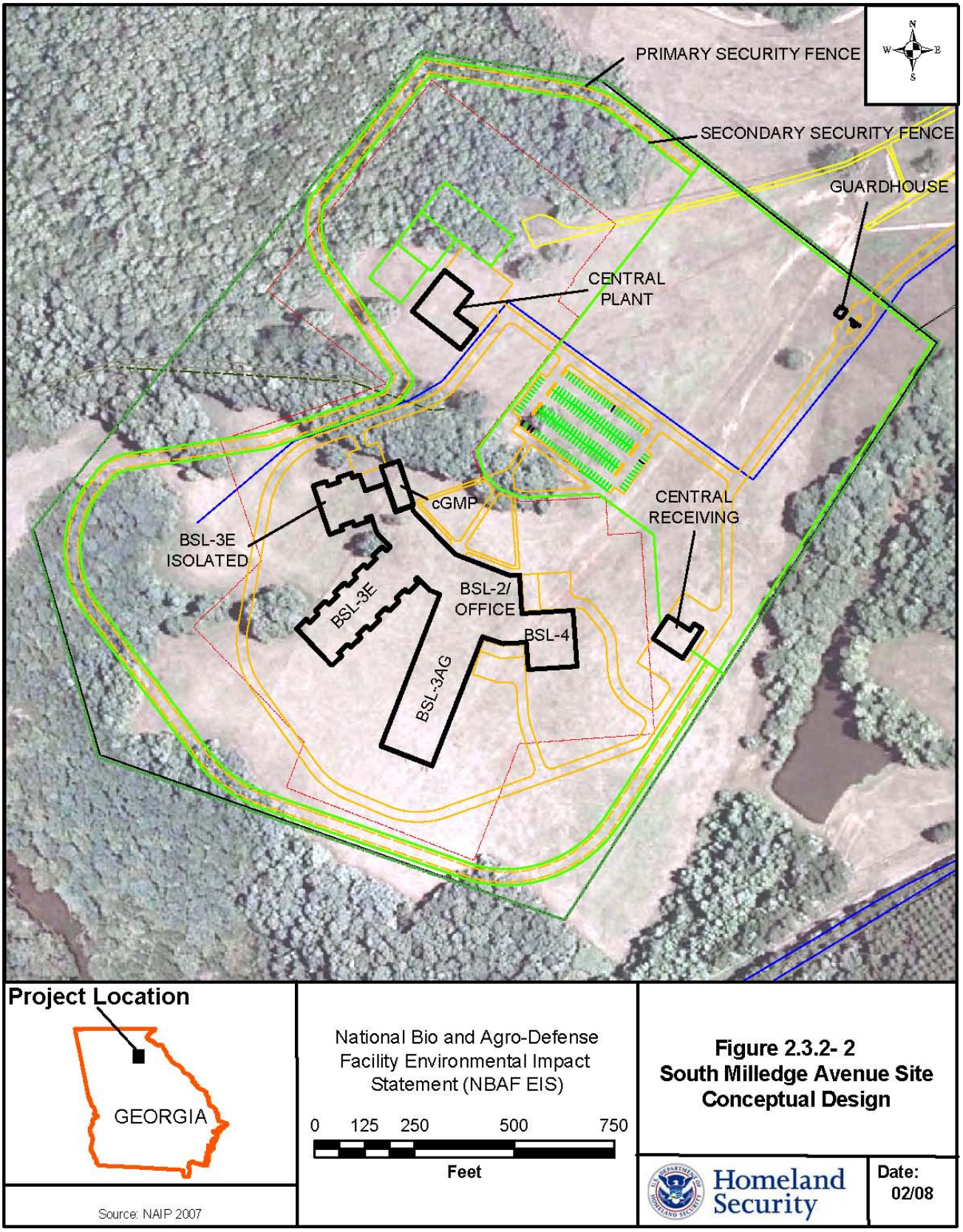


**Figure 2.3.2-2 — South Milledge Avenue Site Conceptual Design**

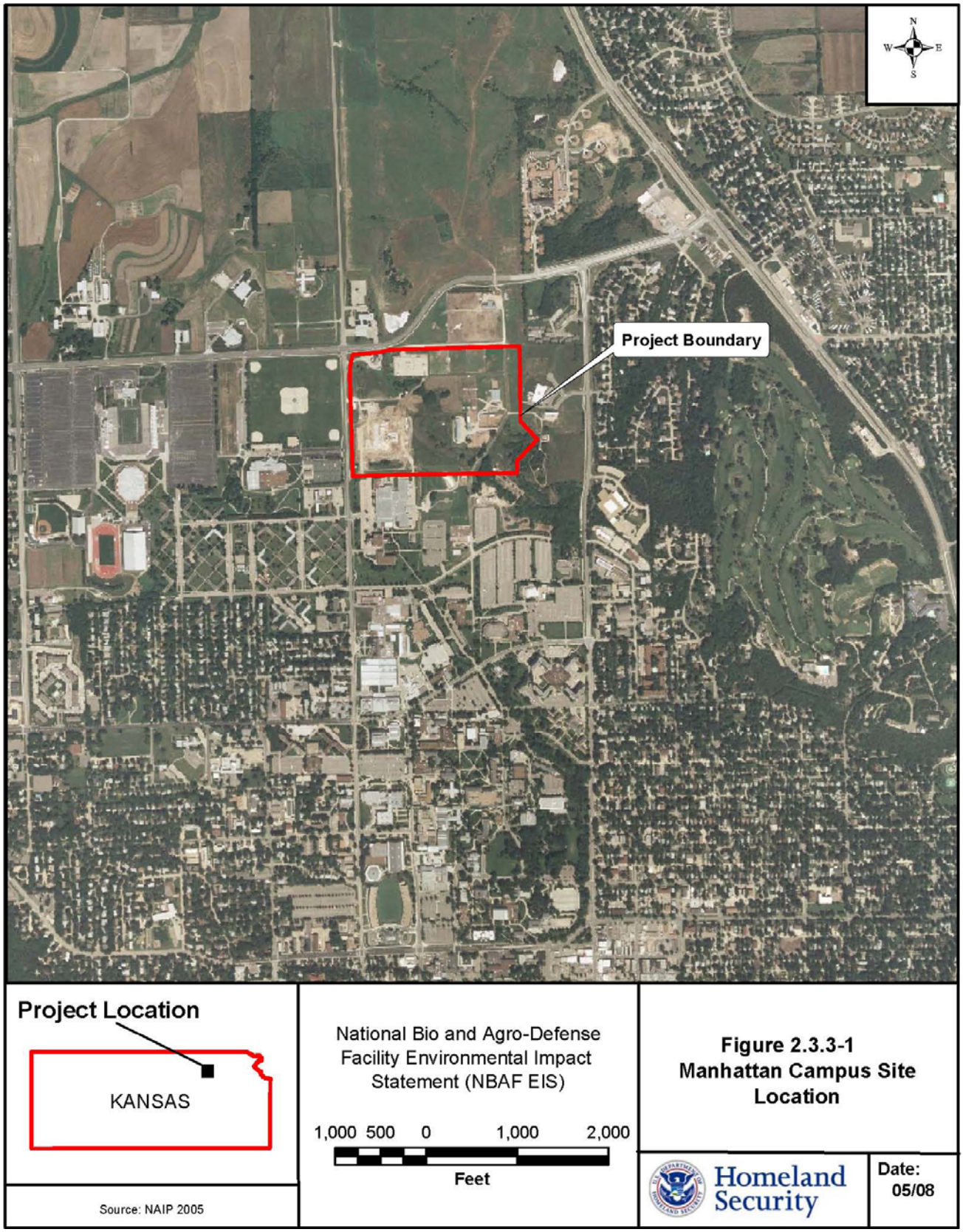


**Figure 2.3.3-1 — Manhattan Campus Site Location**

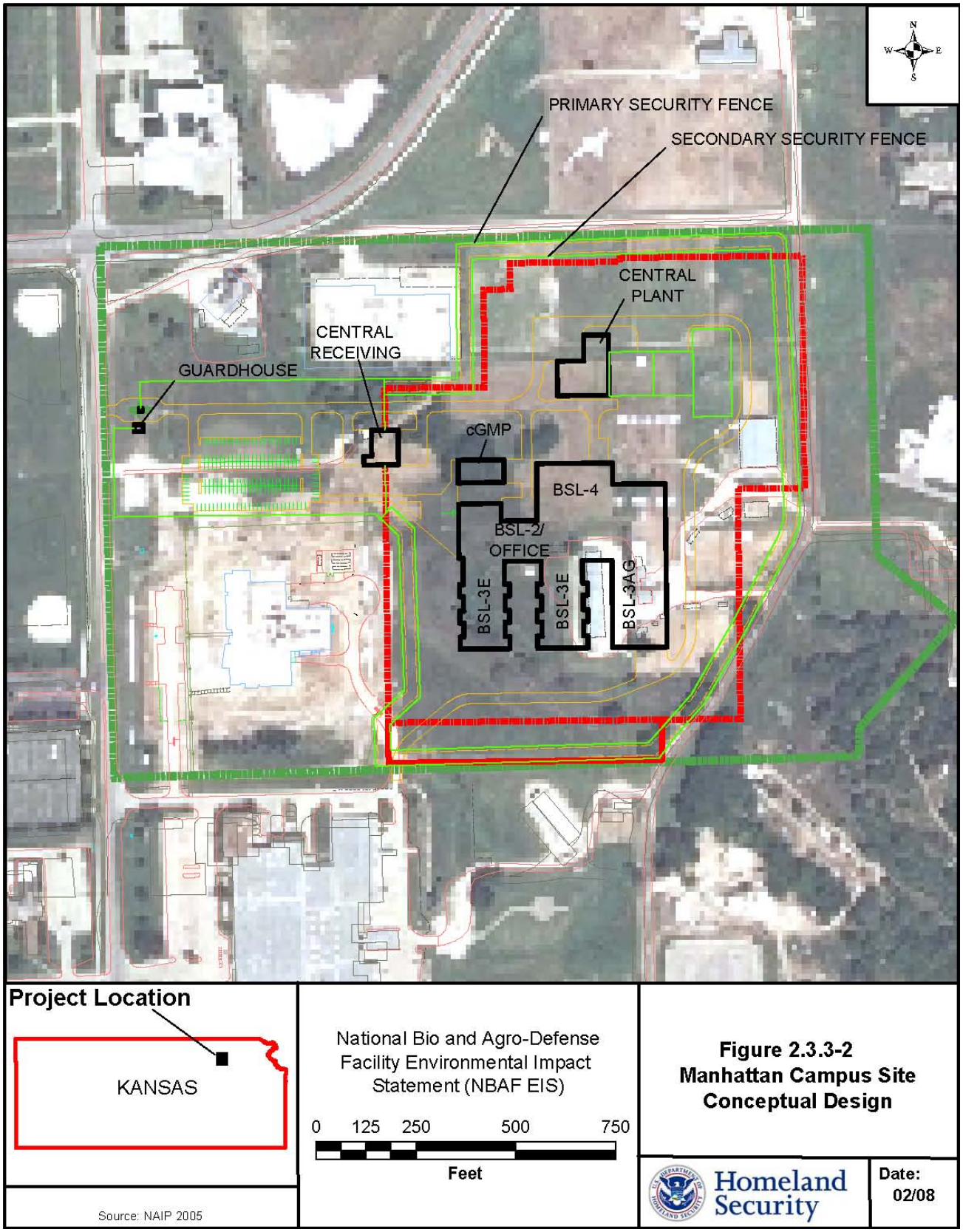


**Figure 2.3.3-2 — Manhattan Campus Site Conceptual Design**

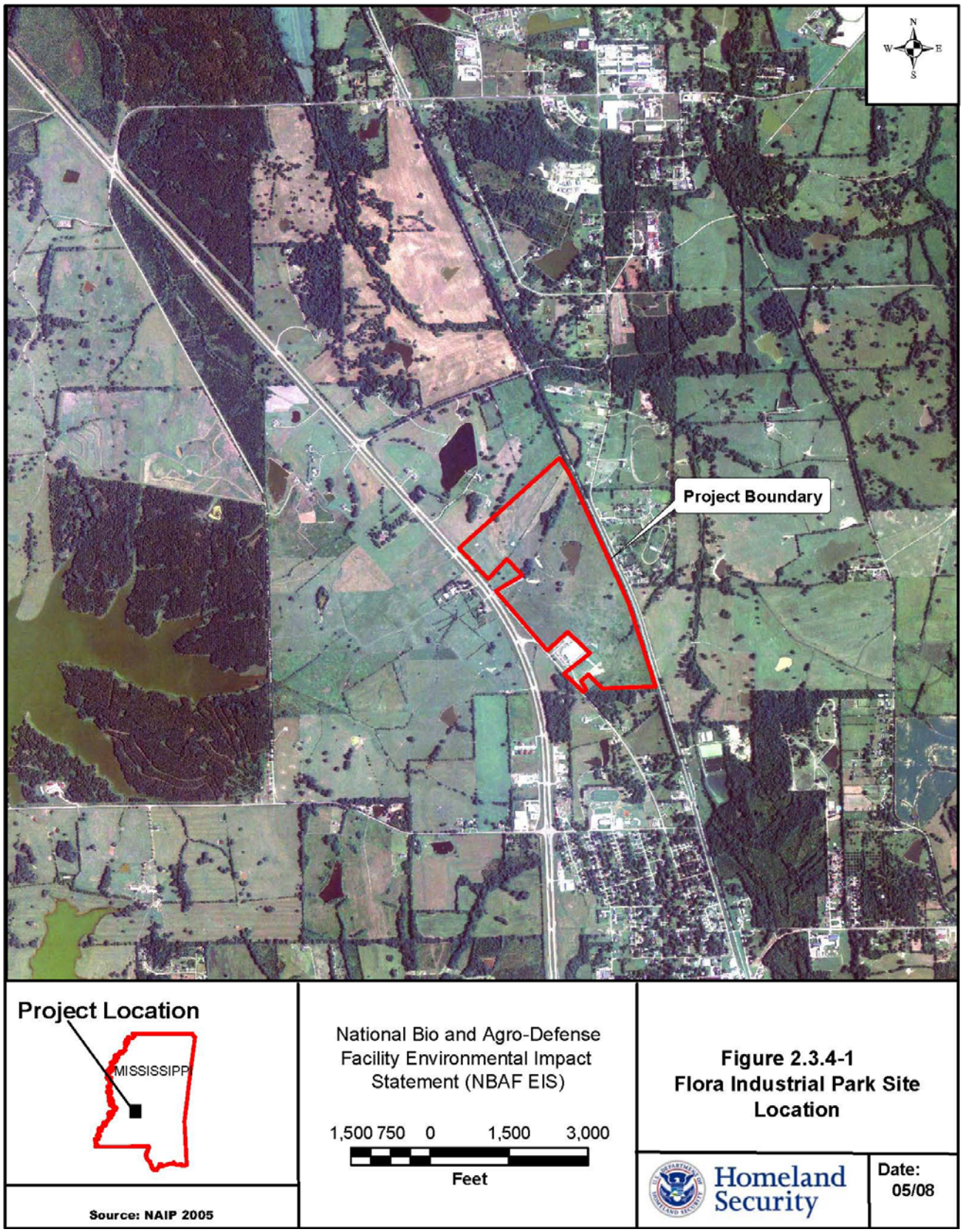


**Figure 2.3.4-1 — Flora Industrial Park Site Location**

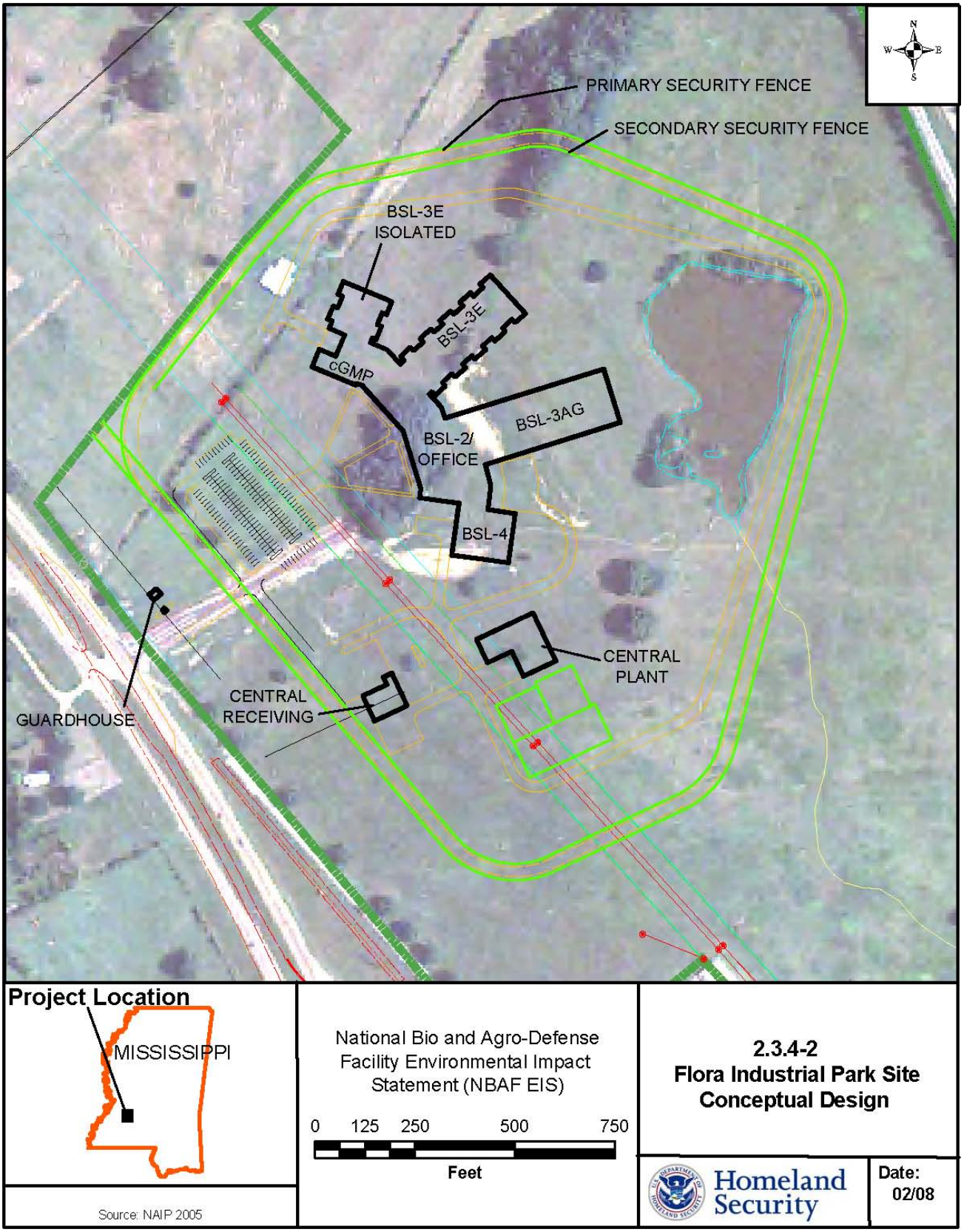


**Figure 2.3.4-2 — Flora Industrial Park Site Conceptual Design**

**Figure 2.3.5-1 — Plum Island Site Location**

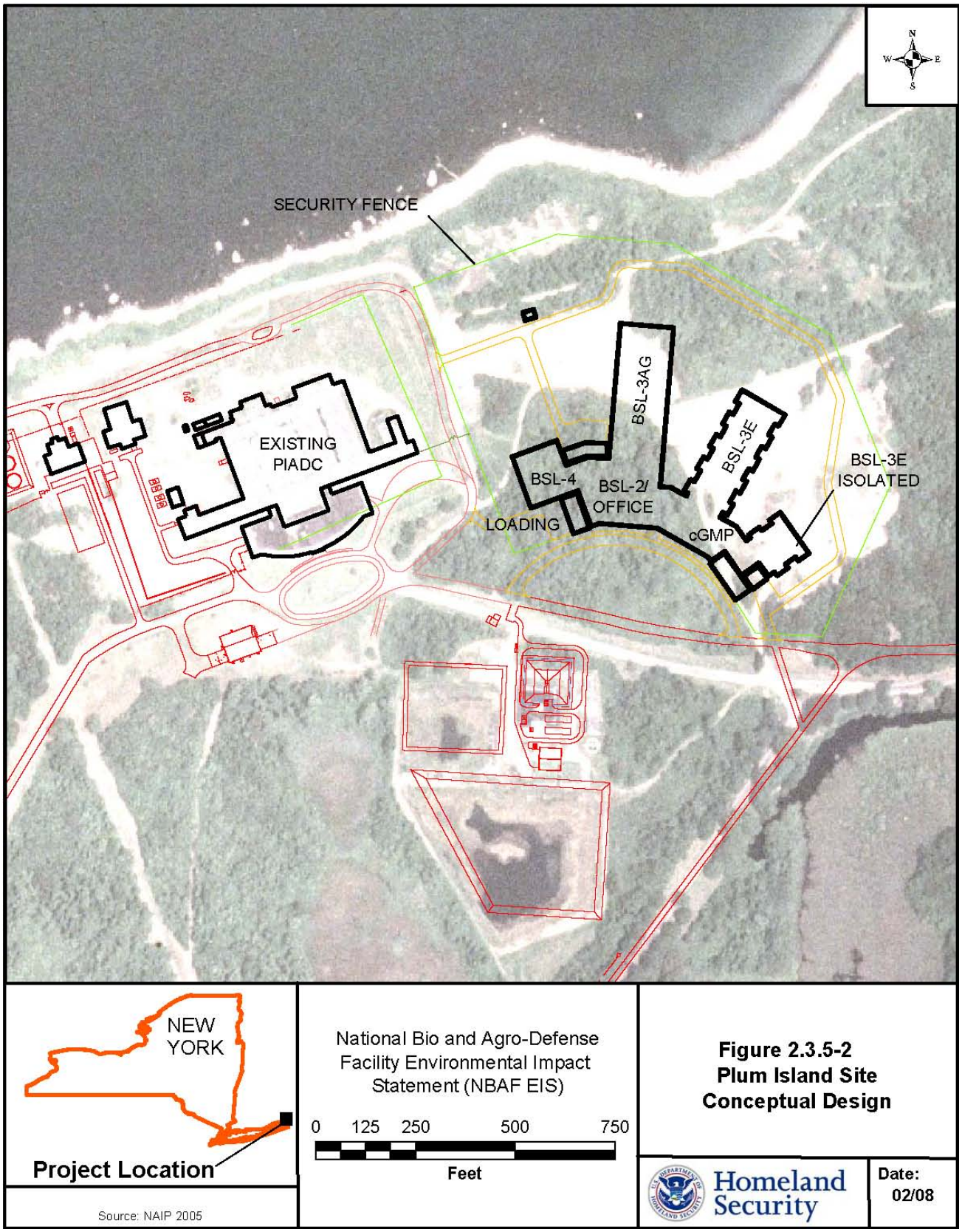


**Figure 2.3.5-2 — Plum Island Site Conceptual Design**

### 2.3.6 Umstead Research Farm Site; Butner, North Carolina

The Umstead Research Farm Site in Butner, North Carolina (Figure 2.3.6-1), is located north of the terminus of Dillon Drive along the northern property boundary of the C.A. Dillon Youth Development Center in Butner. The site is a 249-acre tract of pasture, grassland, and wooded land. The site is currently owned and operated by North Carolina State University as part of the North Carolina Department of Agriculture Umstead Research Farm and is zoned as institutional. The preliminary site design is shown in Figure 2.3.6-2. The site area was operated from early 1942 to June 1943 as part of Camp Butner, a training facility for light infantry and artillery during World War II. Other operations included ammunition storage, a redeployment center, and a general and convalescent hospital. The site has been undeveloped wooded land since at least 1940, except for one cemetery. The site has historically been maintained as undeveloped wooded land; however, in the fall of 2001, the site and surrounding area was partially logged.

### 2.3.7 Texas Research Park Site; San Antonio, Texas

The Texas Research Park Site in San Antonio, Texas, extends over the Bexar County line into a portion of Medina County (Figure 2.3.7-1). The 100.1-acre site is located west of Lambda Drive, south of the proposed extension of Omicron Drive, and is currently vacant, undeveloped land covered in dense vegetation comprised of trees, shrubs, and tall prairie grasses. The site appears to have consisted of vacant, undeveloped ranch land before 1938 to the present. The site has no zoning category because it is outside the San Antonio city limits. The preliminary site design is shown in Figure 2.3.7-2. The entire Texas Research Park property is a 1,000-acre industrial district 4 miles outside the San Antonio city limits.

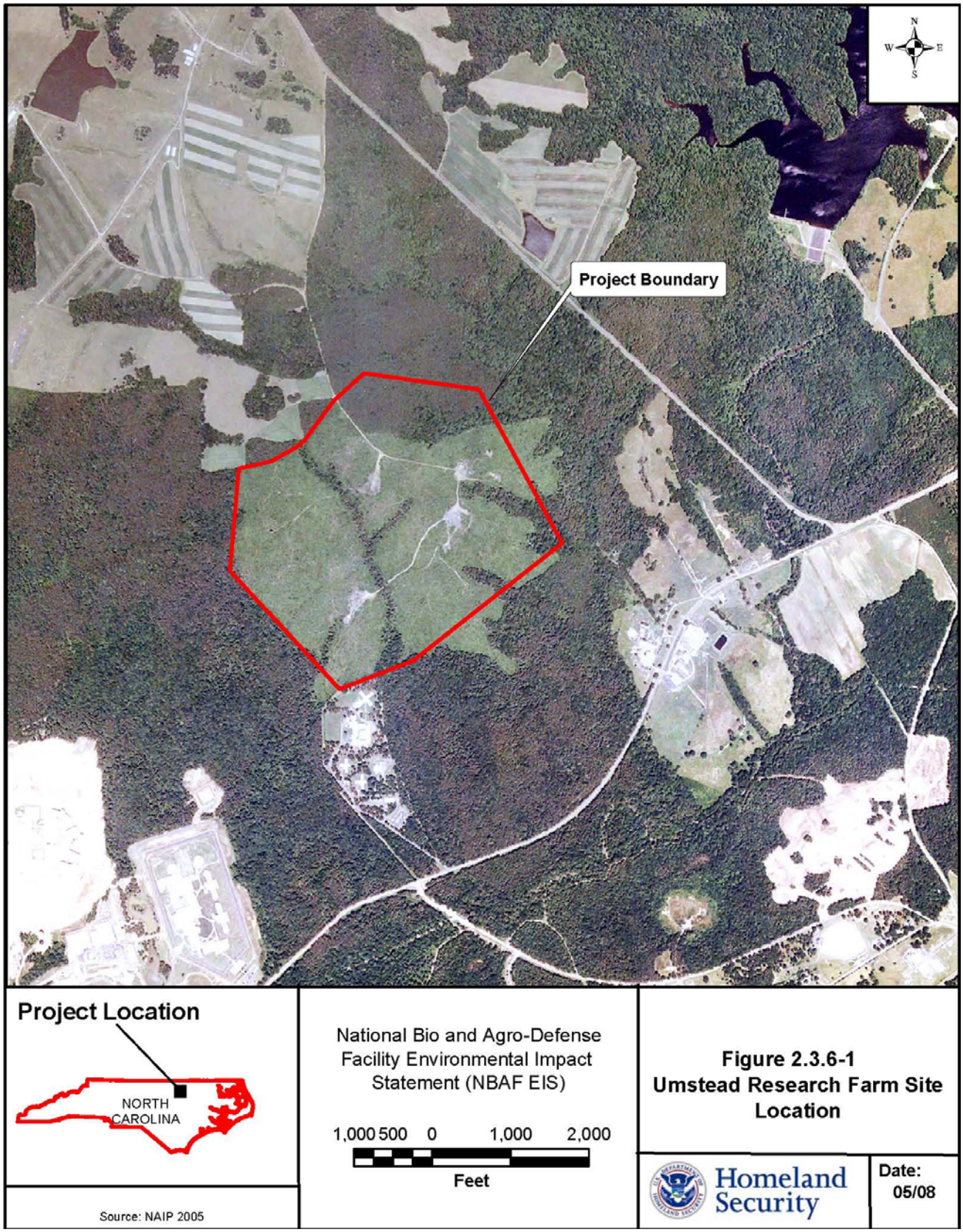


**Figure 2.3.6-1 — Umstead Research Farm Site Location**

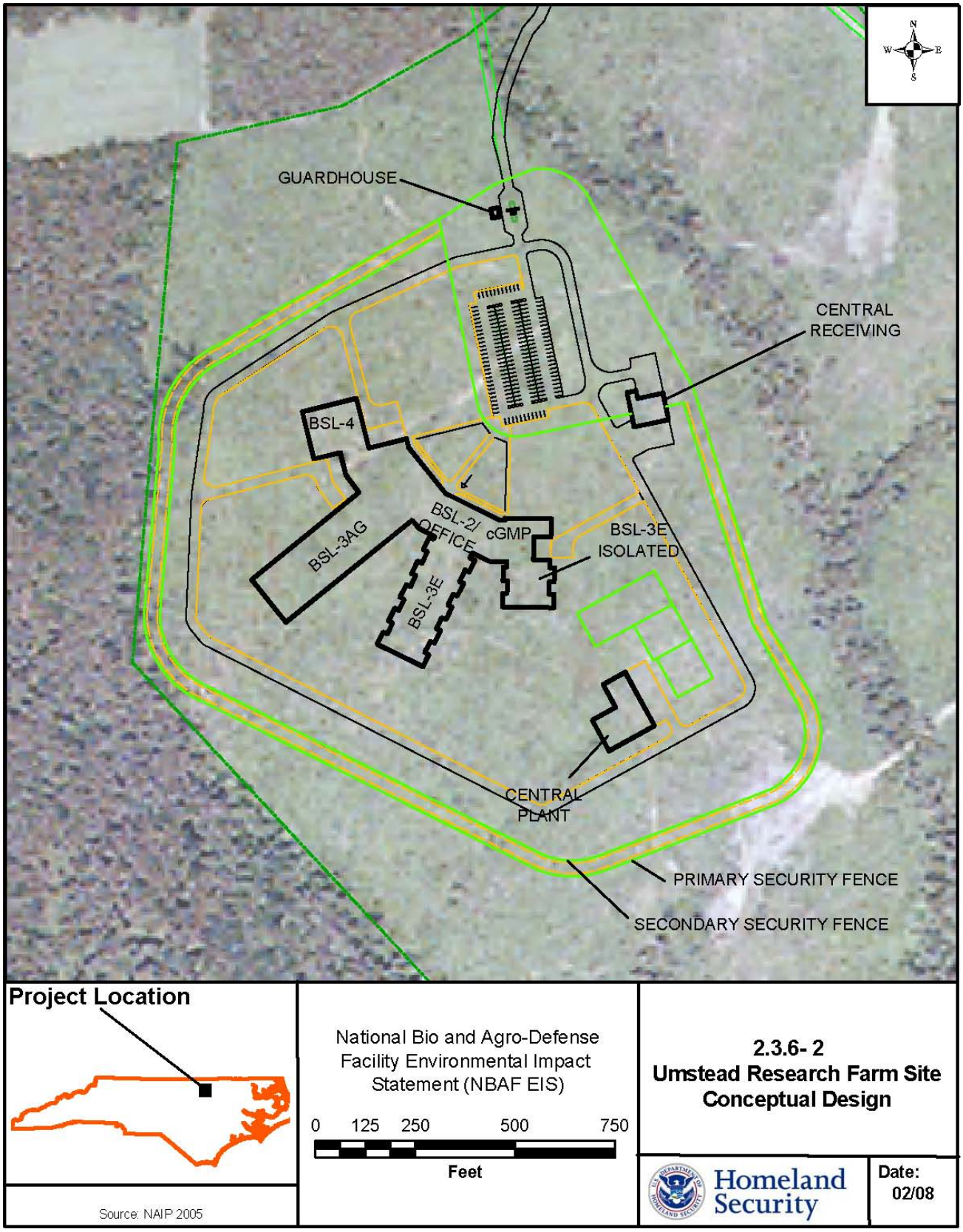


**Figure 2.3.6-2 — Umstead Research Farm Site Conceptual Design**

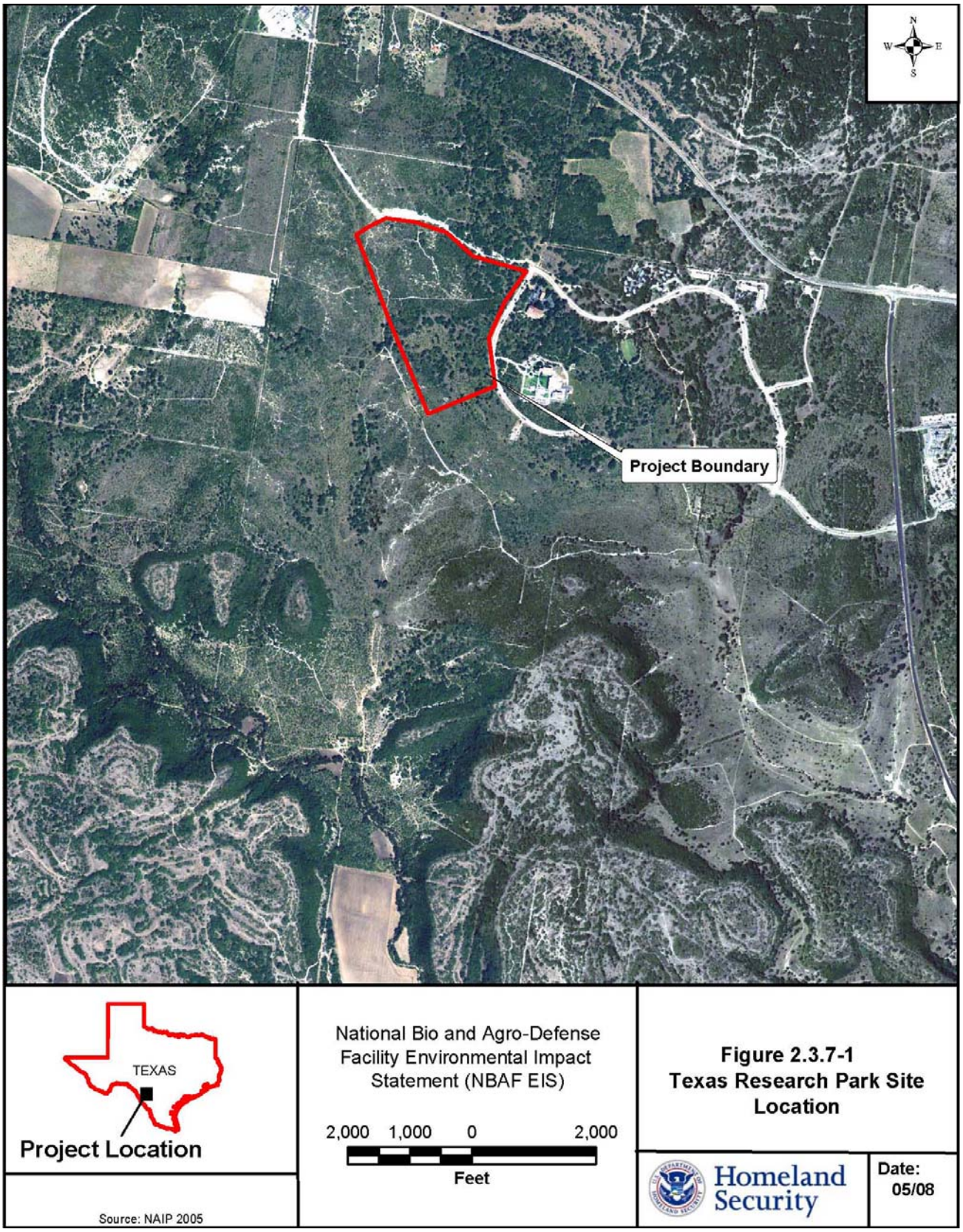


**Figure 2.3.7-1 — Texas Research Park Site Location**

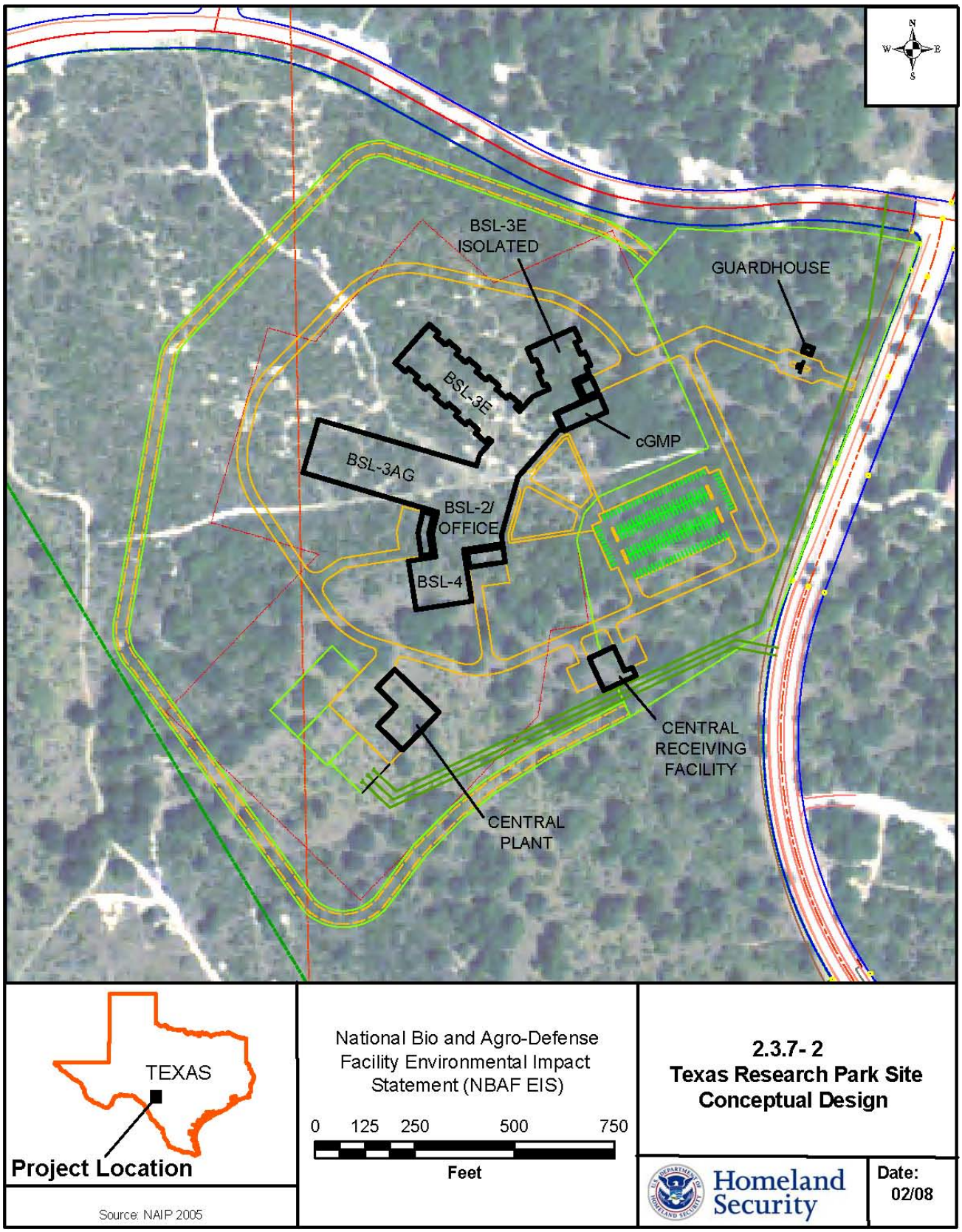


**Figure 2.3.7-2 — Texas Research Park Site Conceptual Design**

## 2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

During the preliminary stages of the NEPA process, DHS considered other potential alternatives and suggestions by the public during the scoping process. The following alternatives were considered but were determined not to be reasonable alternatives for evaluation in the DEIS.

### 2.4.1 Upgrading PIADC

The current PIADC does not meet the purpose and need as described in Chapter 1. PIADC does not have the required BSL-4 laboratory space, and the existing infrastructure is inadequate to support a BSL-4 facility. Upgrading and expanding the current PIADC to meet the NBAF requirements was initially considered for evaluation. A number of factors caused this alternative to be eliminated from further consideration: refurbishing the existing facilities and obsolete infrastructure to allow PIADC to meet the current mission would be more costly than building a new facility (NBAF) on Plum Island, so the cost of upgrading PIADC to meet the NBAF mission would be even greater; PIADC does not have the substantial amount of new research space that would be required, including space for a BSL-4 facility, which does not currently exist at PIADC. In addition, for the existing facility to be refurbished, current research activities might have to be suspended for extensive periods. These temporary shutdown periods would be counterproductive to the current PIADC mission and to the security of the United States. Therefore, PIADC does not meet the purpose and need of the Proposed Action. In light of these considerations, and because building a new facility at Plum Island was already one of the site alternatives being considered, continued evaluation of this alternative was eliminated.

### 2.4.2 Using Existing Laboratory Facilities

No existing U.S. facility could meet the mission needs determined by DHS and USDA. Although a number of BSL-3 and BSL-4 facilities are located in the United States, they do not have the capacity to conduct the research required to satisfy the NBAF mission needs. Similar facilities in Winnipeg, Canada, and Geelong, Australia, do not have the capacity to address the outbreak scenarios in the United States in a timely manner and could not guarantee their availability to meet U.S. research requirements.

### 2.4.3 Other Locations

As described in Section 2.2, other potential locations to construct the NBAF were considered during the site selection process but were eliminated based on evaluation by the selection committee. It was suggested during the scoping process that the NBAF be constructed in a remote location such as an island distant from populated areas or in a location that would be inhospitable (e.g., desert or arctic habitat) to escaped animal hosts/vectors; however, the evaluation criteria called for proximity to research programs that could be linked to the NBAF mission and proximity to a technical workforce (Section 2.2). The Plum Island Site is an isolated location as was suggested while still meeting the requirements listed in the EOI.

It was also suggested that the NBAF could be constructed beneath a mountain; however, the cost and feasibility of such a construction project would be prohibitive.

## 2.5 SUMMARY OF ENVIRONMENTAL IMPACTS AND COSTS

This section provides a brief summary of the alternative site evaluation process and presents a comparison of the effects of the alternatives on the various resources in a tabular format. The comparison also includes other site-specific information that may be of interest to the decision makers and general public.

A Site Cost Analysis was prepared to determine the full costs of constructing the NBAF at the alternative sites. The projected site specific costs included the following four major categories:

- Construction Estimate – This includes the construction budget, moveable scientific equipment budget, escalation, contingency, and fees.
- Systems Maintenance – This includes all maintenance related costs, both material and or contract costs, to support the NBAF.
- Utility Costs – This includes the anticipated utility consumption based on this preliminary program. These costs factor in each specific site's climate.
- Salaries – This includes all salaries related to the personnel that would be working within the NBAF compound.

### 2.5.1 Summary of Environmental Impacts by Resource

Table 2.5.1-1 presents the projected cost estimates for the various alternatives.

Table 2.5.1-2 presents a summary comparison of potential environmental impacts. A more detailed analysis is provided in Chapter 3. Environmental effects categories were applied to each resource for each site alternative and the No Action Alternative to provide a subjective comparison of the alternatives. Table 2.5.1-3 provides a description of the effect categories used for comparison in Table 2.5.1-4.

### 2.5.2 Mitigation Measures

Adverse effects to resources were minimized or eliminated through the site selection process and placement of the proposed NBAF within the boundaries of each alternative site. There would be little or no direct effects to wetlands, water resources, natural biotic communities, protected species, or cultural and archaeological resources with the Proposed Action. Management of stormwater runoff during both construction and operation of the NBAF and measures to eliminate or minimize the potential effects of spills or releases from the NBAF would mitigate potential secondary effects to resources. Section 3.15 provides a more detailed description of specific mitigation measures for the Proposed Action.

**Table 2.5.1-1 — Preliminary Costs of the NBAF Alternatives**

| Cost Category | South Milledge Avenue Site (dollars) | Manhattan Campus Site (dollars) | Flora Industrial Park Site (dollars) | Umstead Research Farm Site (dollars) | Plum Island Site (dollars) | Texas Research Park Site (dollars) |
|---|---|---|---|---|---|---|
| Construction Estimate | 525,846,429 | 563,009,934 | 497,998,475 | 523,711,811 | 752,474,897 | 501,734,260 |
| Maintenance[1] | 10,145,744 | 10,359,339 | 9,611,758 | 10,145,744 | 14,097,244 | 9,611,758 |
| Utilities[1] | 7,566,180 | 6,758,870 | 7,849,037 | 8,809,375 | 9,055,160 | 7,231,148 |
| Salaries[1] | 29,343,993 | 27,408,870 | 27,408,870 | 29,115,897 | 30,975,249 | 31,811,404 |

[1] The maintenance, utility, and salary costs represent an average annual cost taken from the estimates of these costs over the initial 8 years as projected in the site cost analysis.

**Table 2.5.1-2 — Comparison of Environmental Effects**

| Alternative | Effects |
|---|---|
| | Land Use and Visual Resources (Section 3.2) |
| No Action | No effects to land use or visual resources would occur. |
| South Milledge Avenue Site | Land use would be consistent with local land use and zoning classifications. Conversion of approximately 30 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school and would be a noticeable landscape feature, particularly to visitors and staff at the nearby botanical garden. Landscaping and appropriate architectural design features would reduce the visual effects. |
| Manhattan Campus Site | Land use would be consistent with local land use and zoning classifications. Conversion of approximately 30 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school and would be a noticeable landscape feature to nearby campus residential communities. Landscaping and appropriate architectural design features would reduce the visual effects. |
| Flora Industrial Park Site | Land use would be consistent with local land use and zoning classifications. Conversion of approximately 30 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Due to the rural nature of the site, long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school and would be a noticeable landscape feature. Landscaping and appropriate architectural design features would reduce the visual effects. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Plum Island Site | Land use would be consistent with local land use. Conversion of approximately 24 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school but would not be a highly noticeable landscape feature due to the adjacent PIADC and the isolated nature of the site. Landscaping and appropriate architectural design features would reduce the visual effects. |
| Umstead Research Farm Site | Land use would be consistent with local land use and zoning classifications. Conversion of approximately 30 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Due to the rural nature of the site, long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school and would be a noticeable landscape feature. Landscaping and appropriate architectural design features would reduce the visual effects. |
| Texas Research Park Site | Land use would be consistent with local land use and zoning classifications. Conversion of approximately 30 acres of open land to the NBAF would occur. No other land use effects are expected.<br><br>Visual effects would occur during construction activities but would be temporary. Long-term visual effects due to operation of the NBAF would occur. The NBAF would be similar in size to a 400-bed hospital or 1,600 student high school and would be a noticeable landscape feature. Landscaping and appropriate architectural design features would reduce the visual effects. |
| Infrastructure (Section 3.3) | |
| No Action | No effects to infrastructure would occur other than with previously authorized improvements. Infrastructure improvements would continue at PIADC to meet existing mission requirements. Wastewater decontamination, chilled water, and electrical distribution will be improved with the authorized renovations. |
| South Milledge Avenue Site | Potable Water. Operation would result in use of 43,000,000 gpy of potable water but can be met by current available capacity. Would require 1.3 miles of new 12” water line.<br>Electricity. Operations would require 12.8 MW from existing Georgia Power capacity. Connection to two existing substations would be required and would include <3 miles of new line per substation.<br>Fuels and Natural Gas. Operation would require 1,106,300 ccf of natural gas per year. It would require 2,900 feet of new 4” line. Fuel oil would be used when natural gas is not available.<br>Sanitary Sewer. Operation would result in an estimated 26,500,000 gpy of wastewater, but the NBAF would be designed and operated to prevent adverse effects to the ACC Middle Oconee WWTP capabilities.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Manhattan Campus Site | Potable Water. Operation would result in use of 37,750,000 gpy of potable water but can be met by currently available capacity and water lines.<br>Electricity. Operations would require 12.8 MW from existing Westar Energy's capacity of 3,082 MW. Connection to an existing substation and 1 mile of new line would be required.<br>Fuels and Natural Gas. Operation would require 1,410,000 ccf of natural gas per year. Fuel oil would be used when natural gas is not available.<br>Sanitary Sewer. Operation would result in an estimated 25,000,000 gpy of wastewater, and capacity would be met by a new WWTP being designed by the City of Manhattan.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |
| Flora Industrial Park Site | Potable Water. Operation would result in use of 48,150,000 gpy of potable water but can be met by currently available capacity and water lines.<br>Electricity. Operations would require 12.8 MW from existing Entergy Mississippi, Inc.'s capacity. A new planned substation to provide service to the region including the NBAF.<br>Fuels and Natural Gas. Operation would require 1,072,400 ccf of natural gas per year. Fifty feet of new connecting line under the railroad tracks would be required. Fuel oil would be used when natural gas is not available.<br>Sanitary Sewer. Operation would result in an estimated 28,250,000 gpy of wastewater and capacity would be met by the Flora WWTP. Approximately 1,600 feet of new sewer line would be required.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |
| Plum Island Site | Potable Water. Operation would result in use of 36,500,000 gpy of potable water but can be met with new groundwater wells and a new 200,000 gallon water tower.<br>Electricity. Operations would require 12.8 MW from existing LIPA capacity. Connection to an existing substation on the NY mainland would require two new submarine power lines to Plum Island.<br>Fuels and Natural Gas. Fuel oil would be the primary fuel source. The NBAF would use 1,600,000 gpy.<br>Sanitary Sewer. Operation would result in an estimated 23,000,000 gpy of wastewater, and capacity would be not be met by current WWTP capabilities. A new WWTP or modifications to the existing WWTP would be required.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |
| Umstead Research Farm Site | Potable Water. Operation would result in use of 39,500,000 gpy of potable water but can be met by currently available capacity. Would require 5,000 feet of new 8" water line.<br>Electricity. Operations would require 12.8 MW from existing Duke Energy capacity of 9,832 MW. Connection to an existing substation in Butner would be required and would include 3 miles of new line. Connection to a substation in Durham would require 17 miles of new line within existing right-of-ways.<br>Fuels and Natural Gas. Operation would require 1,193,300 ccf of natural gas per year. Would require 5,000 feet of new 4" line. Fuel oil would be used when natural gas is not available.<br>Sanitary Sewer. Operation would result in an estimated 25,250,000 gpy of wastewater, but the NBAF would be designed and operated to prevent adverse effects to the SGWASA Sewage Treatment Facility capabilities.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Texas Research Park Site | Potable Water. Operation would result in use of 51,750,000 gpy of potable water but can be met by currently available capacity and water lines.<br>Electricity. Operations would require 12.8 MW from existing CPS Energy's capacity of 5,468 MW. Connection to two existing substations and <0.5 miles of new line per substation would be required.<br>Fuels and Natural Gas. Operation would require 1,002,000 ccf of natural gas per year. Fuel oil would be used when natural gas is not available.<br>Sanitary Sewer. Operation would result in an estimated 29,250,000 gpy of wastewater and capacity would be met by the SAWS Medio Creek WRC, but 4.6 miles of new sanitary sewer line would be required.<br>Steam and Chilled Water. Steam requirements would be met by on-site boilers. Chilled water requirements would be met by on-site chillers. |
| Air Quality (Section 3.4) | |
| No Action | No effects to air quality would occur. Temporary effects would occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. |
| Manhattan Campus Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. |
| Flora Industrial Park Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. |
| Plum Island Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. In addition, since Suffolk County is a non-attainment area for ozone and $PM_{2.5}$ an air conformity analysis would be required prior to final authorization. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Umstead Research Farm Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. |
| Texas Research Park Site | Air quality effects would occur with construction and operation of the NBAF. Air emissions from construction activities would include construction traffic and equipment. Operation of the NBAF would result in air emissions from boilers, emergency generators, and traffic from employees and deliveries. Additional air emissions would occur from carcass and pathologic waste treatment and may include incineration, alkaline hydrolysis, or rendering. Preliminary assessments based on conservative estimates of air emissions indicate that operation of the NBAF would not likely affect regional air quality, although air permit requirements may require additional modeling once the final disposal methodology has been selected. In addition, since Bexar County is a non-attainment area for ozone, an air conformity analysis would be required prior to final authorization. |
| Noise (Section 3.5) | |
| No Action | No effects to noise would occur. Temporary increases in noise levels due to construction equipment would occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Temporary effects to noise levels may be experienced by the botanical garden and residents due to construction activities including construction-related traffic. Operation of the NBAF would result in minor increases in noise levels from employee traffic and heating and cooling facilities. However, operation of the emergency generators would result in sporadic noise increases during testing. |
| Manhattan Campus Site | Temporary effects to noise levels may be experienced by nearby institutions due to construction activities including construction-related traffic. However, given the highly developed surrounding area, the increase in noise levels would not be very noticeable. Operation of the NBAF would result in minor increases in noise levels from employee traffic and heating and cooling facilities. However, operation of the emergency generators would result in sporadic noise increases during testing. |
| Flora Industrial Park Site | Temporary effects to noise levels may be experienced by nearby institutions and residents due to construction activities including construction-related traffic. Operation of the NBAF would result in minor increases in noise levels from employee traffic and heating and cooling facilities. However, operation of the emergency generators would result in sporadic noise increases during testing. |
| Plum Island Site | Temporary effects to noise levels may be experienced by nearby PIADC employees due to construction activities including construction-related traffic. Operation of the NBAF would result in minor increases in noise levels from heating and cooling facilities. Operation of the emergency generators would result in sporadic noise increases during testing, but these already occur with the existing PIADC emergency generators. |
| Umstead Research Farm Site | Temporary effects to noise levels may be experienced by nearby institutions and residents due to construction activities including construction-related traffic. Operation of the NBAF would result in minor increases in noise levels from employee traffic and heating and cooling facilities. However, operation of the emergency generators would result in sporadic noise increases during testing. |
| Texas Research Park Site | Temporary effects to noise levels may be experienced by nearby institutions and residents due to construction activities including construction-related traffic. Operation of the NBAF would result in minor increases in noise levels from employee traffic and heating and cooling facilities. However, operation of the emergency generators would result in sporadic noise increases during testing. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| | Geology and Soils (Section 3.6) |
| No Action | No effects to geology or soils would occur. Temporary effects due to minor soil disturbances would occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |
| Manhattan Campus Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |
| Flora Industrial Park Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |
| Plum Island Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Umstead Research Farm Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |
| Texas Research Park Site | Design specifications of the NBAF would be according to appropriate seismic design criteria for the region, as well as for site-specific geological conditions.<br><br>Temporary effects to soils would occur due to excavation and clearing with construction activities. BMPs during construction would minimize any adverse effects. Potential effects to soils could occur with operation of the NBAF, but appropriate BMPs would eliminate or minimize the potential for adverse effects.<br><br>It is not anticipated that Prime or Unique Farmlands would be affected, although coordination with the NRCS is not complete. |
| Water Resources (Section 3.7) | |
| No Action | No effects to water resources would occur. Temporary effects are not likely to occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to stormwater pollution prevention plans (SWPPP) and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 118,000 gpd of potable water from surface water sources. Approximately 73,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |
| Manhattan Campus Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to SWPPP and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 118,000 gpd of potable water from groundwater sources. Approximately 68,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |
| Flora Industrial Park Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to SWPPP and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 132,000 gpd of potable water from groundwater sources. Approximately 77,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Plum Island Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to SWPPP and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 101,000 gpd of potable water from groundwater sources. Approximately 63,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |
| Umstead Research Farm Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to SWPPP and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 110,000 gpd of potable water from surface water sources. Approximately 70,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |
| Texas Research Park Site | Potential effects to water resources could occur with construction activities. Runoff from the construction site has the potential enter surface or groundwater sources, but BMPs during construction would minimize the potential for this to occur. Similar effects could occur with operation of the NBAF. Adherence to SWPPP and spill management protocols would minimize the potential and mitigate the effects of a potential spill. Operation of the NBAF would result in use of 164,000 gpd of potable water from groundwater sources. Approximately 80,000 gpd of treated sanitary waste would be discharged from the site but would be required to meet all discharge limits. No effects to floodplains would occur. |
| Biological Resources (Section 3.8) | |
| No Action | No effects to biological resources would occur. Temporary effects are not likely to occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 30 acres of disturbed vegetation and 0.2 acres of forested uplands would be removed. Wetlands (<0.5 acres) and associated buffer areas may be effected due to proposed road crossings. Threatened or endangered species, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |
| Manhattan Campus Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 30 acres of disturbed vegetation would be removed. Threatened or endangered species, wetlands, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |
| Flora Industrial Park Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 30 acres of disturbed vegetation would be removed. Threatened or endangered species, wetlands, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |
| Plum Island Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 24 acres of disturbed vegetation would be removed. Threatened or endangered species, wetlands, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Umstead Research Farm Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 30 acres of disturbed vegetation would be removed. Threatened or endangered species, wetlands, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |
| Texas Research Park Site | Effects to biological resources would occur from site clearing associated with construction of the NBAF. Approximately 30 acres of disturbed vegetation would be removed. Additional vegetation would be cleared with installation of 4.6 miles of new sewer line. Threatened or endangered species, wetlands, aquatic resources, and wildlife would not be directly affected by construction or normal operations. An accidental release of pathogens from the NBAF would adversely affect selected wildlife populations. Potential benefits to wildlife would occur from research on FADs at the NBAF. |
| Cultural Resources (Section 3.9) | |
| No Action | No effects to cultural resources would occur. |
| South Milledge Avenue Site | No known effects to cultural resources would occur with construction or operation of the NBAF. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Manhattan Campus Site | No known effects to cultural resources would occur with construction or operation of the NBAF. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Flora Industrial Park Site | No known effects to cultural resources would occur with construction or operation of the NBAF. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Plum Island Site | No known effects to cultural resources would occur with construction or operation of the NBAF, although coordination with the NY SHPO has not yet been completed. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Umstead Research Farm Site | No known effects to cultural resources would occur with construction or operation of the NBAF. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Texas Research Park Site | No known effects to cultural resources would occur with construction or operation of the NBAF. Consultation with state and federally recognized Native American Indian tribes has been initiated. |
| Socioeconomics (Section 3.10) | |
| No Action | No effects to employment, income, population, housing, or quality of life would occur. No disproportionate effects to low-income or minority populations would occur. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| South Milledge Avenue Site | Construction activities would result in 1,639 temporary jobs (661 direct jobs and 978 associated jobs) generating an estimated $150 million in labor income and $14.6 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $27 million annually (0.8% increase in Clarke County). An estimated $1.6 million in state and local taxes would be generated. Population growth due to the NBAF would be 4.9% of the estimated growth in the study area. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be negligible. Law enforcement and fire protection personnel would be adequately trained by DHS to respond to incidents at the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in Georgia and the area around the site are relatively small, resulting in less potential economic loss from an extreme FMD-related event than has been previously described. Response measures to contain and eliminate the threat would also greatly reduce the potential economic loss. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The warm climate and aquatic habitat suitable for arthropod vectors would increase the likelihood that the RVF would establish a sustainable reservoir. However, the risk of release remains very small.<br><br>The site is located in a census block group containing higher low-income populations than Clarke County. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations immediately adjacent to the site. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Manhattan Campus Site | Construction activities would result in 1,641 temporary jobs (679 direct jobs and 962 associated jobs) generating an estimated $138.2 million in labor income and $12.5 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $26.8 million annually (0.8% increase in the three-county region). An estimated $1.5 million in state and local taxes would be generated. Population growth due to the NBAF would be significant based on historic trends but would be small compared to increases expected with expansions at Fort Riley. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be negligible, although the Fort Riley expansion would require some investment in schools, law enforcement, fire protection, and medical facilities. Law enforcement and fire protection personnel would be adequately trained by DHS to respond to incidents at the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in southwestern Kansas and the area around the site are relatively small, resulting in less potential economic loss from an extreme FMD-related event than has been previously described. Response measures to contain and eliminate the threat would also greatly reduce the potential economic loss. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The climate at the site would not be hospitable to mosquito species to breed, and the likelihood that the RVF would establish a sustainable reservoir is low. In any case, the risk of release remains very small.<br><br>The site is located in a census block group containing slightly higher minority populations than Riley County. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations immediately adjacent to the site. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Flora Industrial Park Site | Construction activities would result in 1,685 temporary jobs (686 direct jobs and 999 associated jobs) generating an estimated $149.6 million in labor income and $14.4 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $28.4 million annually (0.3% of labor income in Madison County). An estimated $1.9 million in state and local taxes would be generated. Population growth due to the NBAF would be a small portion of the estimated growth in the study area based on historic trends. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be minimal, although some investment in these services may be required. Law enforcement and fire protection personnel would be adequately trained by DHS to respond to incidents at the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in Mississippi and the area around the site are relatively small, resulting in less potential economic loss from an extreme FMD-related event than has been previously described. Response measures to contain and eliminate the threat would also greatly reduce the potential economic loss. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The warm climate and aquatic habitat suitable for arthropod vectors would increase the likelihood that the RVF would establish a sustainable reservoir. However, the risk of release remains very small.<br><br>The site is located in a census block group containing higher low-income and minority populations than Madison County. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations immediately adjacent to the site. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Plum Island Site | Construction activities would result in 1,372 temporary jobs (528 direct jobs and 844 associated jobs) generating an estimated $183.9 million in labor income and $24.7 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $30.8 million annually (0.1% of labor income in the three-county region). An estimated $2.7 million in state and local taxes would be generated. Population growth due to the NBAF would be a small portion of the estimated growth in the study area based on historic trends. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be minimal, although some investment in these services may be required. Law enforcement and fire protection personnel are currently adequately trained by DHS to respond to incidents at the PIADC, and additional training may be required for the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in the counties adjacent to the proposed site are small, and Plum Island is virtually free of livestock populations and other animals potentially affected by FMD. The geographic isolation from the mainland significantly mitigates the risk of the virus reaching livestock populations. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The climate at the site would not be hospitable to mosquito species to breed, and the likelihood that the RVF would establish a sustainable reservoir is low. In any case, the risk of release remains very small.<br><br>The site is located in a census block group that does not contain higher low-income or minority populations than Suffolk County. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations near the Orient Point staging area. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Umstead Research Farm Site | Construction activities would result in 1,535 temporary jobs (612 direct jobs and 923 associated jobs) generating an estimated $162.1 million in labor income and $16.2 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $29.4 million annually (0.1% increase in the four-county region and 2.7% in Granville County). An estimated $1.9 million in state and local taxes would be generated. Population growth due to the NBAF would be a small portion of the estimated growth in the study area. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be negligible. Law enforcement and fire protection personnel would be adequately trained by DHS to respond to incidents at the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in North Carolina and the area around the site are relatively small, resulting in less potential economic loss from an extreme FMD-related event than has been previously described. Response measures to contain and eliminate the threat would also greatly reduce the potential economic loss. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The climate conditions during winter months would not be optimal for mosquito species to breed, and the likelihood that the RVF would establish a sustainable reservoir is low. In any case, the risk of release remains very small.<br><br>The site is located in a census block group that does not contain higher low-income or minority populations than Granville and Durham Counties. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations immediately adjacent to the site. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Texas Research Park Site | Construction activities would result in 1,614 temporary jobs (607 direct jobs and 1,007 associated jobs) generating an estimated $180.5 million in labor income and $13.6 million in state and local taxes. Population, housing, and quality of life would not be affected by construction.<br><br>Operation of the NBAF would result in 250-350 direct jobs and an estimated income of $30.4 million annually (<0.1% increase in the two-county region). An estimated $1.7 million in state and local taxes would be generated. Population growth due to the NBAF would be a very small portion of the estimated growth in the study area. The effect of the NBAF on the housing market and quality of life (schools, law enforcement, fire protection, medical facilities, recreation, and health and safety) would be negligible. Law enforcement and fire protection personnel would be adequately trained by DHS to respond to incidents at the NBAF.<br><br>The risk of an accidental release of a pathogen is extremely low (see Section 3.14), but the economic effect would be significant. The cattle and pork industries in the area around the site are relatively small, resulting in less potential economic loss from an extreme FMD-related event than has been previously described. Response measures to contain and eliminate the threat would also greatly reduce the potential economic loss. The potential economic loss would be significant due to zoonotic diseases that can affect human as well as animal populations. The warm climate suitable for arthropod vectors would increase the likelihood that the RVF would establish a sustainable reservoir. However, the risk of release remains very small.<br><br>The site is located in a census block group that does not contain higher low-income or minority populations than Bexar and Medina Counties. There are no long-term, high, adverse, and disproportionate effects which would occur to low-income or minority populations. Visual effects and traffic increases due to construction would be minimized with proper site management protocols. Potential traffic effects would be minimized by limiting road closures and rerouting traffic. Economic benefits would potentially occur to populations within the area due to construction-related jobs. Should a release of certain vector-borne pathogens occur, impacts such as aerial spraying of insecticide(s) could directly affect minority and low-income communities and other populations immediately adjacent to the site. |
| Traffic and Transportation (Section 3.11) | |
| No Action | No effects to traffic or transportation would occur. Temporary, minor increases from construction-related traffic would occur with construction activities associated with authorized infrastructure improvements. |
| South Milledge Avenue Site | Local traffic would be temporarily affected by general construction traffic.<br><br>Operation of the NBAF would result in a 9% increase in average daily traffic on South Milledge Avenue, which already experiences impaired traffic flow. The NBAF would result in adverse effects to traffic flow at the Whitehall Road and South Milledge Avenue intersection. GADOT recommended modifications to the intersection and a dedicated turn lane for the NBAF.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Manhattan Campus Site | Local traffic would be temporarily affected by general construction traffic.<br><br>Operation of the NBAF would result in an 8.7% increase in average daily traffic on Denison Avenue and would result in adverse effects to traffic flow on Denison, Anderson, and Kimball Avenues.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |
| Flora Industrial Park Site | Local traffic would be temporarily affected by general construction traffic.<br><br>Operation of the NBAF would result in a 6.7% increase in average daily traffic on Highway 49 and would result in minor adverse effects to traffic flow. A left turn lane and acceleration/deceleration lanes at the NBAF entrance were recommended.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |
| Plum Island Site | Traffic along Route 25 in NY and Highway 95 at Old Saybrook, CT would be temporarily affected by general construction traffic.<br><br>No substantial adverse effects to traffic due to operation of the NBAF would be expected.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |
| Umstead Research Farm Site | Local traffic would be temporarily affected by general construction traffic.<br><br>Operation of the NBAF would result in a 476% increase in average daily traffic on Range Road and Old Route 75, but current traffic on these roads is extremely low (2005 average daily traffic was 2.0 and 2.2 vehicles per day, respectively) and would not result in significant adverse effects to traffic flow, particularly with planned improvements to Range Road.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Texas Research Park Site | Local traffic would be temporarily affected by general construction traffic.<br><br>Operation of the NBAF would result in a 6.2% increase in average daily traffic on State Highway 211 and would result in minor adverse effects to traffic flow between Potranco Road and U.S. 90. Planned improvements to Potranco Road scheduled for completion in 2010 would minimize the effects. An emergency exit off Lambda Drive has been proposed to service the NBAF.<br><br>An increase in transportation of infectious material traffic would occur to and from the site but would not significantly increase the risk of a traffic-related incident. |
| Hazardous, Toxic, and Radiological Waste (Section 3.12) | |
| No Action | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| South Milledge Avenue Site | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| Manhattan Campus Site | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| Flora Industrial Park Site | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| Plum Island Site | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| Umstead Research Farm Site | No effects to existing hazardous, toxic, and radiological waste conditions are likely to occur. Recent investigations indicate the potential for unexploded ordnance is low, although institutional controls still remain on the site. Training for construction workers may be required prior to initiation of construction activities. |
| Texas Research Park Site | No effects to existing hazardous, toxic, and radiological waste conditions would occur. |
| Waste Management (Section 3.13) | |
| No Action | No effects to waste management would occur. However, wastewater decontamination will be improved with the authorized repair and upgrade of the wastewater decontamination system for Building 102. |
| South Milledge Avenue Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 73,000 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |
| Manhattan Campus Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 68,500 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Flora Industrial Park Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 77,400 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |
| Plum Island Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 63,000 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |
| Umstead Research Farm Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 70,000 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |
| Texas Research Park Site | Construction would generate construction debris, sanitary solid waste, and wastewater. Operation of the NBAF would result in generation of wastewater, waste solids, and medical, hazardous, and industrial solid wastes. An estimated 80,000 gpd of pretreated wastewater would be discharged to the municipal sewer system. The volume and characteristics of the waste stream would not exceed current or projected capacity or requirements. |
| Health and Safety (Section 3.14) | |
| No Action | No effects to health and safety would occur. However, the authorized renovations at PIADC will improve health and safety conditions at PIADC. |
| South Milledge Avenue Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. Because of the potential for easy spread of the disease via infected livestock, wildlife and vectors the overall site risk rank is designated moderate. |
| Manhattan Campus Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. Because of the potential for easy spread of the disease via infected livestock, wildlife and vectors the overall site risk rank is designated moderate. |
| Flora Industrial Park Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. Because of the potential for easy spread of the disease via infected livestock, wildlife and vectors the overall site risk rank is designated moderate. |

**Table 2.5.1-2 — Comparison of Environmental Effects (Continued)**

| Alternative | Effects |
|---|---|
| Plum Island Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. The location of the Plum Island provides a barrier against the spread of viruses. Given the low likelihood of infected animals or vectors getting off of the island, which substantially reduces the potential for the spread of disease, there is a no or low overall site risk rank. |
| Umstead Research Farm Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. Because of the potential for easy spread of the disease via infected livestock, wildlife and vectors the overall site risk rank is designated moderate. |
| Texas Research Park Site | The construction and operation of the NBAF would present the standard industrial hazards of slips, trips, falls, wounds, electrical hazards, chemical toxicity, fire hazards, and traumatic injuries. Equipment and facility systems would serve as primary and secondary barriers to the release of infectious biological materials while administrative controls would serve an important support function. The primary hazard of the NBAF operations is the pathogen and the consequences of its release. There are very few accident scenarios that would result in animal or human disease, the exceptions being an over-pressure event resulting in loss of containment and a facility fire, both of which present a moderate risk rank for distances close to the release. Because of the potential for easy spread of the disease via infected livestock, wildlife and vectors the overall site risk rank is designated moderate. |

**Table 2.5.1–3 — Environmental Effects Categories**

| Effect Category | | Definition |
|---|---|---|
| Beneficial Effects | Significant | An action that would greatly improve current conditions |
| | Moderate | An action that would moderately improve current conditions |
| | Minor | An action that would slightly improve current conditions |
| Negligible or No Effect | | An action that would neither improve nor degrade current conditions |
| Adverse Effects | Minor | An action that would slightly degrade current conditions |
| | Moderate | An action that would moderately degrade current conditions |
| | Significant | An action that would greatly degrade current conditions |

As shown in Table 2.5.1-4, the potential effects of the NBAF at the site alternatives are generally negligible to minor. There would be moderate effects to infrastructure, mainly due to the demand for water and wastewater capacity due to NBAF operations. Moderate air quality effects at the Plum Island Site and the Texas Research Park Site are due to their location in non-attainment areas. Moderate effects would occur to visual resources at the South Milledge Avenue Site, Manhattan Campus Site, Flora Industrial Park Site, and Umstead Research Farm Site and to traffic at the South Milledge Avenue Site and Texas Research Park Site.

Construction of the NBAF at any of the site alternatives would have potential beneficial effects to wildlife, socioeconomics, and health and safety. The work performed at the NBAF could result in development of vaccines or new diagnostic tools to protect or contain outbreaks of foreign animal diseases.

Significant Adverse Environmental Effects

No significant adverse effects to environmental or human resources would be expected from any of the alternatives with normal operation of the NBAF. Moderate effects that would occur would be to the following resources:

- Potable water – use of 36 million to 52 million gallons of potable water per year.
- Wastewater treatment capacity – generation of 25 million to 30 million gallons of wastewater per year.
- Visual Quality – visual prominence of the NBAF at four of the alternative site locations.
- Air Quality – Potential for air emissions to affect local air compliance plans in Suffolk County, New York and Bexar County, Texas.
- Traffic – Potential adverse traffic flow effects at the South Milledge Avenue Site and the Texas Research Park Site.

Significant beneficial effects to biological resources (wildlife), economics, and health and safety could occur with the development of new vaccines, diagnostic procedures, or rapid responses to potential FAD outbreaks.

**Table 2.5.1-4 — Summary of Environmental Effects**

| Resource | No Action | South Milledge Avenue Site | Manhattan Campus Site | Flora Industrial Park Site | Plum Island Site | Umstead Research Farm Site | Texas Research Park Site |
|---|---|---|---|---|---|---|---|
| Potential Adverse Effects from Normal Operations | | | | | | | |
| Land Use | None | Minor | Minor | Minor | Minor | Minor | Minor |
| Visual | None | Moderate | Moderate | Moderate | Minor | Moderate | Minor |
| Infrastructure | Minor | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate |
| Air Quality | Minor | Minor | Minor | Minor | Moderate | Minor | Moderate |
| Noise | Minor | Minor | Minor | Minor | Minor | Minor | Minor |
| Geology and Soils | Minor | Minor | Minor | Minor | Minor | Minor | Minor |
| Water | Minor | Minor | Minor | Minor | Minor | Minor | Minor |
| Biology | Negligible | Minor | Negligible | Negligible | Negligible | Minor | Negligible |
| Cultural | None | None | None | None | None | None | None |
| Socioeconomics | None | Minor | Minor | Minor | Minor | Minor | Minor |
| Traffic and Transportation | None | Moderate | Minor | Minor | Negligible | Minor | Moderate |
| Hazardous Waste | None | Negligible | Negligible | Negligible | Minor | Minor | Negligible |
| Waste Management | Minor | Minor | Minor | Minor | Minor | Minor | Minor |
| Health and Safety | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |
| Cumulative Effects | None | Minor | Minor | Moderate | Negligible | Minor | Moderate |
| Potential Beneficial Effects from Normal Operations | | | | | | | |
| Biology | None | Significant | Significant | Significant | Significant | Significant | Significant |
| Socioeconomics | None | Significant | Significant | Significant | Significant | Significant | Significant |
| Health and Safety | None | Significant | Significant | Significant | Significant | Significant | Significant |

## 2.6 PREFERRED ALTERNATIVE

DHS has not identified a Preferred Alternative at this point in the evaluation process. The evaluation conducted during the NEPA process and presented in this DEIS documents the potential effects of the various alternatives on the natural and human environments on a local, regional, and national scale. This evaluation will be used in conjunction with other factors to assist DHS in selecting the Preferred Alternative. Additional studies are being performed concurrently with this EIS that will provide important decision making information. Results of these studies along with agency and public input will be used in the development of the Final EIS and the ROD.

> A **Preferred Alternative** is the alternative that an agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. DHS will present its Preferred Alternative in the Final EIS.

The ROD will address the following:

- Whether or not to build the NBAF;
- Other factors involved in the decision as to whether and where the NBAF would be built, including considerations of national policy, lifecycle costs, site characterizations, security, and other programmatic considerations;
- If the decision is made to build the NBAF, where it will be built;
- How the site alternatives compare based on the environmental criteria studied; and
- Whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted and, if not, why, as well as any required mitigation, monitoring, and enforcement programs that would be necessary to offset any environmental impacts.

In making these decisions and formulating the ROD, the following reports will be considered:

- NBAF EIS,
- Threat Risk Assessment,
- Site Cost Analysis,
- Site Characterization Study, and
- Plum Island Facility Closure and Transition Cost Study.

The information contained in these reports will assist DHS and USDA, a consulting agency in this endeavor, in considering the protection of the public and the environment while meeting the need for a domestic, modern, high-security BSL-3Ag and BSL-4 research facility with the capabilities needed to address potential threats to our agriculture.