3.0 AFFECTED ENVIRONMENT AND CONSEQUENCES

3.1 INTRODUCTION

This chapter provides a description of the baseline conditions (the affected environment) associated with each resource category potentially affected by the alternatives, followed by the direct and indirect effects (the consequences) on the specific resource. Because the alternatives are sited at different locations throughout the United States, the affected environments are distinct for each project alternative. The consequences sections immediately follow the affected environment sections for each resource and site to assist the reader in connecting the environmental effects to the baseline conditions associated with each of the alternatives.

In this chapter, each major resource section (Sections 3.2 to 3.14) provides an analysis for each resource category potentially affected by the alternatives. The methodology used to conduct the evaluation is described, followed by an evaluation for each alternative. Mitigation Measures are described in Section 3.15. The final sections in this chapter describe Unavoidable Adverse Impacts (Section 3.16), the Relationship Between Short-Term Uses of the Environment and Long-Term Productivity (Section 3.17), and Summary of Significant Effects (Section 3.18).

This Draft Environmental Impact Statement (DEIS) evaluates the potential environmental impacts that could result from the site selection, construction, and operational impacts at six alternative sites for the National Bio- and Agro-Defense Facility (NBAF) and from the No Action Alternative. In preparing the DEIS, the Department of Homeland Security (DHS) specifically analyzed and considered public scoping comments received during the 60-day public scoping period (see Section 1.6). A sliding-scale approach was the basis for the analysis of potential environmental effects in this DEIS. This approach implements the Council on Environmental Quality's (CEQ's) regulations for implementing the *National Environmental Policy Act* (NEPA) and its instruction that federal agencies preparing EISs "focus on significant environmental issues and alternatives" (40 CFR 1502.1) and that impacts be discussed "in proportion to their significance" (40 CFR 1502.2(b)). That is, certain aspects of the alternatives have a greater potential for creating environmental effects than others. Therefore, they are discussed in greater detail than those aspects that have little potential for effect. For example, because the NBAF could affect human health, in-depth information is provided for an effective analysis. Conversely, the NBAF would have less affect on cultural resources, and as a result, there is limited discussion of effects on cultural resources. In implementing this approach, DHS adhered to CEQ's guidelines for determining significance as presented in 40 CFR 1508.27.

An environmental justice assessment was conducted to determine potential disproportionately high and adverse effects to minority or low-income populations (Louis Berger Group 2008). This evaluation is consistent with Executive Order 12898, which was issued on February 11, 1994 by the President of the United States and calls for Federal actions to address environmental justice in minority and low-income populations.

The environmental justice assessment recognizes the issues addressed in the Environmental Justice Guidance under NEPA (CEQ 1997), and uses the EPA Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (EPA 1998) as a guide.

An environmental justice assessment requires an analysis of whether minority and low-income populations (i.e., "the populations of concern") would be affected by a proposed federal action and whether they would experience adverse impacts from the proposed action at any of the site alternatives. If there are adverse impacts, the severity and proportionality of these impacts on populations of concern must be assessed in comparison to the larger non-minority or non-low-income populations. At issue is whether such adverse impacts fall disproportionately on minority and/or low-income members of the community and, if so, whether they meet the threshold of "disproportionately high and adverse." If disproportionately high and adverse effects are evident, then the EPA Guidance advises that it should trigger consideration of alternatives and mitigation actions in coordination with extensive community outreach efforts (EPA 1998).

The environmental justice analysis focused on the potential for disproportionately high and adverse impacts to minority and low-income populations during the construction and normal operation of the proposed NBAF. While the assessment identified the occurrence of minority or low-income populations within the region of influence of all of the alternative sites except for the Texas Research Park Site, no disproportionately high and adverse effects to environmental or human resources are evident with any of the alternatives.

CEQ regulations (40 CFR 1508.8) distinguish between direct and indirect effects. Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects (also referred to as secondary impacts) are reasonably foreseeable effects caused by the action that occur later in time or at a greater distance. For example, clearing a 1-acre lot would have a direct effect on the area being cleared such as loss of vegetation or any other resource on the site. Indirect effects could also occur, such as downstream sedimentation due to erosion once the site was cleared.

The evaluation also included potential impacts resulting from other separate activities that would not be related to the NBAF that, in combination with potential impacts from the Proposed Action, may cumulatively impact areas of concern. Cumulative impacts are impacts in the environment that result from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person that undertakes such other actions (40 CFR 1508.7). For this DEIS, the existing conditions of each alternative location as described in the affected environment sections reflect the cumulative effects of past and present actions. Potential cumulative impacts of facility operations were also evaluated using the sliding-scale approach, as previously described. At all sites, the nature of proposed activities of others are such that the cumulative effects on the following resources required further analysis: air quality, water resources, wastewater treatment capacity, and traffic. Cumulative impacts relative to the aforementioned resources, along with contributing reasonably foreseeable future actions, are discussed for each site location in the appropriate subsections of this chapter.

When details about a component of an alternative were incomplete or unknown, a determination was made if the detail is critical and would influence the effects analysis; if not, then no further action is necessary. However, if the incomplete or unknown details could influence the effects analysis, then a bounding analysis approach is used. The incidents analysis in this DEIS, which includes both accidents and deliberat acts uses a bounding analysis approach. A bounding analysis entails the use of reasonable maximum assumptions, such as potential effects to livestock from air emissions because of an accidental or deliberate release of biohazardous materials. When information to conduct a bounding analysis was not available or there was uncertainty in the analysis, that fact was acknowledged. CEQ regulations (40 CFR 1502.22 [51 FR 15625, Apr. 25, 1986]) state that when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and information is incomplete or unavailable, the agency shall always make clear that such information is lacking and:

> (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, then the agency shall include the information in the EIS.
>
> (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the EIS:
>
> 1. A statement that such information is incomplete or unavailable;
> 2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
> 3. A summary of existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
> 4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, it is not based on pure conjecture, and it is within the rule of reason.

3.1.1 Construction

As described in Section 2.1.1, the NBAF would be located on a site of no less than 30 acres. The site would include the NBAF, a current good manufacturing practice (cGMP) laboratory, a central receiving facility, a guard house, and a central utility plant (CUP). Section 2.1.1 also describes the need for utility and road improvements that were identified during development of the Site Characterization Study (NDP 2008). Since construction of the proposed NBAF is the sole reason for these improvements, their effects to the environment are included in this evaluation as connected actions. Table 3.1.1-1 provides a list of needed infrastructure to be constructed and road improvements for each alternative site for the proposed NBAF.

Construction activities would include site clearing, excavation, grading, and permanent loss of resources due to these actions. The evaluation of construction impacts includes the temporary effects that would occur during the 4-yr construction period. These effects may include construction traffic, potential erosion and runoff from the construction site, fugitive dust and emissions from vehicles and construction equipment, waste generated and disposed of during construction, economic benefit of construction jobs and expenditures, and power and water needs for construction.

3.1.2 Operations

Operation of the NBAF is described in Section 2.1.2, Operation of the proposed NBAF. Operational activities for the proposed NBAF include utility use (electricity, water, natural gas, and fuel oil); waste management and disposal (solid, sanitary, hazardous, pathologic, and radioactive wastes); employee traffic; operation of boilers, emergency generators, and incinerators; research and development; and storm water management. These activities could have diverse effects on environmental and human resources during both normal operating conditions and non-normal situations. Section 3.14, Health and Safety, provides a description of potential effects from operation of the NBAF under non-normal situations.

Table 3.1.1-1 — Infrastructure and Traffic Improvements Required for Construction and Operation of the Proposed NBAF

	South Milledge Avenue Site	Manhattan Campus Site	Flora Industrial Park Site	Plum Island Site	Umstead Research Park Site	Texas Research Park Site
Potable Water	1.3 miles of new 12" line buried along South Milledge Ave in existing right-of-ways to intersection of Riverbend Road	None	None	New groundwater wells and a new 200,000 gallon water tower would be required	5,000 feet of new buried 8" water line from Old Route 75 north along the ditch adjacent to Dillon Drive to NBAF site	None
Electricity	<3.0 miles of new line from each of two existing substations to NBAF site within existing right-of-ways	1 mile of new line from second existing substation to NBAF site within existing right-of-ways	None	Two new cables from LIPA on Long Island at Point Orient or from CL&P in Connecticut to Plum Island from independent substations	3 miles of new line from substation in Butner to NBAF site within existing right-of-ways, 17 miles of new line from substation in Durham to NBAF site within existing right-of-ways	<0.5 mile of new line from each of the two existing substations to NBAF site within existing right-of-ways adjacent to Lambda Drive
Natural Gas	2,900 feet of new 4" high-pressure gas line in existing right-of-way along South Milledge Ave.	None	50 feet of line under railroad tracks to connect to existing gas line	None	5,000 feet of new buried 4" natural gas line from Old Route 75north along the ditch adjacent to Dillon Drive to NBAF site	None
Sanitary Sewer	<5,286 feet of new 12” sewer line along South Milledge Ave. to WWTP inlet piping	None	1,600 feet of new sewer line	1,000 feet of new sewer line from NBAF to modified WWTP or new WWTP	6,500 feet of new sanitary sewage line from the NBAF site to a 36" gravity trunk wastewater main located south of Old Route 75 north along the ditch adjacent to Dillon Drive	4.6 miles of new sanitary sewage line from the NBAF site to tie into an existing 27" gravity trunk wastewater main located to the southeast, north of Hwy. 90 and east of SR 211
Roadways	None	None	Left turn lane (south-bound Hwy. 49) and acceleration/ deceleration lanes at NBAF entrance	None	4,100 feet of entrance road to connect site to Range Road (SR 1121), acceleration/ deceleration lanes on Range Road at NBAF entrance	Emergency exit off of Lambda Drive

3.2 LAND USE AND VISUAL RESOURCES

3.2.1 Methodology

3.2.1.1 Land Use

Several sources were consulted to determine land uses at the six alternative sites. These include the National Land Cover Database (NLCD), local land use maps, technical reports, aerial photography, and site visits. Local zoning ordinances and regulations were also reviewed. Potential changes in land use were identified for each alternative site. Effects were identified based on changes in land use and determinations of compatibility among land uses reasonably anticipated to occur as a result of the proposed action and adjacent land uses. In addition, compatibility with management plans, policies, and practices was discussed.

3.2.1.2 Visual Resources

The methodology used to assess visual resources and impacts generally conforms to the Visual Management System (VMS) developed by the U.S. Forest Service. Topography, vegetation (size and shape), and developed land uses were considered in the assessment, along with the visibility of changes from sensitive viewpoints.

Visual quality is described as the visual patterns created by the combination of rural character landscapes and industrial and man-made features. There are three criteria for evaluating visual quality: vividness; integrity; and unity. Vividness can be defined as the visual power or memorability of landscape components as they combine in distinctive visual patterns. Integrity is the visual collection of the natural and man-made landscape and its freedom from encroaching elements. Visual unity can be described as the degree of visual coherence and compositional harmony of the landscape considered as a whole. Levels of visual impact were documented as low, moderate, or high.

Visual quality was evaluated using the following descriptions:

- Urban/Industrial – The landscape is common to urban areas and urban/industrial fringes. Human elements are prevalent or landscape modifications exist, which do not compatibly blend with the natural surroundings (low visual intactness and unity).
- Rural – The landscape exhibits reasonably attractive natural and human-made features/patterns, although they are not visually distinctive or unusual within the region. The landscape integrity of the area provides some positive visual experiences such as the presence of natural open space dispersed with existing agricultural areas (farm fields, etc.) or well-maintained, landscaped urban areas.
- Unique/Distinctive – The landscape exhibits distinctive and memorable visual features (landform, rock outcrops, etc.) and patterns (vegetation/open space) that are largely undisturbed—usually in a rural or open space setting. Few, if any, man-made developments are present.

Viewer sensitivity is dependent on viewer types, exposure (number of viewers and viewer frequency), viewer orientation, view duration, and viewer awareness to visual changes. Levels of viewer sensitivity were evaluated using the following criteria:

- Low – Viewer types deemed to have low visual sensitivity include mainly indoor workers. Compared with other viewer types, the number of viewers is generally considered small and the duration of view is short. Viewer activities typically limit awareness/sensitivity to the visual setting immediately outside the workplace. Landscaping or adjacent buildings are seen by screen views.
- Moderate – Viewer types deemed to have moderate visual sensitivity include highway and local travelers. The number of viewers varies depending on location but tends to be relatively large based on overall densities of surrounding areas and the resulting volume of highway commuters. Viewer awareness/sensitivity is also considered moderate because destination travelers often have a focused orientation.

High – Residential and recreational viewers, as well as viewers congregating in public gathering places (churches, schools, etc.), are considered to have comparatively high visual sensitivity. The visual setting may in part contribute to specific building orientation or the enjoyment of the experience. Views may be of long duration and frequency. In some cases, views may contribute to property value.

3.2.2 No Action Alternative

3.2.2.1 Affected Environment

3.2.2.1.1 Land Use

Under the No Action Alternative, the NBAF would not be constructed and the existing Plum Island Animal Disease Center (PIADC), located on Plum Island, would continue operation. Plum Island, approximately 840 acres in size, is located 12 miles southwest of New London, Connecticut, and 1.5 miles off the northeast tip of Long Island, New York (i.e., Orient Point). Plum Gut separates Plum Island and Orient Point. The island is self-contained and has its own potable well water, water treatment plant, wastewater treatment facility, emergency power generators, fuel storage areas, and electrical substation. These facilities all support PIADC, the only facility on the island. Access to the island is provided by government ferries but only for the government employees, contractors, and approved visitors. Government-operated ferry services run between Orient Point, New York, and Old Saybrook, Connecticut. The Cross Sound Ferry runs between New London, Connecticut, and Plum Island, New York (Telemus 2007).

Plum Island is part of Suffolk County, New York, which occupies the easternmost portion of Long Island in the southeastern portion of New York State. The county is surrounded by water on three sides, including the Atlantic Ocean and Long Island Sound. Suffolk County is divided into 10 towns, 1 of which is Southold. Since June 2003, DHS has assumed the administration of Plum Island and plays an integral role in its security.

Land use controls for the site include the Federal Government General Services regulations for federally owned property and New York and U.S. regulations regarding environmental issues. Because Plum Island is owned by the federal government, it is not zoned by Suffolk County or the Town of Southold (Telemus 2007).

Land cover on the island is shown in Figure 3.2.2.1.1-1 and consists of

- Deciduous forest (35%)
- Barren land (17%)
- Grassland (15%)
- Herbaceous wetlands (14%)
- Woody wetlands (12%)
- Scrub land (5%)
- Open water (2%) (NCLD 2001)

3.2.2.1.2 Visual Resources

Overall, visual quality of the Plum Island landscape is classified as rural in character. The topography is slightly hilly, generally sloping to the south-southwest. The landscape integrity is high; because the site is isolated, the landscape is free from encroaching elements. The island itself is a notable visual feature of Plum Island Sound.

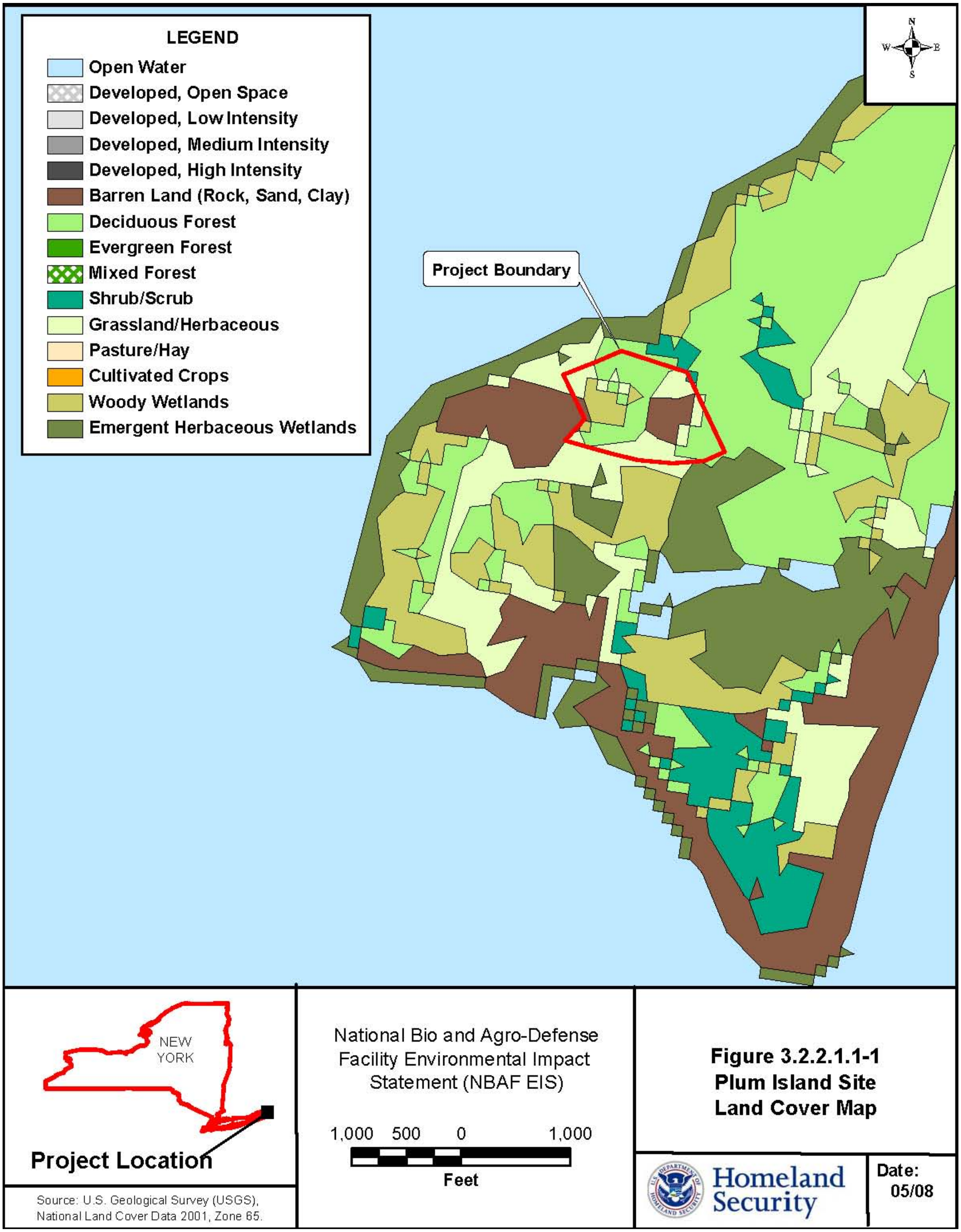

Figure 3.2.2.1.1-1 — Plum Island Existing Land Cover Map

There are few sensitive viewers to Plum Island or PIADC. The only on-site viewers are the employees of PIADC and occasional visitors. The structures that comprise PIADC are primarily visible by marine travelers, including ferry passengers and recreational boaters. Motorists, pedestrians, and residents at Orient Point, at least 1.5 miles away, also have views of Plum Island, but at this distance, PIADC is indistinct.

3.2.2.2 Construction/Operation Consequences

Neither land use nor visual resources would be affected under the No Action Alternative. The existing conditions would remain the same.

3.2.3 South Milledge Avenue Site

3.2.3.1 Affected Environment

3.2.3.1.1 Land Use

The proposed NBAF would be located on the 67-acre South Milledge Avenue Site west of the South Milledge Avenue/Whitehall Road intersection in Clarke County, Georgia. The site is part of the University of Georgia Whitehall Farm and is located near the University of Georgia Livestock Instructional Arena. It is currently undeveloped pastureland utilized by the University of Georgia Equestrian Team (Geo-Hydro Engineers 2007). There are no adjacent neighborhoods. Land cover types at the site are shown in Figure 3.2.3.1.1-1 and include the following:

- Pasture (72%)
- Deciduous forest (26%)
- Grassland (2%)

The proposed NBAF South Milledge Avenue Site is zoned government use. Land use controls for Clarke County include the Clarke County Zoning Ordinance and the Athens-Clarke County Comprehensive Plan of 2001 (ACC 2005). The Athens-Clarke County Comprehensive Plan establishes land planning objectives, goals, and implementation plans. The main objective for developed areas is to focus on the stabilization and revitalization of residential, commercial, and industrial areas. Additional objectives of the plan include development of the under-utilized West End in a responsible manner within city, state, and federal guidelines.

The title to the property is vested in the University System of Georgia Board of Regents, which would deed the property to the federal government if the site is selected for construction of the NBAF.

3.2.3.1.2 Visual Resources

The South Milledge Avenue Site is in a portion of Clarke County that has been primarily agricultural, light industrial, and government owned over the last 98 years (Geo-Hydro Engineers 2007). Overall, visual quality of the regional landscape is classified as rural in character. The natural and agricultural landscape features and patterns are typical within the region. The topography of the site is rolling terrain, with much of the site on a hilltop. Visual sensitivity is low because the site is located in a predominantly rural environment, with few individuals observing the site on a regular basis. However, limited vegetation screening exists and topography at the site causes high visibility to viewers and travelers.

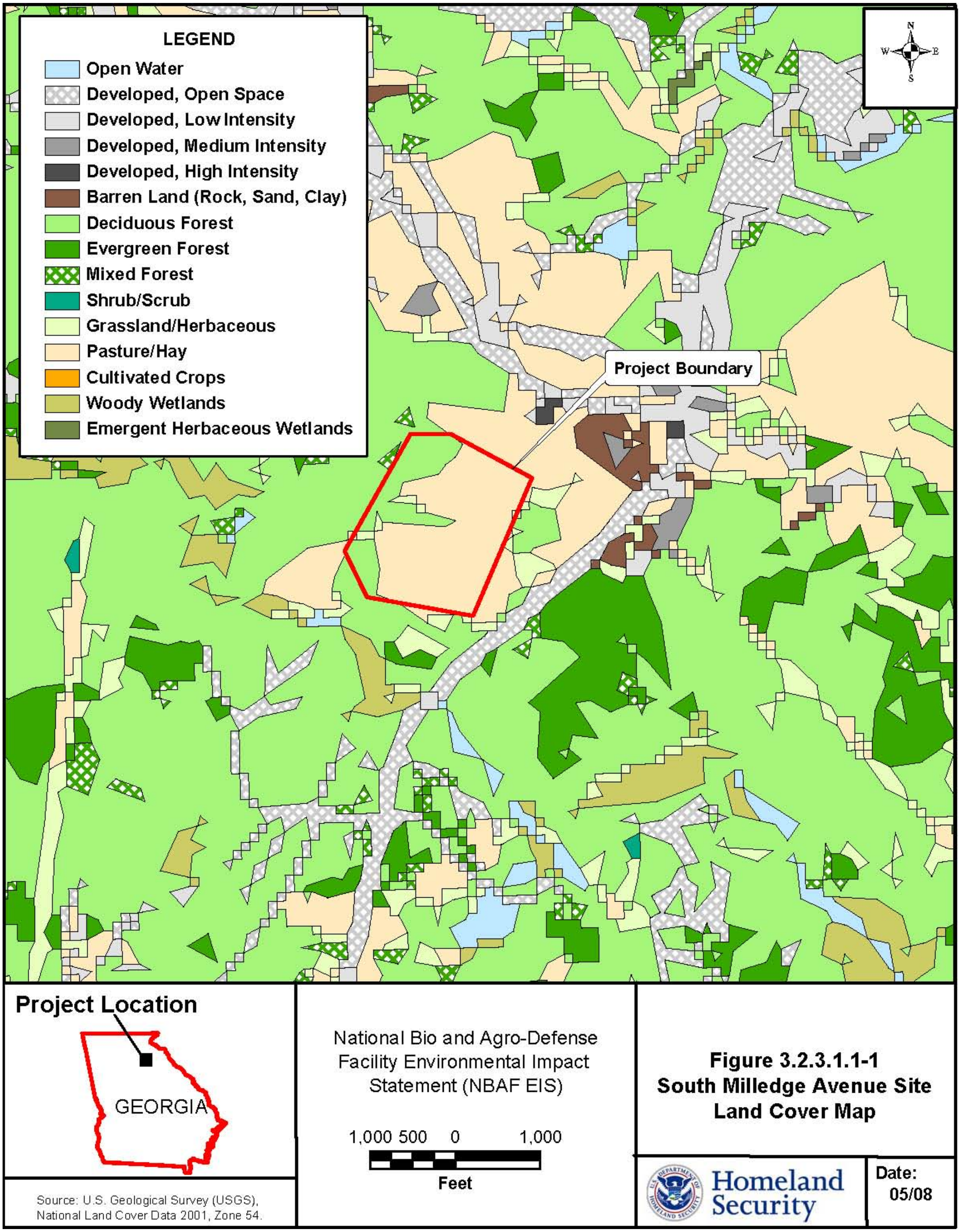

Figure 3.2.3.1.1-1 — South Milledge Avenue Site Land Cover Map

Sensitive visual receptors in the vicinity of the South Milledge Avenue Site include patrons and employees of the University of Georgia State Botanical Gardens, located approximately 0.5 miles northwest of the proposed NBAF site, and the University of Georgia School of Forestry, within 0.5 miles east of the site (Figure 3.2.3.1.2-1). Schools near the site include Timothy Road Elementary, located approximately 3 miles east of the site, and the Seventh Day Adventist School, approximately 2 miles from the site (ACC 2007a). There are no sensitive residential receptors near the proposed site.

3.2.3.2 Construction Consequences

3.2.3.2.1 Land Use

Approximately 30 acres of the 67-acre proposed NBAF site would be disturbed during construction and would be an irretrievable and irreversable use of land. Additional acreage would be affected for temporary construction areas. The size of the construction laydown area has not been determined at this time. Land use would change as a result of NBAF construction. The existing pasture, grassland, and forested land would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.3.2.2 Visual Resources

Construction activities would disturb approximately 30 acres, plus additional acreage for temporary construction areas. During construction of the NBAF at the South Milledge Avenue Site, viewers would observe site grading and related construction activities, which would include the stripping of grass and removal of trees and other vegetation. There would be heavy equipment vehicles conducting earthwork activities on the NBAF site during the 4-yr construction period, as well as light- and medium-weight vehicles going to and from the site. Deliveries of soil, backfill, and building materials would be expected on a daily basis. Fencing and screening of the construction site would curtail sight visibility.

In general, visual impacts to the overall landscape setting resulting from construction of the NBAF would be high. Viewers would observe earthwork equipment, construction trailers, building construction, and cranes. A temporary security fence to prevent trespassing and control traffic entering and leaving the NBAF site would also serve to provide some visual screening of the construction area.

3.2.3.3 Operation Consequences

3.2.3.3.1 Land Use

The operation of the proposed NBAF would be consistent with the current land use patterns and the government zoning designation. There would not be an alteration of current land use designations and planning as a result of operation of the proposed NBAF, although a change in land use would occur from existing pasture to a developed, government research facility. The NBAF would not affect other governmental uses near the South Milledge Avenue Site, such as the University of Georgia Livestock Arena, School of Forestry, or the Botanic Gardens. Overall, land use impacts due to operation of the NBAF would be minor.

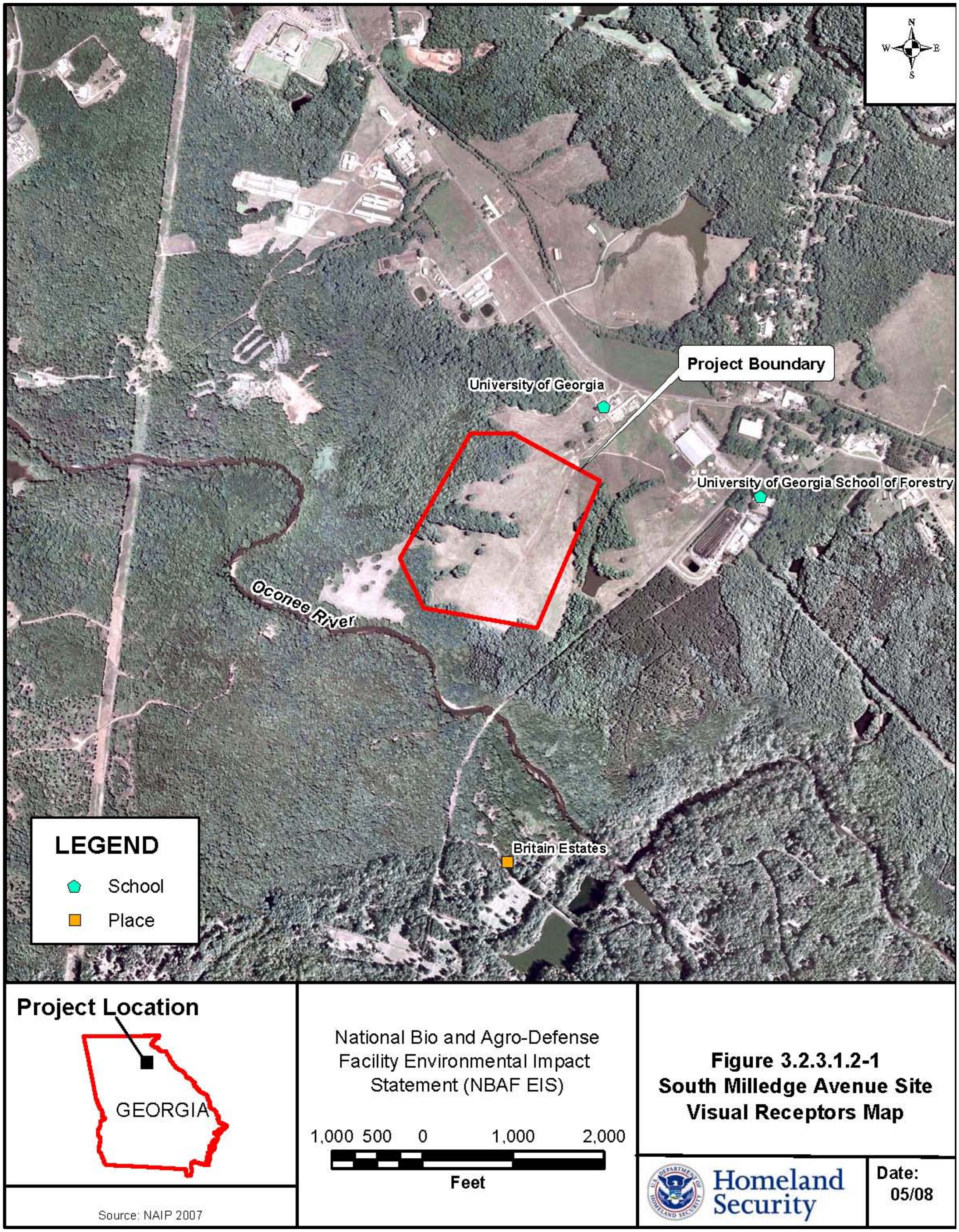

Figure 3.2.3.1.2-1 — South Milledge Avenue Site Visual Receptors Map

3.2.3.3.2 Visual Resources

Visual impacts from the proposed NBAF would be high. The main building would be prominent in the viewshed due to its position on a hilltop. It would be similar in size to a 400-bed hospital or a 1,600 student high school. Although portions of the main building would be underground, the heights of project components have not been finalized at this time but could be up to 90 feet high (NDP 2007a). Other ancillary elements that would likely be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. A proposed upgrade to the municipal potable water system includes the installation of a dedicated, on-site 200,000 gallon elevated water tank at the South Milledge Avenue Site that would be a prominent visible feature. The entire facility would be surrounded by a security fence, which itself would be a highly visible element.

Additional visual impacts would occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence.

The proposed NBAF would be visible to travelers on South Milledge Avenue and East Whitehall Road. Due to the facility's topographical prominence on the landscape, visual effects would be sustained. It would also be visible from other viewpoints such as the Botanic Gardens and nearby University of Georgia facilities.

The visual impact could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas. However, vegetative screening would not be used along the fence for security purposes. Additional design features that could help ameliorate visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.2.4 Manhattan Campus Site

3.2.4.1 Affected Environment

3.2.4.1.1 Land Use

The proposed NBAF would be located on a 48.4-acre parcel of land on the north end of the Kansas State University (KSU) in Manhattan, Riley County, and entirely surrounded by KSU property. The proposed NBAF site would be deeded to DHS if the site is selected for construction. Kansas legislature has passed a bill authorizing the transfer.

The proposed NBAF would be located in a governmentally zoned area (zoning designation "U" for University) characterized by research and development land and facilities. Currently, the proposed Manhattan Campus Site consists of two dog and horse research buildings, a residential structure used as student housing, the Biosecurity Research Institute (BRI), a flea/dog food research laboratory, and a building used for storing recycling materials and maintenance supplies (Terracon 2007c). The BRI is a biosafety level (BSL)-3 facility. Some open space is also present. The site is surrounded by a paved road and pond to the north and residential development to the east. Parking lots and large university buildings border the south, and two large buildings and baseball fields border the west (Terracon 2007c).

Land use controls for the site include the City of Manhattan Zoning Ordinance and the Manhattan Urban Area Comprehensive Plan. According to the Growth Vision of the Comprehensive Plan, the Manhattan Urbanized Area is "economically vital community which provides employment and income opportunities to its residents and financial support for quality of life programs; a caring community which offers its residents equal opportunities to seek a higher quality of life; and a community which recognizes the importance of conserving and enhancing its natural environment” (MUACP 2003).

Current land cover at the proposed NBAF Manhattan Campus Site and surrounding area is in Figure 3.2.4.1.1-1.

3.2.4.1.2 Visual Resources

At the Manhattan Campus Site, institutional and research development structures intermixed with recreational and student housing buildings mostly determine the human-made visual character in the immediate area. The site is adjacent to the BRI, a BSL-3 facility. It also borders the research laboratories and teaching hospital of the KSU College of Veterinary Medicine.

Overall, visual quality of the landscape is classified as urban/industrial. The landscape is common to urban areas and urban/industrial fringes. Human elements are prevalent. Limited vegetation screening exists around the industrial development.

KSU athletic fields are located immediately west of the site, with the KSU football stadium west of the fields, within sight of the proposed NBAF site. Some residential development is located east of the site, also within view of the proposed NBAF site. Hospitals, schools, recreation areas, and various institutions are within 1 mile of the site, but due to the urban setting many of these potentially sensitive visual receptors are not within direct sight of the proposed NBAF site. Figure 3.2.4.1.2-1 shows the receptors surrounding the proposed NBAF site.

3.2.4.2 Construction Consequences

3.2.4.2.1 Land Use

Construction of the NBAF at the Manhattan Campus Site would result in a disturnbance of approximately 30 acres during construction and would be an irretrievable and irreversable use of land. Additional acreage would be affected for temporary construction areas. The construction laydown area has not been determined at this time, and preliminary indications suggest that the area may extend beyond the 30-acre proposed construction site but not outside of the 48.4-acre site. Minor land use change would occur as a result of NBAF construction. Some of the existing open areas would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.4.2.2 Visual Resources

In general, visual impacts to the overall landscape resulting from construction of the NBAF would be moderate. Viewers would observe site grading and related construction activities and equipment, which would include the stripping of grass and removal of trees and other vegetation. There would be heavy equipment vehicles conducting earthwork activities on the NBAF site during the 4-yr construction period, as well as light- and medium-weight vehicles going to and from the site. Deliveries of soil, backfill, and building materials would be expected on a daily basis. Fencing and screening of the construction site would curtail sight visibility. There were no sensitive visual receptors within 0.75 miles of the Manhattan Campus Site (Figure 3.2.4.1.2-1).

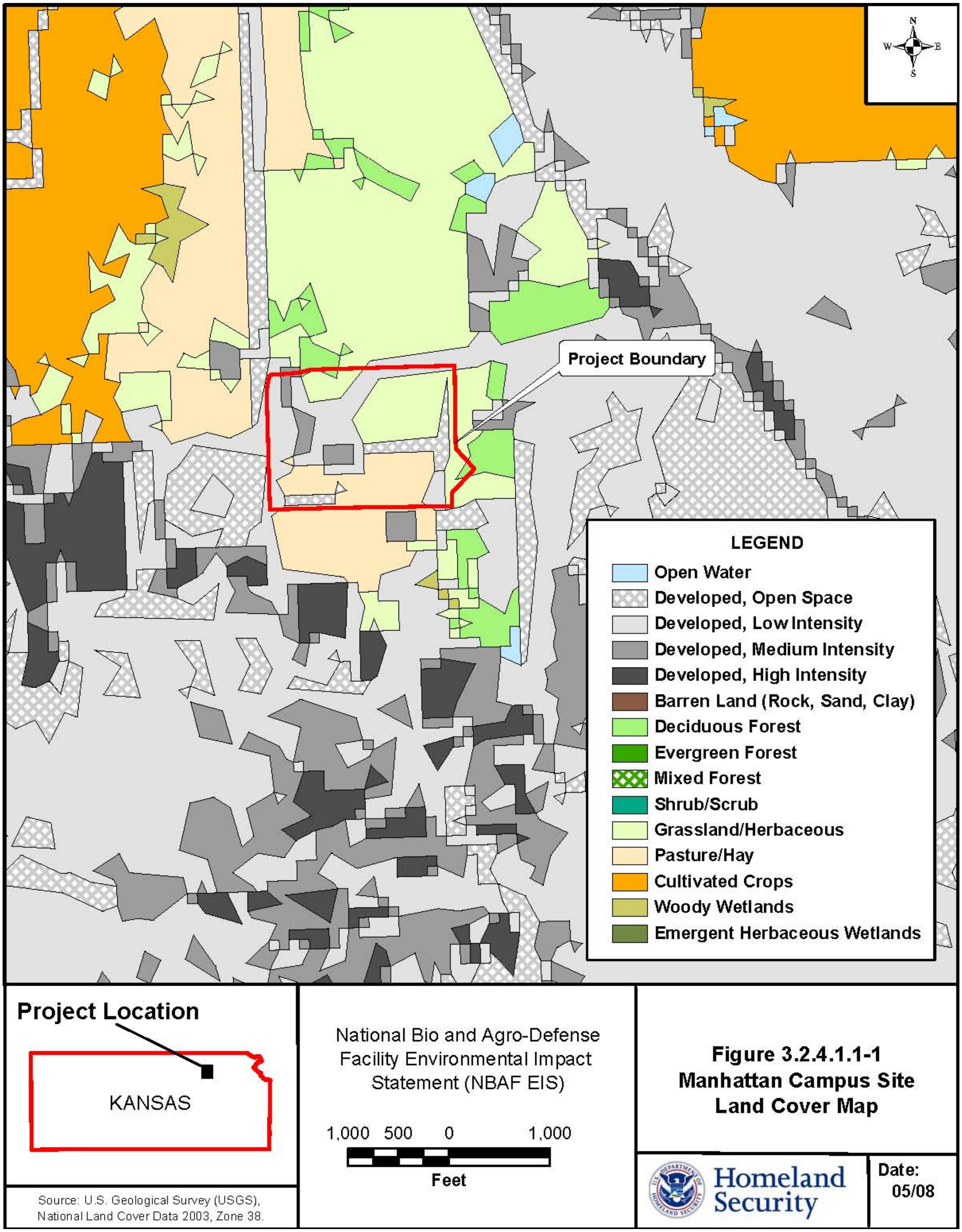

Figure 3.2.4.1.1-1 — Manhattan Campus Site Land Cover Map

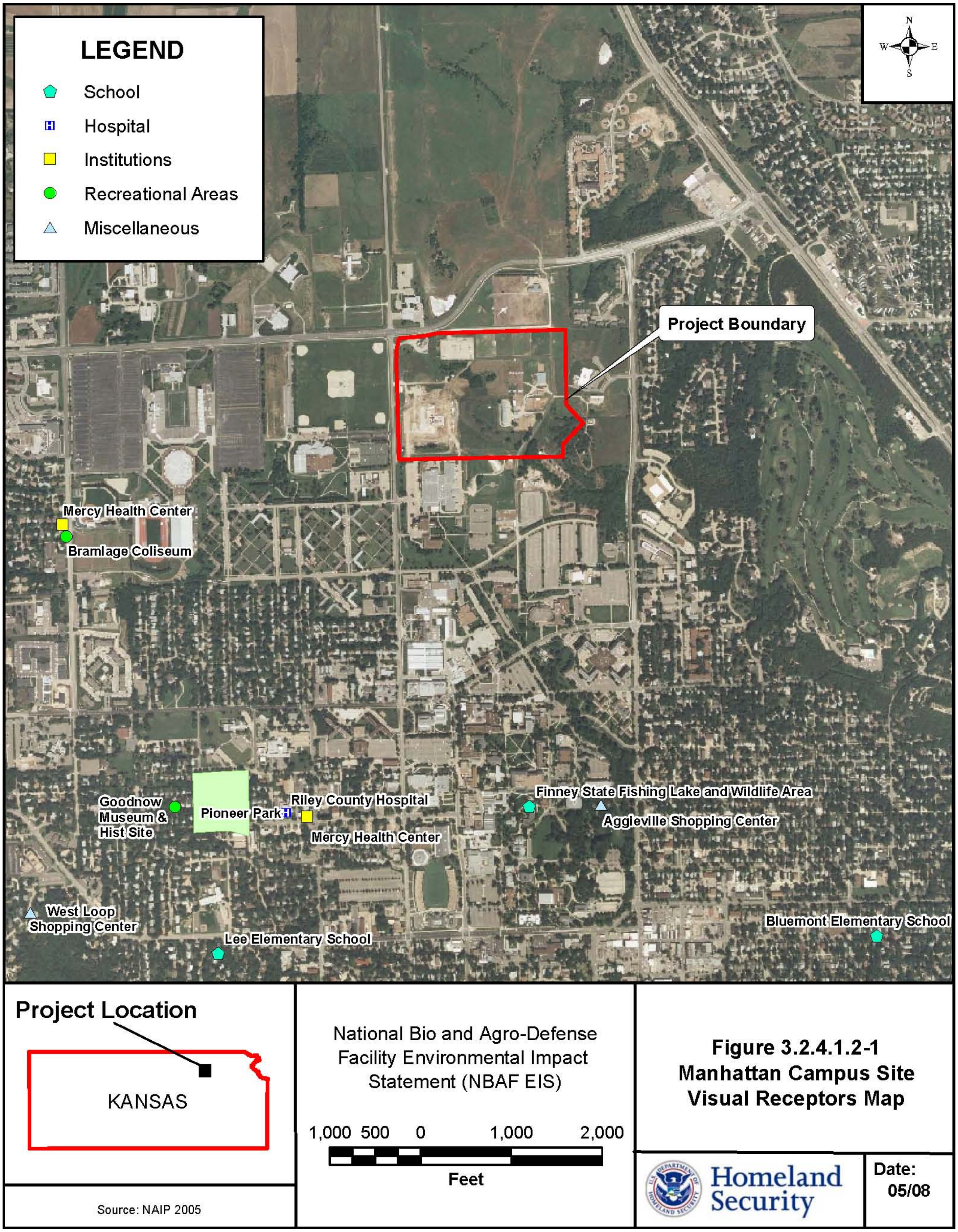

Figure 3.2.4.1.2-1 — Manhattan Campus Site Visual Receptors Map

3.2.4.3 Operation Consequences

3.2.4.3.1 Land Use

The operation of the proposed NBAF at the Manhattan Campus Site would be consistent with the current land use patterns on the KSU campus and within the immediate vicinity of the City of Manhattan. There would be minimal alteration of current land use patterns resulting from the proposed NBAF. The zoning designation of "U" for University on the City of Manhattan Zoning Map and the City of Manhattan Comprehensive Plan Existing Land Use Map would remain the same. Overall, land use impacts due to operation of the NBAF would be minor.

3.2.4.3.2 Visual Resources

Visual impacts from the proposed NBAF would be moderate. Because of its urban setting on the KSU campus with similar buildings nearby, it would not be visually distinctive. It would be similar in size to a 400-bed hospital or a 1,600 student high school, which is consistent with the campus setting. Although portions of the main building would be underground, the heights of project components have not been finalized at this time and could be up to 90 feet high (NDP 2007a). Other ancillary elements that would likely be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. The entire facility would be surrounded by a security fence, which itself would be a highly visible element.

Moderate visual impacts would also occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence.

Residences on campus adjacent to the site and east of the campus would be considered sensitive viewers. The existing BRI located directly south of the site and other campus structures would provide some degree of visual screening, but the scale of the facility and elevated viewpoints would make the facility a visually dominant component of their view. Travelers on Denison Avenue and Kimball Avenue would also have views of the NBAF.

The visual impact could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas. However, vegetative screening could not be used along the fence for security purposes. Additional design features that could help ameliorate visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.2.5 Flora Industrial Park Site

3.2.5.1 Affected Environment

3.2.5.1.1 Land Use

The Flora Industrial Park Site is a 150-acre parcel within the Town of Flora in Madison County. The Madison County Economic Development Agency (MCEDA) maintains the park. The parcel would be deeded to DHS if the site is selected for construction. Other tenants in the Flora Industrial Park include the Primos Manufacturing Company.

The proposed NBAF site is zoned limited industrial (I-1), which is characterized by light manufacturing, commercial facilities, and processing plants. The site consists of idle pasture at an elevation of 240 feet with two small ponds and a few scattered wooded areas. It is surrounded by rural residential, low/medium-density residential, commercial, and agricultural uses to the north, east, and west with intense commercial, low-density residential, and industrial uses to the south. Land use controls for the site include the Town of Flora Zoning Ordinance, Town of Flora Comprehensive Plan, and the Restrictive Covenants for Flora Industrial Park.

Land cover at the Flora Industrial Park Site and surrounding area is shown in Figure 3.2.5.1.1-1. Land cover classes include the following:

- Deciduous, evergreen, or mixed forest (33%)
- Forested wetlands (12%)
- Cultivated crops (11%)
- Shrubland (9%)
- Developed land (7%)
- Open water (4%)
- Other (24%)

3.2.5.1.2 Visual Resources

The proposed NBAF site at Flora Industrial Park currently has no physical structures. One tenant in the park, Primos Manufacturing Company (which manufactures hunting calls), borders the site to the south. The site is predominantly undeveloped gently rolling pastureland. An overhead power transmission line runs through the south-central and west-central portions of the site (Terracon 2007b).

Overall, visual quality of the regional landscape is classified as rural in character. The natural and agricultural landscape features and patterns are reasonably attractive and interesting but are not visually distinctive or unusual within the region.

To the north of the site, there are three small structures, a residential home, pastureland, a large pond, and Middle Road. The Illinois Central Gulf Railroad, Kearney Park Road, Woodman Hill Baptist Church, Balfour Cemetery, Harris Road Subdivision residential development, Town of Flora Fire Station, a series of individual residential lots, and small roads lined with several small structures lie to the east. To the south, there is predominantly open grass land, some wooded land, the Primos Manufacturing Company, and the Paradigm Manufacturing Plant. To the west, the site is adjacent to U.S. Highway 49 with predominantly open land with scattered residential homes along the highway.

Sensitive visual receptors are primarily located east of the site and include the Woodman Hill Church and scattered rural residences. Residential homes are also found north, west, and south of the site. The Tri-County Academy is located south of the site, but views of the site are somewhat obscured by trees and the Primos Manufacturing facility. Travelers along Highway 49, which runs west of the site, have unobscured views of the site. Figure 3.2.5.1.2-1 shows the visual receptors within and surrounding the Flora Industrial Park Site.

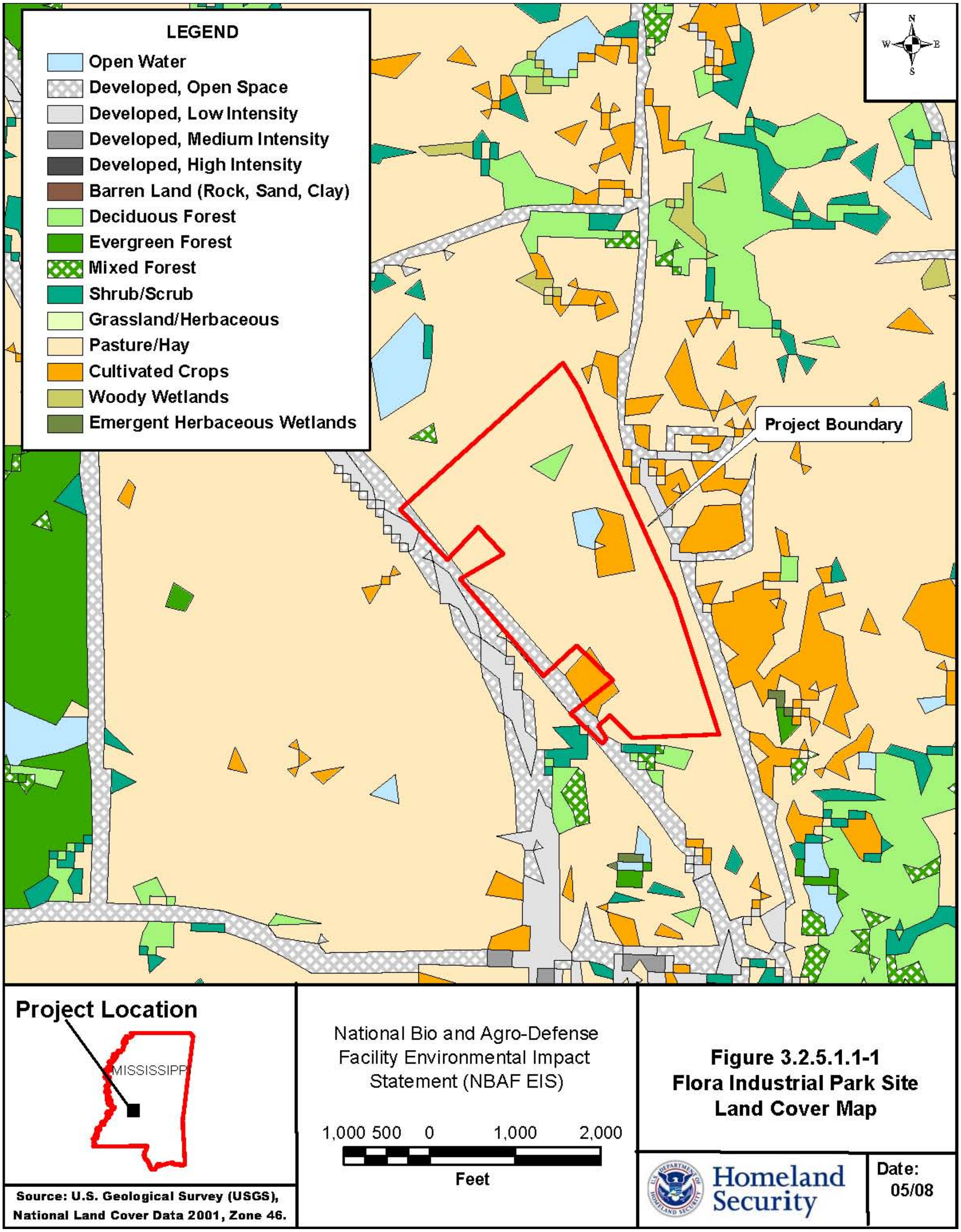

Figure 3.2.5.1.1-1 — Flora Industrial Park Land Cover Map

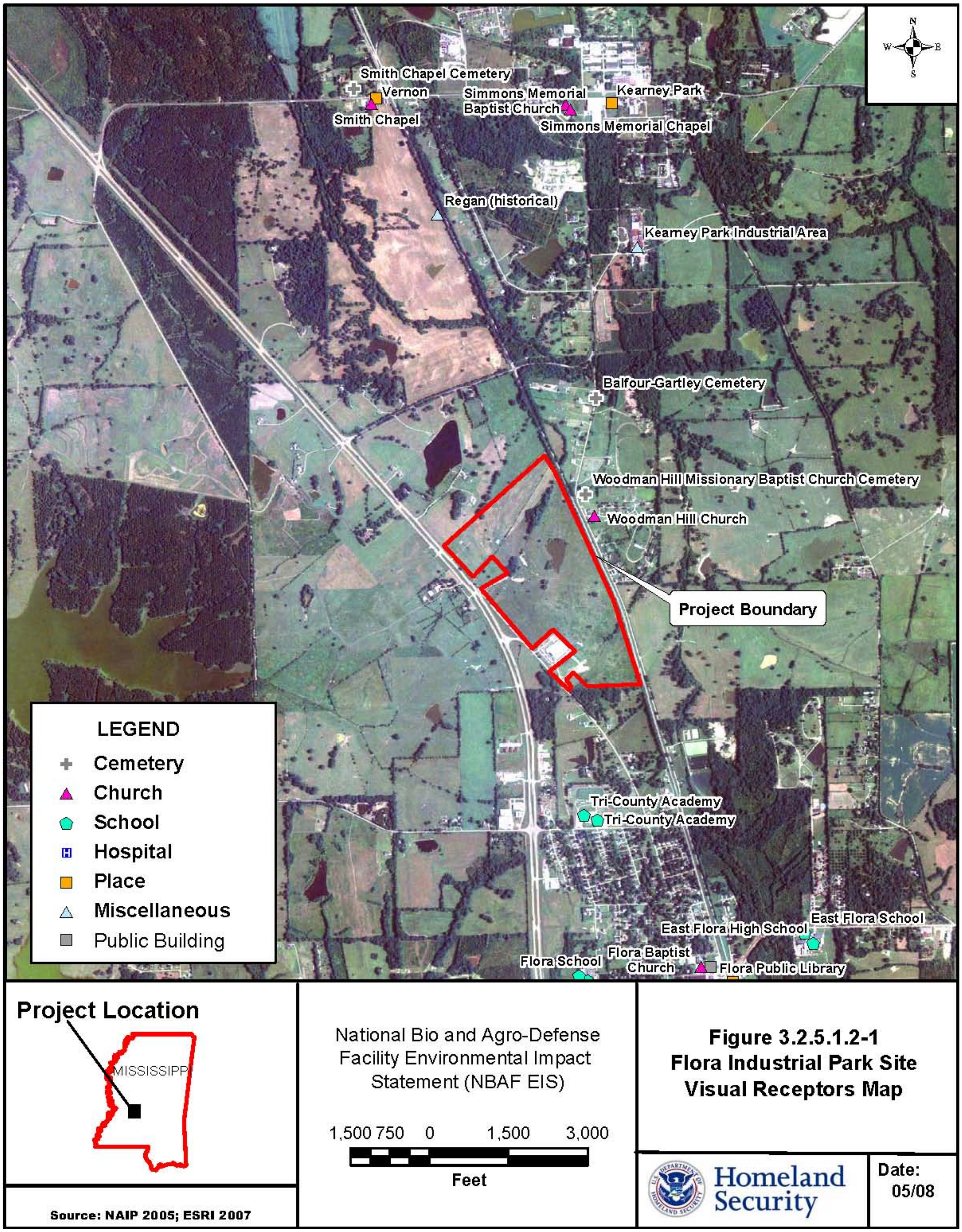

Figure 3.2.5.1.2-1 — Flora Industrial Park Visual Receptors Map

3.2.5.2 Construction Consequences

3.2.5.2.1 Land Use

Construction of the NBAF at the Flora Industrial Park Site would occur on approximately 30 acres of the 150 acre site and would result in an irretrievable and irreversible commitment of land. Additional acreage would be required for temporary construction areas. The construction laydown area has not been determined at this time, and preliminary indications suggest that the area may extend beyond the 30-acre proposed construction site but not outside the 150-acre site. Minor land use change would occur as a result of NBAF construction. Some of the existing open areas would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.5.2.2 Visual Resources

In general, visual impacts to the overall landscape resulting from construction of the NBAF would be moderate. Viewers would observe site grading and related construction activities and equipment, which would include the stripping of grass and removal of trees and other vegetation. There would be heavy equipment vehicles conducting earthwork activities on the NBAF site during the 4-yr construction period, as well as light- and medium-weight vehicles going to and from the site. Viewers would observe earthwork equipment, construction trailers, building construction, and cranes. Deliveries of soil, backfill, and building materials would be expected on a daily basis. Fencing and screening of the construction site would curtail sight visibility.

Due to the proximity of Highway 49, travelers would view construction activity and equipment during the 4 yr construction period. Nearby locations (within 1,500 feet of the site) with potentially sensitive visual receptors that could be impacted during construction would include scattered residences, Simmons Memorial Baptist Church and Woodman Hill Church, and the Woodman Hill Missionary Baptist Church Cemetery. The Tri-County Academy and the Balfour-Gartley Cemetery are within 3,000 feet of the NBAF site.

3.2.5.3 Operation Consequences

3.2.5.3.1 Land Use

The operation of the proposed NBAF at the Flora Industrial Park Site would be consistent with the current land use patterns within the immediate vicinity of the Town of Flora and with the purposes of the industrial park. There would not be an alteration of current land use designations and planning resulting from the proposed NBAF. Overall, land use impacts due to operation of the NBAF would be minor.

3.2.5.3.2 Visual Resources

Visual impacts from the proposed NBAF would be high. Because of the relatively open setting, it would be visually distinctive on the landscape. It would be similar in size to a 400-bed hospital or a 1,600 student high school located in an otherwise primarily rural setting. Although portions of the main building would be underground, the heights of project components have not been finalized at this time but could be up to 90 feet high (NDP 2007a). Other ancillary elements that would likely be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. The entire facility would be surrounded by a security fence, which itself would be a highly visible element.

Visual impacts would also occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence.

The visual impact of the NBAF on Highway 49 travelers would be ameliorated by partial screening and setbacks. Additionally, the visual effects would not be sustained for travelers. Sensitive visual receptors that would be impacted during operation include scattered residences, Simmons Memorial Baptist Church and Woodman Hill Church, and the Woodman Hill Missionary Baptist Church Cemetery, all within 1,500 feet of the proposed NBAF. The Tri-County Academy and the Balfour-Gartley Cemetery are within 3,000 feet of the NBAF site. The scale of the facility in a relatively open area would make the NBAF a visually dominant component of their view.

The visual impact could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas. However, vegetative screening could not be used along the fence for security purposes and the fencing itself would provide only minimal screening. Additional design features that could help ameliorate visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.2.6 Plum Island Site

3.2.6.1 Affected Environment

3.2.6.1.1 Land Use

The proposed NBAF would be located on a 24-acre site located directly east of the existing PIADC, which is on the western shore of Plum Island. Land use conditions for Plum Island are described under the No Action Alternative in Section 3.2.1.1. The conditions described in that section are applicable to the affected environment for the Plum Island Site alternative.

3.2.6.1.2 Visual Resources

The visual resources of Plum Island in general are described under the No Action Alternative in Section 3.2.1.1. The conditions described in that section are applicable to the affected environment for the Plum Island Site alternative.

3.2.6.2 Construction Consequences

3.2.6.2.1 Land Use

Construction of the NBAF at the Plum Island Site would occupy the 24-acre site and would result in an irretrievable and irreversible commitment of land. Additional acreage on Long Island would be needed for temporary construction areas. Minor land use change would occur as a result of NBAF construction. Some of the existing open areas would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.6.2.2 Visual Resources

In general, visual impacts to the overall landscape resulting from construction of the NBAF would be low. Construction-related visual impacts would occur on both Plum Island and Long Island. Viewers of the Plum Island construction site would observe site grading and related construction activities and equipment, which would include the stripping of grass and removal of trees and other vegetation. There would be heavy equipment vehicles conducting earthwork activities on the NBAF site during the 4-yr construction period. Earthwork equipment, construction trailers, building construction, and cranes would be visible. However, due to its isolation, few viewers would observe the construction activity on Plum Island. Viewers would primarily include marine travelers; some viewers on Orient Point, approximately 1.5 miles away, could observe some highly visible construction activity and equipment, such as cranes.

A temporary construction parking and material laydown area would be located at Orient Point, on the eastern tip of Long Island, accessible by State Highway 25. This site would be used to embark to Plum Island via ferry or barge transportation. Visual impacts to travelers, residents, and pedestrians would be low for this area because of the infrequency of visitors to this area and because of the fencing and screening used at the laydown area. These effects would last for the entire duration of the construction period.

3.2.6.3 Operation Consequences

3.2.6.3.1 Land Use

The operation of the proposed NBAF at the Plum Island Site would be consistent with the current land use patterns on Plum Island. State and federal regulations would apply. However, as this is federal property, local zoning designations do not apply to the site. There would be a change of the existing land use; the site would change from existing open space to an institutional-type use. Overall, land use impacts due to operation of the NBAF would be minor.

3.2.6.3.2 Visual Resources

Visual impacts from the proposed NBAF at the Plum Island Site would be moderate because of its isolation and the low number of viewers that would observe it. Other than the workers at the site and viewers on passing marine transportation, the nearest populations that would view the NBAF are located at Orient Point, approximately 1.5 miles away. At that distance, the NBAF would be relatively indistinct. The height of the project components have not been finalized at this time but could be up to 90 feet high even though portions of the main building would be underground. The taller the building is, the more likely it is to be seen from a distance. Other ancillary elements that could be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. The entire facility would be surrounded by a security fence.

Visual impacts would also occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence. The lights would be observed by passing marine travelers and would likely be seen from Orient Point.

Visual impact could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas, including the planting of some mature trees. However, vegetative screening would not be used along the fence for security purposes. Additional design features that could help ameliorate visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Large native specimen trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.2.7 Umstead Research Farm Site

3.2.7.1 Affected Environment

3.2.7.1.1 Land Use

The Umstead Research Farm Site is a 249-acre parcel near the town of Butner in Granville County. Umstead Research Farm is part of the North Carolina Department of Agriculture. The parcel is unimproved land that was partially logged in 2000. Umstead Research Farm neighbors include the North Carolina Department of Health and Human Services, a National Guard facility, North Carolina State University, and federal, county, and state entities. The parcel would be deeded to DHS if the site is selected for construction.

The Umstead Research Farm Site is zoned I-1 institutional. The land use patterns surrounding the proposed NBAF site include a large tract of office and institutionally zoned areas to the north with a mixture of residential/agriculture lands on tracts larger than 5 acres and a mix of agricultural, open space, and residential (greater than 5-acre tracts) zones in the other directions. Oxford, Creedmoor, and Butner are the three largest communities within Granville County.

Land use controls for Granville County include the Granville County Zoning Ordinance and the Granville County Comprehensive Plan of 2002 (Granville County 2002). The Granville County Comprehensive Plan establishes land planning objectives, goals, and implementation plans that are compatible with the general character of the county. The Comprehensive Plan provides a foundation for zoning and subdivision regulations and the capital improvements program, which puts the goals and objectives of the land use plan into action.

The Umstead Research Farm Site is surrounded by cropland, pasture, and timberland. Land cover at the site and surrounding area is shown in Figure 3.2.7.1.1-1. Land cover classes include the following:

- Pasture (36%)
- Grassland (30%)
- Deciduous, evergreen, or mixed forest (18%)
- Barren land (11%)
- Developed open space (3%)
- Cultivated crops (2%) (NLCD 2001)

3.2.7.1.2 Visual Resources

Overall, visual quality of the landscape at the Umstead Research Farm Site is classified as rural in character. The natural and agricultural landscape features and patterns are reasonably attractive and interesting, but are not visually distinctive or unusual within the region. It abuts other vacant parcels along Dillon Drive, Range Road, and Old North Carolina Highway Road 75. Currently, the site is primarily open pasture and grassland and surrounded primarily be forest land, which provides some natural screening effect. The site has three crowned areas and an elevation change of 140 feet.

Sensitive visual receptors in the vicinity of the Umstead Research Farm Site include C.A. Dillion Youth Development Center on the southern border of the site, scatted rural residences, and travelers along Old North Carolina Highway Road 75 and Range Road. Figure 3.2.7.1.2-1 shows the visual receptors adjacent to the Umstead Research Farm Site.

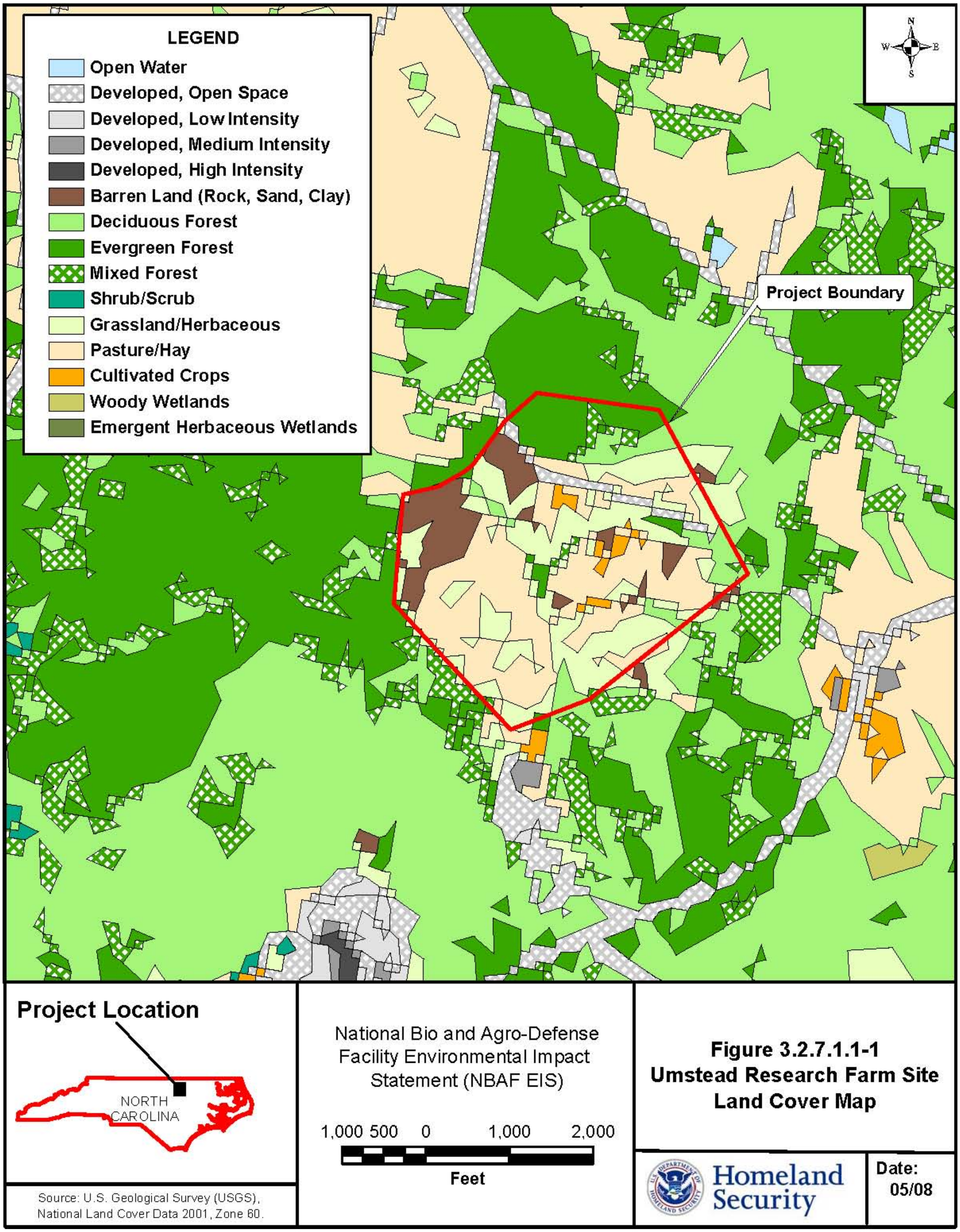

Figure 3.2.7.1.1-1 — Umstead Research Farm Land Cover Map

3.2.7.2 Construction Consequences

3.2.7.2.1 Land Use

Construction of the NBAF at the Umstead Research Farm Site would occur on approximately 30 acres of the 249-acre site and would result in an irretrievable and irreversible commitment of land. Additional acreage would be required for temporary construction areas. The construction laydown area has not been determined at this time, and preliminary indications suggest that the area may extend beyond the 30-acre proposed construction site but not outside the 249-acre site. Minor land use change would occur as a result of NBAF construction. Some of the existing open areas would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.7.2.2 Visual Resources

In general, visual impacts to the overall landscape resulting from construction of the NBAF would be low. Viewers would observe site grading and related construction activities and equipment, which would include the stripping of grass and removal of trees and other vegetation. However, the number of viewers, including sensitive receptors, is expected to be low due to the rural setting of the site and the surrounding forested land. Construction-related impacts would last 4 years. A temporary security fence to prevent trespassing and control traffic entering and leaving the NBAF site would also serve to provide some visual screening of the construction area.

3.2.7.3 Operation Consequences

3.2.7.3.1 Land Use

The operation of the proposed NBAF at the Umstead Research Farm Site would result in an alteration of current land use patterns because the NBAF site is currently undeveloped, and this would change to an industrial/institutional use. Although the use would change, the zoning classification would remain as institutional (I-1) (Town of Butner 2007). All of the land surrounding the site is either federally or state-owned and zoned as either institutional or agricultural. Based on zoning, the NBAF would be compatible with surrounding lands. Overall, land use impacts due to operation of the NBAF would be minor.

3.2.7.3.2 Visual Resources

Visual impacts from operation of the proposed NBAF would be high. In general, the NBAF would be similar in size to a 400-bed hospital or a 1,600 student high school located in an otherwise primarily rural setting. Although portions of the main building would be underground, the heights of project components have not been finalized at this time but could be up to 90 feet high (NDP 2007a). Other ancillary elements that would likely be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. The entire facility would be surrounded by a security fence, which itself would be a visible.

Visual impacts would also occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence.

The visual impact of the NBAF to travelers along Old North Carolina Highway Road 75 and Range Road would be lessened by forested land between the NBAF and the roadways. Additionally, the visual effects would not be sustained for travelers. Sensitive visual receptors that would be impacted during operation primarily include students and staff at the Dillion Youth Development Center on the southern border of the site. The NBAF would be screened by forested land from other sensitive viewers.

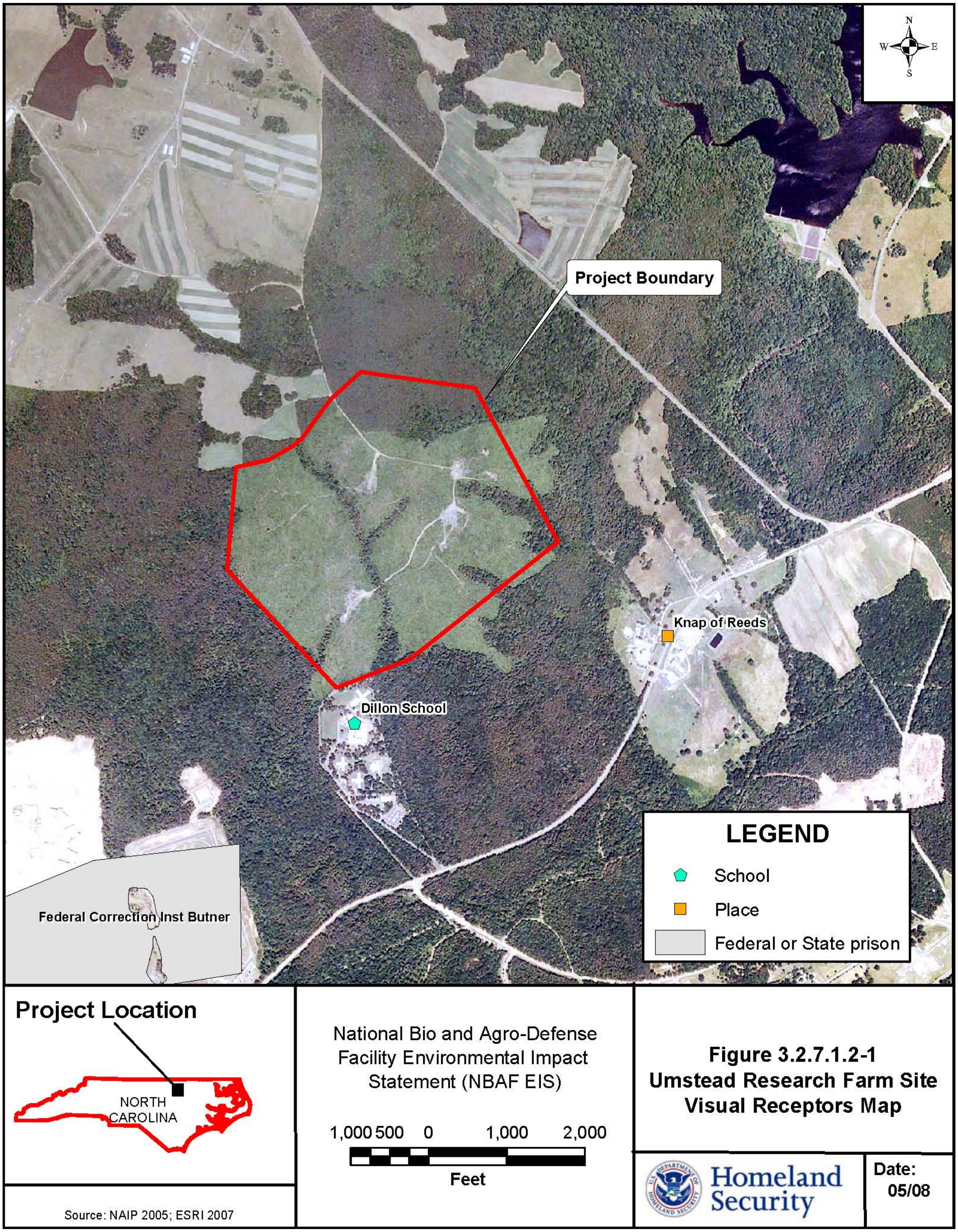

Figure 3.2.7.1.2-1 — Umstead Research Farm Visual Receptors Map

Visual impacts could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas. However, vegetative screening would not be used along the fence for security purposes. Additional design features that could help lessen visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.2.8 Texas Research Park Site

3.2.8.1 Affected Environment

3.2.8.1.1 Land Use

The proposed NBAF site is located on 100.1 acres within the Texas Research Park in San Antonio, Bexar County and a small portion of Medina County. The proposed NBAF site is owned by the State of Texas Research and Technology Foundation (TRTF), a charitable 501 (c) (3) public foundation dedicated to economic development through the recruitment of bioscience and high technology assets.

The proposed Texas Research Park Site is undeveloped, vacant land, vegetated with live oak clusters and native South Texas brush. The site is not zoned. The Texas Research Park is within the Extraterritorial Jurisdiction of the City of San Antonio under a 2004 signed agreement between the City of San Antonio, Bexar County, and the TRTF. This agreement stipulates that the park lies outside of the City of San Antonio's municipal boundaries, but the City would assume jurisdiction and the Texas Research Park would be classified as an Industrial District with all land use controls governed by the Restrictive Convenants. Other developments at the Texas Research Park include the University of Texas Health and Science Center, the Cancer Therapy and Research Center, the Southwest Oncology Group, and Genzyme Corporation.

The site is surrounded by a vacant, wooded land. Omicron Drive with Ashton Park Residential Subdivision lies to the north; Lambda Drive, wooded vacant land, and two University of Texas Health and Science Center research campuses lie to the east; vacant, wooded land and Felder Tract Residential Subdivision to the south; and vacant, wooded land with several unpaved roads to the west. Land use controls for the site include the Texas Research Park Restrictive Covenants, the San Antonio Master Plan, and the San Antonio Zoning Code.

Land cover at the site and surrounding area is shown in Figure 3.2.8.1.1-1. Land cover classes at the site include the following:

- Evergreen forest (47%)
- Deciduous forest (36%)
- Shrub/scrub land (17%) (NLCD 2001)

3.2.8.1.2 Visual Resources

Overall, visual quality of the regional landscape is classified as rural in character. The natural and agricultural landscape features and patterns are reasonably attractive and interesting but are not visually distinctive or unusual within the region. Currently, the site is undeveloped, vacant land, vegetated with live oak clusters and native South Texas brush.

Sensitive visual receptors in the vicinity of the Texas Research Park Site include the Potranco Elementary School northwest of the site in Medina County located off of County Road 381. It is within a 0.5 miles of the Texas Research Park Site.

3.2.8.2 Construction Consequences

3.2.8.2.1 Land Use

Construction of the NBAF at Texas Research Park would occur on approximately 30 acres of the 100.1-acre sitend would result in an irretrievable and irreversible commitment of land. Additional acreage would be required for temporary construction areas. The construction laydown area has not been determined at this time, and preliminary indications suggest that the area may extend beyond the 30-acre proposed construction site but not outside the 100.1-acre site. Minor land use change would occur as a result of NBAF construction. Some of the existing open areas would be used as a construction site with the associated typical construction activities. The effects would be temporary and last the duration of the 4-yr construction period.

3.2.8.2.2 Visual Resources

In general, visual impacts to the overall landscape resulting from construction of the NBAF would be low. Viewers would observe site grading and related construction activities and equipment, which would include the stripping of grass and removal of trees and other vegetation. There would be heavy equipment vehicles conducting earthwork activities on the NBAF site during the 4-yr construction period, as well as light- and medium-weight vehicles going to and from the site. Viewers would observe earthwork equipment, construction trailers, building construction, and cranes. Deliveries of soil, backfill, and building materials would be expected on a daily basis.

3.2.8.3 Operation Consequences

3.2.8.3.1 Land Use

The operation of the proposed NBAF at the Texas Research Park Site would result in an alteration of current land use patterns because the NBAF site is currently vacant, and this would change to an industrial/institutional use. Although the use would change, the zoning classification would remain as I-1. The land surrounding the site is currently compatible with the proposed NBAF because it is either part of the Texas Research Park or vacant. Future housing developments are planned near the proposed NBAF site; however, zoning is not expected to be affected should these developments take place, since the NBAF would be within the Texas Research Park and is consistent with the intended use of Texas Research Park. Overall, land use impacts due to operation of the NBAF would be minor.

3.2.8.3.2 Visual Resources

Visual impacts from operation of the proposed NBAF would be high. In general, the NBAF would be similar in size to a 400-bed hospital or a 1,600 student high school located in an otherwise primarily rural setting. Although portions of the main building would be underground, the heights of project components have not been finalized at this time, but could be up to 90 feet high (NDP 2007a). Other ancillary elements that would likely be visible include fuel and liquid storage tanks, an electrical switchyard, emergency power generators, and power lines (NDP 2007a). If incinerators are included in the final design, stacks would likely be visible, as well. The entire facility would be surrounded by a security fence, which itself would be a visible element on the landscape.

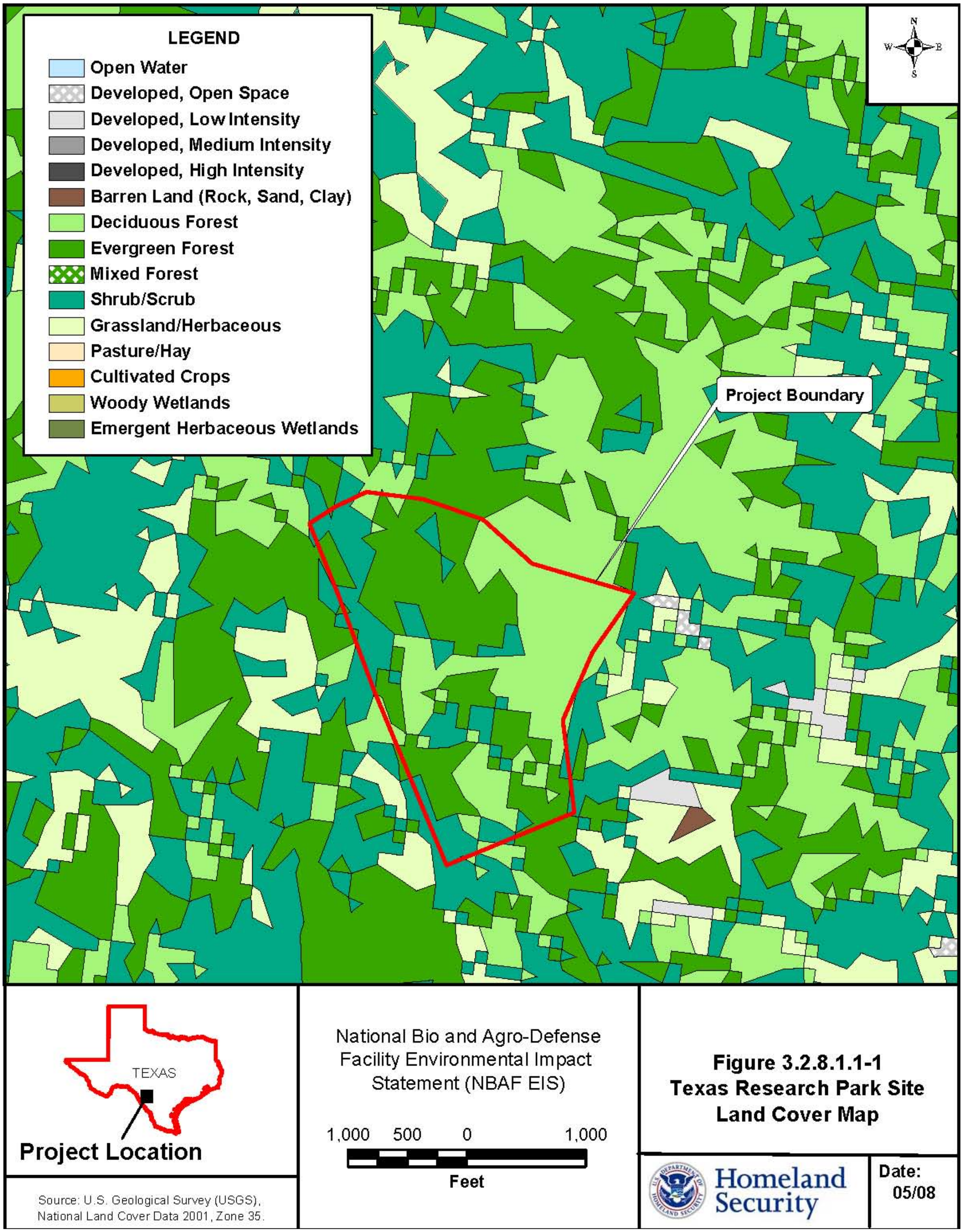

Figure 3.2.8.1.1-1 — Texas Research Park Land Cover Map

There are two approved future residential communities planned adjacent to the site. Ashton Park development, a 200-unit plus single-family residential community, would be located approximately 0.5 miles north of the Texas Research Park Site. Felder Tract, located approximately 0.5 miles south of the Texas Research Park Site, would consist of an estimated 2,590 single-family dwelling units. Both developments would have high visual sensitivity. The scale of the NBAF and elevated viewpoints would make the facility a visually dominant component of their view, and future impacts would likely be high.

The visual impact to travelers from the NBAF on Lambda Drive and Omicron Drive would be ameliorated by partial screening and setbacks. Because the visual effects are not sustained, impacts would be moderate. The visual impact for travelers along State Highway 211 would be relatively low because most travelers would be viewing the site from at least 1 mile distance, and the view would not be sustained.

Visual impacts would also occur from lighting during the nighttime. The main facility, all support buildings, and the parking lot would be well-lit. Lighting is also proposed at regular intervals along the security fence.

Visual impacts could be partially ameliorated by limited vegetative screening and setbacks. Landscaping is planned around buildings and adjacent to parking areas. However, vegetative screening would not be used along the fence for security purposes. Additional design features that could help lessen visual impacts include the following:

- Some existing native trees could be maintained around the perimeter of the site to serve as landscape buffers and to increase NBAF's visual compatibility with the surrounding area.
- Trees could be planted to help screen the view of the site. These plantings could include fast-growing trees to expedite the development of a mature vegetative screen.

3.3 INFRASTRUCTURE

3.3.1 Methodology

The general methodology for infrastructure involved the selection and verification of current and planned site infrastructure data, identification of infrastructure design requirements, comparison of current and planned infrastructure capabilities verses design requirements, and finally, identification and evaluation of site-specific impacts resulting from construction, installation, and operations of the facility. The results are presented in the following subsections.

3.3.2. No Action Alternative

This section describes the existing infrastructure on Plum Island that would remain in use as part of the existing PIADC research mission. PIADC is owned by the federal government and operated by DHS. The day-to-day operation and maintenance (O&M) of PIADC are administered and performed by a private contractor, Field Support Services, Inc. (FSSI). FSSI is responsible for the operations of various self-contained utilities at PIADC. These utilities include the island's two potable water well fields, a sewage treatment plant, emergency power plant, and electrical substations.

3.3.2.1 Affected Environment

3.3.2.1.1 Potable Water Supply

Potable water is supplied to the site by the PIADC O&M contractor from 2 potable water well fields consisting of 12 functioning wells and 2 non-functioning wells in a sole source aquifer. Wells 1-10 are in the shallow well field, with an average well depth of 30 feet. These wells are located near the existing facility well pump house where potable water treatment is conducted. Wells 11-14 comprise the deep well field with an average depth of about 60 feet. These wells are located at the base of the Harbor Hill End Moraine. The wells are situated northwest of the former pump house facility historically used by the military during its occupation of the island. The maximum daily draw rate from the 12 functioning wells ranges from 170,000 to 200,000 gpd. The existing water tower has a usable volume of 200,000 gallons (NDP 2008b).

The potable water system is permitted by the New York State Department of Environmental Conservation (NYSDEC) and currently operates in compliance with permit requirements. The PIADC potable water system is operated by operators licensed and inspected annually by the NYSDEC/Suffolk County Department of Health (SCDHS). Backflow prevention inspection/reports are provided to the SCDHS on an annual basis, and water-tower/cathodic protection inspection is conducted annually (K. Klotzer, PIADC Environmental Specialist unpublished summary of PIADC Air, Waste-Water and Potable Water Permits prepared August 30, 2007). Excess potable water not immediately available for use or distribution is stored in a 200,000-gallon water tower.

An assessment of the PIADC aquifer, designated “sole source” per Section 1424(e) of the *Safe Drinking Water Act* of 1974 and regulated by the U.S. Environmental Protection Agency (EPA), was conducted in 2000 to provide updated information regarding the condition and quality of the island’s potable water resources. The study recommended a “water budget”—the maximum amount of groundwater that may be sustainably withdrawn without adversely impacting water quality or availability—of no more than 55,000,000 gallons per year (gpy) or approximately 150,000 gallons per day (gpd). The 2006 annual water report submitted to the NYSDEC indicated an annual water production of 17,412,000 gpy or an average production of 47,704 gpd. In addition, the designation of the Plum Island aquifer also requires the EPA to review all proposed projects within the designated area that receive federal financial assistance.

3.3.2.1.2 Electricity

Long Island Power Authority (LIPA), serving a territory of approximately 1,377 square miles with a total power availability of 5,357 megawatts (mW), is the electrical utility responsible for providing power to PIADC (LIPA 2004). LIPA supplies electrical power to Plum Island from Orient Point on Long Island. A single 13.2 kilovolt (kV) aerial line serves two underwater electric cables to Plum Island. The historical peak demand on the electrical service is 2.3 megawatt (mW). The current distribution isolation switches are positioned to operate the bulk of the existing facilities on one underwater service cable. The two underwater feeders to the island can each supply the 2.3-mW load at a voltage drop of the estimated 2.5 mile conductor length, but only one electrical line is used at any given time (NDP 2008).

Annual electrical usage at the PIADC, measured in kilowatt-hours (kWh) and based on records from 2005 and 2006, ranges from 11,500 kWh to just under 12,000 kWh per year.

3.3.2.1.3 Fuels and Natural Gas

No. 2 diesel is the primary fuel source for the PIADC facility. Fuel oil is stored in underground storage tanks and aboveground storage tanks. The maximum storage capacities of the underground and aboveground storage tanks are approximately 12,000 gallons and 643,000 gallons, respectively. Fuel oil is used in the boilers for facility heating, the generators for facility back-up power, and the incinerators for refuse disposal. The PIADC facility’s annual fuel oil usage is reported to range from 634,880 gpy (FY 2006 fuel acquisition report) to approximately 900,000 gpy (K. Klotzer, PIADC Environmental Specialist phone call from L. Bedsole, Dial Cordy, February 29, 2008).

3.3.2.1.4 Sanitary Sewage

All wastewater from the PIADC is subject to treatment prior to discharge in accordance with the operating and wastewater discharge permit requirements of the State of New York. Wastewater sources at PIADC are organized under the two general source categories of Research Waste and Non-Research Waste and are described below with regard to source and treatment.

Research wastes include wastewaters generated by laboratory sinks and drains, restroom facilities, and animal handling/holding areas within the BSL-3 areas of Building 101. The liquid research wastes (sewage) are conveyed from Building 101 via underground piping and enter Building 102 for pretreatment through grinding units for size classification, then into a series of holding tanks for mixing and heating at various temperatures and residence times under continuous flow or batch conditions. Muriatic acid is also added to the sewage stream occasionally if the content of the waste is suspected to be particularly contaminated with research biologicals. This portion of the research waste pretreatment system is collectively referred to as the "Heat Exchanger Treatment System." From the heat exchanger treatment system, the fluids are sent to one of two "Retention Tube Rooms," which houses 3,500 linear feet of piping. The pretreated effluents pass through this lengthy system to dissipate heat before being combined with non-research waste for secondary and tertiary treatment in the central wastewater treatment plant (WWTP).

Non-research waste includes all pretreated sewage from the research facility (discussed above), as well as sink, drain, and sewage wastes from the non-research support facilities on Plum Island. The largest contributor of wastes from non-research facilities is Building 100, which contains most of the employees and administrative/support functions of the PIADC facility. All combined, non-research waste is treated in the central WWTP located several hundred feet southeast of the main PIADC laboratory. The existing WWTP was built in 1995 with a major upgrade completed in 2004 (NDP 2008). The WWTP is a state permitted tertiary treatment facility that has a maximum permitted capacity of 60,000 gpd. Wastewaters are chemically treated and irradiated with ultraviolet light to enhance disinfection of the effluent. Once treated, the wastewater passes through reed beds designed to polish the effluent prior to discharge from a single outfall located in Plum Gut Harbor. According to the "PIADC Research Needs and Corrective Action Project Prioritization Study" dated January 27, 2006, the PIADC WWTP is currently capable of treating up to 80,000 gpd (NDP 2008b). The facility has, therefore, requested a discharge permit modification, increasing the permitted capacity to 80,000 gpd (K. Klotzer, PIADC Environmental Specialist phone call from L. Bedsole, Dial Cordy, February 29, 2008). The WWTP currently operates in compliance with permit requirements of New York's, State Pollutant Discharge Elimination System (SPDES).

3.3.2.1.5 Steam and Chilled Water

The existing boiler plant at PIADC came on line in 2005 and has three equally sized boilers with a total installed capacity of 1,500 boiler horsepower (51,750 bl/hr). The existing chilled water plant has a total installed capacity of 1,700 tons.

3.3.2.2 Construction/Operation Consequences

The No Action Alternative would have no effect on infrastructure; however, a number of infrastructure improvements are anticipated for the PIADC facility to meet the demands of its current mission. These improvement projects would allow for the facility to continue functioning for a 10-yr period, after which additional improvements would be required for the facility to continue operating in a safe and efficient manner. However, continued operation of PIADC would result in the irretrievable use of 870 million gallons of potable water when projected over the next 50 years (for comparison to the other alternatives). Diesel fuel and gasoline would be consumed by maintenance equipment, and fuel oil would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.3 South Milledge Avenue Site

This section describes the existing services available to support the operation of the NBAF at the South Milledge Avenue Site and the potential consequences to the existing infrastructure from the addition of the facility. The infrastructure encompasses potable water supply, electrical power, fuels and natural gas, sanitary wastewater treatment facilities, and steam and chilled water.

3.3.3.1 Affected Environment

3.3.3.1.1 Potable Water Supply

Potable water is supplied by the Athens-Clarke County Public Utilities Department. Currently, raw water comes from three sources: Bear Creek Reservoir, the North Oconee River, and the Middle Oconee River. Water from these sources is treated at the J.G. Beacham Water Treatment Plant and then delivered to the end user. Athens-Clarke County has four elevated storage tanks and one ground storage tank that collectively hold 3.75 million gallons of water. The City of Athens currently consumes an average of over 15.5 million gpd. Its peak consumption, 26.5 million gallons per day (mgd), was roughly 95% of its supply capacity of 28 mgd (ACCG 2007). The J. G. Beacham Plant is currently being upgraded to meet future demands, to ensure performance reliability, and to comply with stricter, impending drinking water regulations. With the upgrade, the capacity of the plant would be increased from its existing capacity of 28 mgd to 36 mgd (ACC 2008). Construction should be completed by the spring of 2008 (ACCG 2007).

Due to current drought conditions, Athens-Clarke County has declared a Level 4 Drought Response, completely banning all outdoor water use 7 days a week, 24 hours a day. These restrictions became effective on September 17, 2007, and will remain in effect until conditions warrant (ACC 2008). The South Milledge Avenue Site is not in a jurisdiction where reclaimed water must be used for construction, landscape, or other non-potable uses, if reclaimed water is available.

There is an 8-inch potable water force main along South Milledge Avenue that has been determined to not have sufficient capacity to accommodate future demand from the proposed NBAF.

3.3.3.1.2 Electricity

Georgia Power, serving all but 4 of Georgia's 159 counties, is the electrical utility responsible for providing power to the proposed South Milledge Avenue Site (GP 2008a). Georgia Power owns a network of 14 generating plants (coal and nuclear) and 20 hydroelectric dams spread across the State of Georgia (GP 2008b).

Georgia Power would supply three-phase electricity to the South Milledge Avenue Site through two independent electrical substations. Within a 3-mile radius of the South Milledge Avenue Site, Georgia Power currently has three electrical substations that exceed the distribution voltage and output capacity specifications for the NBAF. These existing electrical substations include the GTC Barnett Shoals Substation to the east (115 kV and 35.4 mW), the East Athens Substation to the north-east (115 kV and 28.6 mW), and South Athens Substation to the north-west (115 kV and 28.6 mW). Power from the two selected primary electrical substations would be routed to the South Milledge Avenue Site through two new and separate aboveground or underground lines that converge at a third electrical substation to step the voltage down and distribute the two independent power supplies to the site. The third electrical substation would be located on or adjacent to the NBAF site and would have dual transformers, each with the capacity to handle the entire facility demand as required.

3.3.3.1.3 Fuels and Natural Gas

Atlanta Gas Light would supply natural gas to the South Milledge Avenue Site. Atlanta Gas Light has an existing 4-inch diameter, supply pressure distribution gas line running adjacent to the site on the south side of South Milledge Avenue (phone interview with Lane Woodall, Atlanta Gas Light by Chit Christian, Tetra Tech, Inc., January 23, 2008). This line does not currently have the capacity to meet the additional demand exerted by the proposed NBAF.

The maximum allowable operating pressure (MAOP) for this line is 300 lbs per square inch (psi), and its peak capacity is 9,220 one hundred cubic feet per day (ccf/day); nominal capacity is unknown (Clarissa Hageman, Tetra Tech, Inc., February 19, 2008, e-mail from Ian Skelton, Atlanta Gas Resources). The current utilization of this natural gas source peaks at 4,420 ccf/day. The gas main has 50% excess flow rate capacity at this pressure under current conditions (Clarissa Hageman, Tetra Tech, Inc., February 19, 2008, e-mail from Ian Skelton, Atlanta Gas Resources).

3.3.3.1.4 Sanitary Sewage

Athens-Clarke County's existing Middle Oconee Wastewater Treatment Facility would treat wastewater from the South Milledge Avenue Site. The Athens-Clarke County Middle Oconee facility treats the wastewater and then discharges it into the Middle Oconee River. The wastewater treatment process includes a bar screen, grit separator, activated sludge process, clarifiers, digesters to remove biosolids, and chlorine disinfection (ACC 2008). The existing treatment system has a 6 mgd capacity and currently operates at 4.5 mgd on average. The Athens-Clarke County Middle Oconee WWTP is currently under design to be expanded from 6 mgd to 10 mgd. Construction is expected to be completed in 2012 (ACCG 2007).

Currently, the closest sewer line to the proposed South Milledge Avenue Site is approximately 9,500 feet from the site (NDP 2007b). The Athens-Clarke County Sewer Use Ordinance (2007) provides limits on specific pollutant discharges to the Middle Oconee Wastewater Treatment Facility as provided in Section 3.3.3.3.4. Additional information regarding sanitary sewage is provided in Section 3.13, Waste Management.

3.3.3.1.5 Steam and Chilled Water

The site does not have existing steam and chilled water infrastructure.

3.3.3.2 Construction Consequences

3.3.3.2.1 Potable Water Supply

Water would be required during the construction of the NBAF at the South Milledge Avenue Site for dust suppression and wash down of equipment. The water would likely be supplied via tanker truck at the point of use or obtained though a metered connection to an existing fire hydrant or similar connection. The additional demand on the water supply due to the construction of the NBAF would be negligible.

3.3.3.2.2 Electricity

There would not be additional demand on the electricity supply during construction of the South Milledge Avenue Site. Portable electrical generators would be utilized throughout construction of the facility.

3.3.3.2.3 Fuels and Natural Gas

Natural gas or No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.3.2.4 Sanitary Sewage

Portable chemical toilets would be used during the construction of the NBAF at the South Milledge Avenue Site, which would result in only a minor increase in the sanitary sewage discharge to the local sewer system during the construction phase. Construction equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water.

3.3.3.3 Operation Consequences

3.3.3.3.1 Potable Water Supply

Potable water would be supplied to the NBAF at the South Milledge Avenue Site by the Athens-Clarke County Public Utilities Department. The NBAF designers recommended that municipal water service be brought to the NBAF via redundant or looped feeds such that maximum water demand may be satisfied even with loss of one feed line (NDP 2007b). The projected water consumption at the NBAF ranges from 50,000 gpd to 275,000 gpd, with a peak flow rate of 657 gallons per minute (gpm) at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption at the South Milledge Avenue Site is 43,000,000 gallons (NDP 2007b). An irretrievable commitment of 2.15 billion gallons of potable water would be required over the 50-year project life.

The current Athens-Clarke County Public Utilities infrastructure of an existing 8-inch force main on South Milledge Avenue would not meet the potable water feed redundancy specifications or the consumption/peak flow requirements for the proposed NBAF without substantial improvements. The proposed upgrades to the municipal potable water system include the installation of a dedicated, on-site 200,000 gallon elevated water tank at the South Milledge Avenue Site. The new elevated tank can be fed from the existing 8-inch water lines on either Whitehall Road or South Milledge Avenue. Based on the information provided, the proposed improvements would not comply with the redundancy specifications and the peak flow requirements for the proposed NBAF.

An alternate infrastructure improvement plan, authored but not recommended by Athens-Clarke County, is to extend a 12-inch water line to the South Milledge Avenue Site along Whitehall Road from the intersection of Barnett Shoals Road and Gaines School Road and to extend a second, redundant 12-inch water line to the South Milledge Avenue Site from Riverbend Road. Should this alternative be selected, the alternate improvements would comply with both the redundancy specifications and the peak flow requirements.

3.3.3.3.2 Electricity

Two existing, redundant medium-voltage services with multiple feeders would be provided by Georgia Power to serve the NBAF at the South Milledge Avenue Site. Both independent substations should have sufficient capacity for 13.5 mW dedicated power to the NBAF. Power from the two primary substations would be routed to the site through two new and separate aboveground or underground lines that converge at a new Georgia Power–constructed electrical substation located on or adjacent to the South Milledge Avenue Site to step the voltage down and distribute the two independent power supplies to the NBAF.

Operating demand for electricity at the NBAF is projected at 12.8 mW (NDP 2007a). The design requirements for electrical service include a minimum of two redundant medium-voltage services with multiple feeders, an on-site utility substation at 34.5 kV with two transformers feeding 15 kV Class switchgear in a main-tie-main arrangement. The secondary feeders would provide primary electric service at 13.8 kV to the CUP and to the NBAF buildings (NDP 2008b). Based on current information, Georgia Power should be able to meet the electrical requirements of the proposed NBAF.

3.3.3.3.3 Fuels and Natural Gas

Operation of the proposed NBAF is projected to require 1,106,300 ccf/yr of natural gas. On an average basis, the NBAF would be expected to exert a natural gas demand of 3,031 ccf/day. The peak gas demand is estimated at 1,335 ccf/hr at a supply pressure of 10 psi (NDP 2008b).

The CUP, constructed as part of the proposed NBAF, would house multiple dual-fuel (natural gas and No. 2 fuel oil) boilers. The primary fuel source for the boilers is to be determined based on local availability (NDP 2007b). In the case of the South Milledge Avenue Site, natural gas would be the primary fuel source to meet peak demand. Fuel oil would be used in cases were natural gas is not available. Natural gas service would be piped to the CUP at an approximate pressure of 10 psi. Metering equipment and main pressure-reducing valve would be located outside the plant (NDP 2007b).

The existing 4-inch diameter supply pressure distribution gas line running adjacent to Milledge Avenue would not have sufficient capacity to supply the proposed NBAF and would require the utility company to upgrade the supply line to support the facility (NDP 2007a). The MAOP for the existing line is 300 psi, with an unknown nominal capacity, and a peak capacity of 384 ccf/hour (Clarissa Hageman, Tetra Tech, Inc., February 19, 2008 e-mail from Ian Skelton, Atlanta Gas Resources). This gas line currently has an excess peak flow rate capacity of 200 ccf/hr. To meet the NBAF requirements, Atlanta Gas Light would install approximately 2,900 feet of high-pressure 4-inch steel main and several regulator stations from a suitable supply distribution line to the South Milledge Avenue Site (Clarissa Hageman, Tetra Tech, Inc., February 19, 2008 e-mail from Ian Skelton, Atlanta Gas Resources). A pressure-reducing station for low-pressure gas distribution to the facility would also be required.

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil and natural gas would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.3.3.4 Sanitary Sewage

Operation of the NBAF at the South Milledge Avenue Site is projected to result in the discharge of between 50,000 gpd gpd and 150,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 26,500,000 gpy (NDP 2008). If a tissue digester is utilized for carcass disposal, the waste stream from the tissue digester, estimated at 2% of the total discharge volume, would be commingled for discharge with the rest of the NBAF wastewater. The wastewater constituents in the tissue digester waste stream are estimated at 10,250 milligrams per liter (mg/l); biological oxygen demend (BOD), 19,600 mg/l chemical oxygen demand; (COD), 1,400 mg/l; suspended solids, and a pH of 9.48 standard units (NDP 2008).

Sanitary wastewater would be pumped into a new sanitary sewer force-main installed along South Milledge Avenue. Wastewater would be conveyed approximately 1 mile from the South Milledge Avenue Site to the University of Georgia (UGA) soccer/softball complex at Will Hunter Road through a redundant pumping system. From there, wastewater would flow in an existing pipeline to the Athens-Clarke County's Middle Oconee WWTP. Further information regarding the sewer system is found in Section 3.13, Waste Management.

Sewage acceptance criteria and pretreatment requirements would apply to the wastewater discharged from the proposed NBAF. The Athens-Clarke County Sewer Use Ordinance of 2007 provides limits on specific pollutant discharges to the Middle Oconee Wastewater Treatment Facility as presented below in Table 3.3.3.3.4-1 (ACC 2007e). The NBAF would be designed and operated as necessary to prevent negative impact to the Athens-Clarke County Middle Oconee WWTP treatment capabilities resulting from flow rate or potentially harmful wastewater constituents.

Pending revisions to the above local limits, which are expected to take effect before the end of 2008, would further reduce the BOD from 1,000 to 500 mg/l and total suspended solids (TSS) from 750 to 500 mg/l (e-mail communication from David Bloyer, WPC Plant Operations Coordinator for Athens-Clarke County, to Clarissa Hageman, Tetra Tech., Inc.).

Table 3.3.3.3.4-1 — Local Limits for Middle Oconee WWTP

Constituent	Limits	Units
Arsenic	0.007	mg/l
BOD	1,000.000	mg/l
Cadmium	0.008	mg/l
Copper	0.110	mg/l
Cyanide	0.300	mg/l
Lead	0.120	mg/l
Mercury	0.002	mg/l
Nickel	0.280	mg/l
Silver	0.770	mg/l
Total chromium	2.630	mg/l
Total phenols	2.130	
Total suspended solids	750.000	mg/l
Zinc	0.210	mg/l
Oils, as defined in §5-1-2(c)(6)	100.000	mg/l

3.3.3.3.5 Steam and Chilled Water

The proposed NBAF operation would require a peak steam load of 133,510 pounds per hour (lb/hr) including 55,000 lb/hr for process loads. To meet the firm capacity, six equally sized boilers at 26,702 lb/hr are required to maintain the firm capacity of 133,510 lb/hr, while meeting the requirement for total installed capacity of 160,212 lb/hr. This configuration would allow the peak capacity of the facility to be met in the event of the loss of 1 boiler (NDP 2008).

The proposed NBAF operation would also require a peak chilled water load of 5,173 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 1,035 tons are required to maintain the firm capacity of 5,173 tons, while meeting the requirement for total installed capacity of 6,210 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008).

3.3.4 Manhattan Campus Site

This section describes the existing services available to support the operation of the NBAF at the Manhattan Campus Site and the potential consequences and effects to the existing infrastructure from the addition of the facility. The infrastructure encompasses potable water supply, electrical power, fuels and natural gas, sanitary wastewater treatment facilities, and steam and chilled water.

3.3.4.1 Affected Environment

3.3.4.1.1 Potable Water Supply

Potable water is supplied by the City of Manhattan Public Works Department. The City of Manhattan's current potable water supply capacity is 20.5 million gpd. Demand on the system averages 6.8 mgd with peak consumption of 17 mgd or 83% of supply capacity. The city is currently planning a major water treatment plant and well field improvement project, which would increase the potable water supply capacity to approximately 30 mgd and is scheduled for completed by 2009 (McIntyre 2007). Regarding a dedicated potable water supply to the Manhattan Campus Site, the Public Works Department has stated that the City of Manhattan would supply the site, from excess capacity, a volume of 1.0 mgd during the months of September through May and an excess capacity volume of 0.5 mgd during the summer months (June through August) (Ann Galbraith, Tetra Tech, Inc., February 20, 2008 e-mail from Peter Armesto, City of Manhattan).

There is a 24-inch water main adjacent to the site along Denison Avenue, which can supply water at 130 to 140 psi and 1,500 to 2,500 gpm, depending on the pumps that are running at the water treatment plant. The 24-inch water main would be dedicated to the NBAF at the Manhattan Campus Site (Ann Galbraith, Tetra Tech, Inc., February 20, 2008 e-mail from Peter Armesto, City of Manhattan).

3.3.4.1.2 Electricity

Westar Energy is the electrical utility responsible for providing power to the Manhattan Campus Site. Westar Energy would supply three-phase electricity to the Manhattan Campus Site through two independent electrical substations. The first electrical substation, designated as the KSU Substation, has a capacity of 22.4 mW and is located on the KSU campus. The second electrical substation, designated as the Matters Corner Substation, has a nearly equal capacity and is located off-campus approximately 1 mile from the site. Power from the two primary substations would be routed to the Manhattan Campus Site through two new and separate aboveground or underground lines that converge at a new Westar Energy–constructed electrical substation to step the voltage down and distribute the two independent power supplies to the site. The new electrical substation would be located on or adjacent to the proposed NBAF site and would have dual transformers, each with the capacity to supply the entire facility's electrical energy demand as required.

3.3.4.1.3 Fuels and Natural Gas

The Kansas Gas Service (KGS) would supply natural gas to the Manhattan Campus Site through an existing 8-inch diameter, high-pressure distribution gas line running along Denison Avenue and adjacent to the proposed Manhattan Campus Site. To distribute gas to the NBAF it would be necessary to tap into this high-pressure distribution gas line.

The capacity of the KGS 8-inch natural gas distribution line at 3,000 ccf/hr is approximately 200% greater than the peak design demand of 1,480 ccf/hr for the NBAF (Kansas Gas Service, Pam Stone, March 11, 2008, letter to Kansas Bioscience, Tom Thornton)

3.3.4.1.4 Sanitary Sewage

The City of Manhattan Public Works Department WWTP includes influent screening, influent pumping, grit removal, conventional activated sludge treatment, and ultraviolet disinfection. The treatment train does not include primary sedimentation. A storm water basin is available for short-term storage during peak flow events. Solids processed at the WWTP consist of aerobic digestion before sludge is pumped to the City's Biosolids Farm for land application. The WWTP ultimately discharges to the Kansas River. The existing treatment system has an 8.7 mgd peak flow capacity and currently operates at 5.0 mgd on average.

The NBAF would discharge sanitary wastewater into the City of Manhattan Public Works Department sewer system. There is an 8-inch sewer line near the Manhattan Campus Site to the north along Denison Avenue, with a 4-inch force main adjacent to the east of the proposed site (KSU 2007). Additional information regarding sanitary sewage is evaluated in Section 3.13, Waste Management.

3.3.4.1.5 Steam and Chilled Water

Existing steam and chilled water utilities adjacent to the Manhattan Campus Site are not available to serve the NBAF (NDP 2008).

3.3.4.2 Construction Consequences

3.3.4.2.1 Potable Water Supply

Water would be required during the construction of the NBAF for dust suppression and wash down of equipment. The water would likely be supplied via tanker truck at the point of use or obtained though a metered connection to an existing fire hydrant or similar connection. The additional demand on the water supply due to the NBAF construction would be negligible.

3.3.4.2.2 Electricity

There would be no additional demand on the electricity supply during construction of the NBAF at the Manhattan Campus Site. Portable electrical generators would be utilized throughout construction and installation of the facility.

3.3.4.2.3 Fuels and Natural Gas

Natural gas or No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.4.2.4 Sanitary Sewage

The construction site would be provided with portable chemical toilets. While these portable toilets would be emptied into the local sanitary sewer system during the construction of the NBAF, the overall impact would be negligible in comparison to the total waste inflow to the WWTP. Construction equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water.

3.3.4.3 Operation Consequences

3.3.4.3.1 Potable Water Supply

Potable water would be supplied to the Manhattan Campus Site by the City of Manhattan Public Works Department. The facility designers recommend that municipal water service be brought to the site via redundant or looped feeds such that maximum water demand may be satisfied with loss of one feed line. Projected water consumption at the proposed NBAF ranges between 50,000 gpd and 250,000 gpd with a peak flow rate of 665 gpm at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption for the NBAF at the Manhattan Campus Site is projected to be 37,750,000 gallons (NDP 2007b). An irretrievable commitment of 1.89 billion gallons of potable water would be required over the 50-year project life.

The current City of Manhattan Public Works Department infrastructure of a 24-inch water main adjacent to the site along Denison Avenue, with a dedicated supply capacity range of 500,000 gpd to 1,000,000 gpd and a peak flow rate of 2,500 gpm at a delivery pressure of 130 psi would meet the potable water design requirements for the NBAF. In addition, upgrades to the municipal potable water system, discussed in Section 3.3.4.1.1, would further enhance the capacity of the municipal water system.

3.3.4.3.2 Electricity

Westar Energy would supply three-phase electricity to the Manhattan Campus Site through two independent electrical substations. Both independent substations would have sufficient capacity for 13.5 mW dedicated power to the NBAF. Power from the two primary substations would be routed to the Manhattan Campus Site through two new and separate aboveground or underground lines that converge at a new Westar Energy–constructed electrical substation located on or adjacent to the proposed Manhattan Campus Site to step the voltage down and distribute the two independent power supplies to the NBAF.

Operating demand for electricity at the NBAF is projected at 13.1 mW (NDP 2007a). This demand represents only 0.43% of Westar Energy's current generating capacity of 3,082 mW. The design requirements for electrical service to the NBAF include a minimum of two redundant medium-voltage services with multiple feeders, an on-site utility substation at 34.5 kV with two transformers feeding 15 kV Class switchgear in a main-tie-main arrangement. The secondary feeders would provide primary electric service at 13.8 kV to the CUP and to the NBAF buildings (NDP 2008). Based on current information, Westar Energy would have sufficient capacity to meet the power requirements and redundancy specifications for the NBAF (March 25, 2008 letter from Westar Energy, Chad Luce to Kansas Bioscience Authority, Tom Thornton).

3.3.4.3.3 Fuels and Natural Gas

Operation of the NBAF at the Manhattan Campus Site is projected to require 1,410,000 ccf/yr of natural gas. On an average basis, the NBAF would be expected to exert a natural gas demand of 3,863 ccf/day. The peak gas demand is estimated at 1,480 ccf/hr at a supply pressure of 10 psi (NDP 2008).

The CUP, constructed as part of the NBAF, would house multiple dual-fuel (natural gas/No. 2 fuel oil) boilers. The primary fuel source for the boilers is to be determined based on local fuel availability (NDP 2007b). In the case of the Manhattan Campus Site, natural gas would be the primary fuel source to meet peak demand. Fuel oil would be used in cases were natural gas is not available.

Natural gas service would be piped to the CUP through an existing 8-inch diameter, high- pressure distribution gas line running along Denison Avenue and adjacent to the proposed Manhattan Campus Site. The required metering equipment and main pressure-reducing valve would be located outside the plant (NDP 2007b). The capacity of the KGS 8-inch natural gas distribution line is 3,000 ccf/hr, which is approximately 200% greater than the peak design demand of 1,480 ccf/hr for the NBAF (Kansas Gas Service, Pam Stone March 11, 2008, letter to Kansas Bioscience, Tom Thornton). Therefore, KGS considers their natural gas capacity sufficient to meet the projected and future gas needs of the NBAF and area population growth with no improvements projected (MS 2007).

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil and natural gas would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.4.3.4 Sanitary Sewage

Operation of the NBAF is projected to result in the discharge of between 50,000 gpd and 140,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 25,000,000 gpy (NDP 2008). If a tissue digester is utilized for carcass disposal, the waste stream from the tissue digester, estimated at 2% of the total discharge volume, would be commingled for discharge with the rest of the NBAF wastewater. The projected wastewater constituents in the tissue digester waste stream include BOD – 10,250 mg/l; COD – 19,600 mg/l; suspended solids – 1,400 mg/l; and pH – 9.48 standard units (NDP 2008).

The NBAF would pump sanitary wastewater into an existing force-main located on the Manhattan Campus Site. A new pump station would be installed on the existing force-main to receive and transport wastewater north through the existing infrastructure and into the Manhattan Public Works Department WWTP. The City of Manhattan is currently designing a new WWTP and is incorporating wastewater discharge projections for the NBAF into the design criteria for the new WWTP (phone conversation between Patricia Myers, Tetra Tech, Inc., and Jerry McIntyre, City of Manhattan, April 2, 2008). Further information regarding the sewer system is found in Section 3.13, Waste Management.

Sewage acceptance criteria and pretreatment requirements would apply to the wastewater discharged from the NBAF. A partial listing of the Manhattan, Kansas, technically based local limits for wastewater discharge into the Manhattan Public Work Department WWTP are presented in Table 3.3.4.3.4-1 (CoM 2007b). The NBAF would be designed and operated as necessary to prevent negative impact to the City of Manhattan Public Works Department WWTP treatment capabilities resulting from flow rate or potentially harmful wastewater constituents.

Table 3.3.4.3.4-1 — Local Limits, Manhattan, Kansas, WWTP

Constituent	Limits	Units
Average Flow	<2% of average flow	gpm
TSS	350	mg/l
BOD	300	mg/l
Fats Oil and Grease	100	mg/l
pH	5.5 – 9.5	Standard Units
Temperature	<150°	Fahrenheit

3.3.4.3.5 Steam and Chilled Water

The NBAF operation would require a peak steam load of 147,865 lb/hr including 55,000 lb/hr for process loads. To meet the firm capacity of the NBAF, six equally sized boilers at 29,573 lb/hr are required to maintain the firm capacity of 147,865 lb/hr while meeting the requirement for total installed capacity of 177,438 lb/hr. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one boiler (NDP 2008b).

The NBAF operation would also require a peak chilled water load of 5,382 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 1,076 tons are required to maintain the firm capacity of 5,382 tons while meeting the requirement for total installed capacity of 6,456 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008b).

3.3.5 Flora Industrial Park Site

This section describes the existing services available to support the operation of the NBAF at the Flora Industrial Park Site and the potential consequences and impacts to the existing infrastructure from the addition of the facility. The infrastructure encompasses potable water supply, electrical power, fuels and natural gas, sanitary wastewater treatment facilities, and steam and chilled water.

3.3.5.1 Affected Environment

3.3.5.1.1 Potable Water Supply

Potable water is supplied to the Flora Industrial Park Site by the Town of Flora, Mississippi. Groundwater is extracted, treated, stored in tanks (approximately 300,000 gallon capacity), then supplied to the town. In 2005, The Town of Flora consumed an average of 756,000 gpd of potable water. Its peak consumption, at 900,000 gpd, was roughly 65% of its supply capacity of 1,390,000 gpd (MDA 2005). Currently planned and funded upgrades would supply in excess of 200,000 gpd to the Flora Industrial Park Site (MS 2007).

There is a 10-inch water main adjacent to the Flora Industrial Park Site that can supply water at over 60 psi (MS 2007). The operating flow rate and available capacity of this pipe are not known .

3.3.5.1.2 Electricity

Entergy Mississippi, Inc., serving 45 of Mississippi's 82 counties, would be the electrical utility responsible for providing power to the Flora Industrial Park Site (EMI 2007). Entergy Mississippi, a subsidiary of Entergy Corporation, is an integrated energy company engaged primarily in electric power production and retail distribution operations. Entergy owns and operates power plants with approximately 30,000 mW of electric generating capacity, and it is the second-largest nuclear generator in the United States. Entergy delivers electricity to utility customers in Arkansas, Louisiana, Mississippi, and Texas (EMI 2007).

Entergy Mississippi, Inc. would build a new substation on the Flora Industrial Park Site to serve the utility load requirement of 13.1 mW. This new substation would be served by an existing 115,000 kV transmission line with the capability to serve from two sources. The new substation would have a power capacity in excess of 13.1 mW and would contain two transformers, with either transformer being capable of bearing the entire power load of the proposed NBAF. Transformer 1 would be used to serve the facility with 13.8 kV nominal voltage. Transformer 2 would serve as a back-up power source and also provide 13.8 kV normal voltage (J. Turner, Entergy Mississippi, Inc. correspondence on March 19, 2008).

3.3.5.1.3 Fuels and Natural Gas

Atmos Energy would supply natural gas to the Flora Industrial Park Site. Atmos Energy is the largest natural gas-only utility in the United States, as well as the largest natural gas distributor in Mississippi. The company serves 144 communities across Mississippi (Atmos Energy Press Release 2005).

Atmos Energy would supply natural gas through an existing 6-inch diameter, supply pressure distribution gas line running adjacent to the proposed Flora Industrial Park Site. To distribute gas to the NBAF, it would be necessary to tap into this supply pressure distribution gas line.

The nominal operating pressure of this 6-inch supply pressure distribution gas line is 125 psi. The MAOP for this line is 275 psi, with a nominal capacity of 600 ccf/hr, and a peak capacity of 1,250 ccf/hr. The current utilization of this natural gas source averages 14,400 ccf/day and peaks at 30,000 ccf/day. The gas main can currently supply an excess 20,400 ccf/day of natural gas at 10 psi (E-mail correspondence from Atmos Energy, Gregory J. Williamson on January 8 and 23, 2008 to Tetra Tech, Inc., Chit Christian).

3.3.5.1.4 Sanitary Sewage

The Town of Flora treats wastewater in an aeration lagoon, passes it through a sand filter, and then discharges it into the Black Creek River. The existing treatment system has a 300,000 gpd capacity and currently operates at 100,000 gpd on average. State funding is being sought for more than a two-fold increase in capacity (MS 2007).

The NBAF would discharge sanitary wastewater into the Town of Flora sewer system. There is currently a 10-inch gravity line on-site that discharges into a 350 gpm lift station. A 6-inch force main transports the waste to the Flora treatment facility (MS 2007). The 10-inch gravity sewer line that would serve the Flora Industrial Park Site currently has no flow, so it has 100% excess flow rate capacity (Dave Holman, Town of Flora, February 5, 2008, phone call from Clarissa Hageman, Tetra Tech, Inc.). The 6-inch force main currently has 52% excess flow rate capacity. Additional information regarding sanitary sewage is provided in Section 3.13, Waste Management.

3.3.5.1.5 Steam and Chilled Water

The Flora Industrial Park Site does not have existing steam and chilled water infrastructure.

3.3.5.2 Construction Consequences

3.3.5.2.1 Potable Water Supply

Water would be required during the construction of the NBAF for dust suppression and wash down of equipment. The water would likely be supplied via tanker truck at the point of use or obtained though a metered connection to an existing fire hydrant or similar connection. The additional demand on the water supply to the Flora Industrial Park Site for NBAF construction would be negligible.

3.3.5.2.2 Electricity

There would be no additional demand on the electricity supply during construction of the NBAF. Portable electrical generators would be used throughout construction and installation of the facility.

3.3.5.2.3 Fuels and Natural Gas

Natural gas or No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.5.2.4 Sanitary Sewage

The construction site would be provided with portable chemical toilets, which would result in only a minor increase in the sanitary sewage discharge to the local sewer system during the construction phase of the proposed NBAF. Construction equipment would be washed down, as necessary, in a designated area with appropriate controls for collecting and managing the wash water.

3.3.5.3 Operation Consequences

3.3.5.3.1 Potable Water Supply

Potable water would be supplied to the Flora Industrial Park Site by the Town of Flora. The NBAF designers recommended that municipal water service be brought to the site via redundant or looped feeds such that maximum water demand may be satisfied with loss of one feed line (NDP 2007b). Projected water consumption at the NBAF ranges between 50,000 gpd and 290,000 gpd with a peak flow rate of 669 gpm at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption for the NBAF at the Flora Industrial Park Site is projected to be 48,150,000 gallons (NDP 2007b). An irretrievable commitment of 2.4 billion gallons of potable water would be required over the 50-year project life.

The current Town of Flora Public Works Department infrastructure of a 10-inch water main adjacent to the Flora Industrial Park Site, with a dedicated supply capacity of 200,000 gpd at a delivery pressure of 60 psi would meet or exceed all but the peak daily water consumption requirements for the NBAF. The planned upgrades to the municipal potable water system of an additional 300,000-gallon tank located on the site, and additional water well(s) with 720,000 gpd capacity, would further enhance the capacity of the municipal water system and are anticipated to meet all the water requirements for the NBAF (MS 2007).

3.3.5.3.2 Electricity

Entergy Mississippi, Inc. would build a new substation on the Flora Industrial Park Site to serve the utility load requirement of 13.1 mW. This new substation would served by an existing 115,000 kV transmission line with the capability to serve from two sources. The new substation would have a power capacity in excess of 13.5 mW and would contain two transformers with either transformer being capable of bearing the entire power load of the NBAF. Transformer 1 would be used to serve the facility with 13.8 kV nominal voltage to the CUP. Transformer 2 would serve as a back-up power source and would also provide 13.8 kV normal voltage to the CUP (J. Turner, Entergy Mississippi, Inc., correspondence on March 19, 2008).

The projected operating demand for electricity at the NBAF of 13.1 mW, represents 66% of the 20.0 mW of electrical load that has been allocated by Entergy Mississippi for operation of the NBAF (NDP 2007a). The design requirements for electrical service to the Flora Industrial Park Site include a minimum of two redundant medium voltage services with multiple feeders, an on-site utility substation at 34.5 kV with two transformers feeding 15 kV Class switchgear in a main-tie-main arrangement. The secondary feeders would provide primary electric service at 13.8 kV to the CUP and to the NBAF buildings. Based on current projections, Entergy Mississippi would have sufficient capacity to meet the power requirements but not the redundancy specifications for the NBAF.

3.3.5.3.3 Fuels and Natural Gas

Operation of the NBAF is projected to require 1,072,400 ccf/yr of natural gas. On an average basis, the NBAF would be expected to exert a natural gas demand of 2,938 ccf/day. The peak gas demand from the NBAF is estimated at 1,330 ccf/hr with a supply pressure of 10 psi (NDP 2008b).

The CUP, constructed as part of the NBAF, would house multiple dual-fuel (natural gas/No. 2 fuel oil) boilers. The primary fuel source for the boilers is to be determined based on local fuel availability (NDP 2007b). In the case of the Flora Industrial Park Site, natural gas would be the primary fuel source to meet peak demand. Fuel oil would be used in cases were natural gas is not available. Natural gas would be piped to the CUP through a pressure-reducing station, at an approximate pressure of 10 psi. Metering equipment and main pressure-reducing valve would be located outside the plant (NDP 2007b).

Natural gas service from Atmos Energy would be piped to the CUP through an existing 6-inch diameter supply pressure distribution gas line running adjacent to the Flora Industrial Park NBAF site. The nominal operating pressure of this gas line is 125 psi. The MAOP for this line is 275 psi with a nominal capacity of 600 ccf/hr and a peak capacity of 1,250 ccf/hr. The excess capacity of this distribution gas line, which could be dedicated to the NBAF, is currently at 40%. Based on the requirements for natural gas peak usage and annual consumption at the NBAF, the existing Atmos Energy natural gas infrastructure would meet the projection for annual natural gas consumption but not the requirement for peak utilization capacity. To serve the NBAF, Atmos Energy would need to install, at a minimum, an 11-mile long, 4-inch and 6-inch steel pipeline from the natural gas distribution input station near Jackson, Mississippi. Furthermore, Atmos Energy would need to confirm the ability of the input station to meet this additional demand (e-mail from Greg Williamson, Atmos Energy, April 1, 2008).

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil and natural gas would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.5.3.4 Sanitary Sewage

Operation of the NBAF is projected to result in the discharge of between 50,000 gpd and 150,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 28,250,000 gpy (NDP 2008b). If a tissue digester is used for carcass disposal, then the waste stream from the tissue digester, estimated at 2% of the total discharge volume, would be commingled for discharge with the rest of the NBAF wastewater. The projected wastewater constituents in the tissue digester waste stream include BOD – 10,250 mg/l; COD – 19,600 mg/l; suspended solids – 1,400 mg/l; and pH – 9.48 standard units (NDP 2008b).

The NBAF would discharge sanitary wastewater into the existing Town of Flora 10-inch diameter gravity wastewater main. Approximately 1,600 feet of new sewer main would be required to tie the Flora Industrial Park NBAF to the existing 10-inch diameter sewer main. Further information regarding the sewer system is found in Section 3.13, Waste Management.

Sewage acceptance criteria and pretreatment requirements would apply to the NBAF wastewater discharge. Although Flora, Mississippi, and Madison County, Mississippi, have no specific ordinances governing pollutant limitations for discharges to the Flora WWTP, local and state review on a case-by-case basis serve as sewage use local limits. The NBAF would be designed and operated as necessary to prevent negative impact to the Flora sewage treatment capabilities resulting from flow rate or potentially harmful wastewater constituents.

3.3.5.3.5 Steam and Chilled Water

The NBAF operation would require a peak steam load of 132,883 lb/hr including 55,000 lb/hr for process loads. To meet the firm capacity of the NBAF, six equally sized boilers at 26,577 lb/hr are required to maintain the firm capacity of 132,883 lb/hr while meeting the requirement for total installed capacity of 159,462 lb/hr. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one boiler (NDP 2008).

The NBAF operation would also require a peak chilled water load of 5,493 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 1,099 tons are required to maintain the firm capacity of 5,493 tons while meeting the requirement for total installed capacity of 6,594 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008).

3.3.6 Plum Island Site

This section describes the existing services available to support the operation of the NBAF at the Plum Island Site and the potential consequences and effects to the existing infrastructure from the addition of the NBAF facility, along with the existing PIADC facility. The infrastructure encompasses potable water supply, electrical power, fuels, sanitary wastewater treatment facilities, and steam and chilled water. The NBAF would operate concurrently with the existing PIADC operations. Current infrastructure would be utilized for the simultaneous operation of both the NBAF and the PIADC operations.

3.3.6.1 Affected Environment

A description of the existing infrastructure conditions (potable water supply, electricity, fuel oil, and sanitary sewage) associated with Plum Island is located in Section 3.3.2.1.

3.3.6.2 Construction Consequences

3.3.6.2.1 Potable Water Supply

Potable water would be supplied during construction of the NBAF at Plum Island by the existing PIADC infrastructure. Non-potable water would be required during the construction for dust suppression, wash down of equipment, and possibly soil compaction. The water would likely be supplied via tanker truck at the point of use or obtained though a metered connection to the existing PIADC water system. The additional demand on the potable water supply to the NBAF would be negligible during construction.

3.3.6.2.2 Electricity

There would be no additional demand on the electricity supply during construction of the NBAF. Portable electrical generators would be used throughout construction and installation of the facility.

3.3.6.2.3 Fuels and Natural Gas

No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.6.2.4 Sanitary Sewage

The construction site would be provided with portable chemical toilets. While these portable toilets would be emptied into the local sanitary sewer system during construction, the overall impact would be negligible in comparison to the total waste inflow to the WWTP. Construction equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water.

3.3.6.3 Operation Consequences

3.3.6.3.1 Potable Water Supply

Potable water would be supplied to the proposed NBAF from the existing groundwater supply. The NBAF designers recommended that water service be available to the NBAF via redundant or looped feeds such that maximum water demand may be satisfied with loss of one feed line (NDP 2007a). The projected water consumption at the NBAF ranges between 50,000 gpd and 250,000 gpd with a peak flow rate of 665 gpm at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption for the NBAF is 36,500,000 gallons (NDP 2007b). An irretrievable commitment of 1.83 billion gallons of potable water would be required over the 50-year project life.

Potable water would also be supplied to the current PIADC from the existing groundwater supply. The historical annual water consumption for the PIADC operations averages 17,412,000 gpy. The estimated total annual water consumption for the combined Plum Island NBAF and the PIADC is projected to be 53,912,000 gallons.

The current PIADC water supply infrastructure of 12 groundwater wells with a production capacity limited to 150,000 gpd for aquifer preservation and a 200,000 gallon water tower, as described more completely in Section 3.3.2.1.1, would not meet the peak daily consumption requirements from the concurrent operation of the NBAF and the PIADC. To meet these requirements, new wells would need to be added to ensure the maximum daily water production and two new 200,000 gallon water towers would also need to be added to allow storage of 2 days of water consumption during peak periods and to comply with supply redundancy requirements for the NBAF (NDP 2008b). The installation of the proposed NBAF at the Plum Island Site would trigger an EPA review to ensure that the groundwater source is not endangered.

3.3.6.3.2 Electricity

Operating demand for electricity at the NBAF is projected at 12.8 mW (NDP 2007a). A minimum of two new redundant medium-voltage services with multiple feeders would be required to serve the NBAF and Plum Island infrastructure. The current PIADC electrical infrastructure, detailed in Section 3.3.2.1.2., and comprised primarily of two submarine electrical cables of approximately 3.4 mW capacity each from Long Island, New York, would remain dedicated to the PIADC operation.

The required improvements in the electrical infrastructure for the operation of the NBAF would include new service from utility substations on Long Island or the Connecticut mainland at 13.2 kV or 34.5 kV, with two additional underwater cables from Long Island or Connecticut to supply feeding 15kV Class switchgear in a main-tie-main arrangement. The new underwater cables would each be supplied from separate utility transformer busses at the utility substation and would each carry a minimum of 13.5 mW of dedicated power. The secondary feeders would provide primary electric service to distribution substations with main-tie-main switchgear for 480 Volt service to support the NBAF. The distribution substations with 5kV main-tie-main switchgear for 4,160 Volt service would support the CUP chillers with the 480 Volt transformers supporting the motor control centers (NDP 2008).

3.3.6.3.3 Fuels and Natural Gas

The CUP to be constructed as part of the NBAF would house multiple boilers. No. 2 fuel oil would be the primary fuel source and would be stored on-site in sufficient quantities to meet peak demand. It is estimated that the new facility would consume 1.6 million gallons of fuel oil per year including normal boiler operation, weekly testing, and 30 days of operation in the stand-by mode for the generators. The 660,000-gallon fuel storage capacity represents a 30-day supply during the month of January in the event the facility needed to operate solely on stand-by power (NDP 2008).

The concurrent operation of the PIADC also utilizes No. 2 fuel oil as the primary fuel source. The historic PIADC consumption of No. 2 fuel oil is approximately 900,000 gpy. Therefore, the estimated annual total for No. 2 fuel oil consumption from the concurrent operation of the Plum Island NBAF and the PIADC is projected to be 2,500,000 gpy.

Depending on the available frequency of refueling of the tanks during the winter months, the fuel tank farm would not be deemed sufficient and would need to be doubled in capacity to meet the simultaneous operational fuel requirements of both the NBAF and the PIADC.

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.6.3.4 Sanitary Sewage

Operation of the NBAF is projected to result in the discharge of between 50,000 gpd and 125,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 23,000,000 gpy (NDP 2008). Currently, a tissue digester is not planned for Plum Island. Given the existing PIADC sanitary treatment system has a capacity of only 80,000 gpd, it would not meet some of the peak demand days. Possible options for treatment of NBAF wastewater at Plum Island include:

- A new WWTP would need to be constructed to accommodate the projected NBAF loads. This new WWTP would require SPDES permitting for annual treatment capacity and pretreatment of animal feed solids removal carryover.
- Expansion of the existing PIADC facilities to handle the additional NBAF loads. This would also require permit revision and pretreatment of animal feed solids removal carryover.
- Add pretreatment holding tanks to the NBAF so that the peaks are averaged to fall within the existing permit levels. This would also require permit revision and pretreatment of animal feed solids removal carryover.

Regardless of the option selected, a new pump station would be required to move the effluent for the NBAF to the area of the selected treatment facility (NDP 2008).

3.3.6.3.5 Steam and Chilled Water

The NBAF operation would require a peak steam load of 141,562 lb/hr including 55,000 lb/hr for process loads. To meet the firm capacity of the NBAF, five equally sized boilers at 28,312 lb/hr are required. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one boiler (NDP 2008b).

The NBAF operation would also require a peak chilled water load of 4,683 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 937 tons are required to maintain the firm capacity of 4,683 tons while meeting the requirement for total installed capacity of 5,622 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008).

3.3.7 Umstead Research Farm

This section describes the existing services available to support the operation of the NBAF at the Umstead Research Farm and the potential consequences and effects to the existing infrastructure from the addition of the facility. The infrastructure encompasses potable water supply, electrical power, fuels and natural gas, sanitary wastewater treatment facilities, and steam and chilled water.

3.3.7.1 Affected Environment

3.3.7.1.1 Potable Water Supply

Potable water is supplied by the South Granville Water and Sewer Authority (SGWASA). SGWASA utilizes surface water from Lake Holt as the potable water source for Granville County and is permitted for the use of 7.5 mgd of raw water from Lake Holt. The water is treated in the SGWASA water treatment plant using flocculation, filtration, sedimentation, and clarification followed by chlorination and storage in a 1,000,000 gallon elevated tank. The 7.5 mgd capacity water treatment plant operates at approximately half capacity (3.0 mgd). SGWASA has indicated that the NBAF site projected water usage of 110,000 gpd [40 million gallons per year (gpy)] would be available from SGWASA on an annual basis due to the excess capacity of 4.5 mgd (April 25, 2007, letter from SGWASA, Lindsey Mize); (January 15, 2008, phone call to SGWASA, Lindsey Mize from Tetra Tech, Inc., Joe Rafferty); (January 24, 2008, phone call to SGWASA, Fred Dancy from Tetra Tech, Inc., Joe Rafferty).

The closest SGWASA water main, located approximately 4,500–5,500 feet south of the Umstead Research Farm Site, is an existing 8-inch water main running adjacent to Old Route 75. This existing water main has the capacity to deliver 783 gpm (about 1.1 mgd) at 50 psi of static pressure and has approximately 70% excess supply capacity at this operating pressure based on current consumption data (January 24, 2008, phone call to SGWASA, Fred Dancy from Tetra Tech, Inc., Joe Rafferty).

3.3.7.1.2 Electricity

Duke Energy, operating in the Carolinas Service Area, is the electrical utility responsible for providing power to the Umstead Research Farm Site (Duke Energy 2008). Duke Energy owns and operates numerous generation plants that utilize nuclear, coal, natural gas, fuel oil, and renewable energy sources (hydro) for 9,830 net mW within the Carolinas Service Area (Duke Energy 2008).

Duke Energy would supply three-phase electricity to the Umstead Research Farm Site through two independent electrical substations. The first 100 kV electrical substation with sufficient capacity for 13.5 mW of dedicated power, designated as the Butner Retail Substation located in Butner, North Carolina, is approximately 2 miles from the proposed site. The second 100 kV electrical substation with sufficient capacity for 13.5 mW of dedicated power would be the Staggville Retail substation. This would be a new substation dedicated to the NBAF and located approximately 4 miles to the west. Power from the two primary substations would be routed to the site through two new and separate aboveground or underground lines that converge at a third Duke Energy electrical substation to step the voltage down and distribute the two independent power supplies to the site. The third electrical substation would be located on or adjacent to the site and would have dual transformers, each with the capacity to supply the entire facility demand as required.

3.3.7.1.3 Fuels and Natural Gas

PSNC Energy is a regulated public utility engaged primarily in purchasing, transporting, distributing, and selling natural gas throughout a 28-county service area in north, central, and western North Carolina (PSNC 2008).

The existing PSNC Energy infrastructure to supply natural gas to the Umstead Research Farm Site includes an existing 4-inch, 60-psi supply distribution gas line running adjacent to Old Route 75 east of the intersection of State Road (SR) 1120 with Old Route 75. To supply the Umstead Research Farm Site, PSNC Energy's original intention was to extend the existing 4-inch, 60-psi service line approximately 5,600 feet north to the 249-acre site (January 11, 2008, e-mail to Joe Rafferty from Jerry O'Keeffe). The PSNC Energy extended 4-inch, 60 psi service line to service the Umstead Research Farm Site would be designed to supply a connected gas load of approximately 500 ccf/hr at a delivery pressure of 5 psi (January 11, 2008, e-mail to Joe Rafferty from Jerry O'Keeffe).

3.3.7.1.4 Sanitary Sewage

The SGWASA sewage treatment plant has a capacity of more than 5.0 mgd. The NBAF would discharge sanitary wastewater through approximately 6,500 feet of newly constructed gravity wastewater line that would connect the NBAF to the existing SGWASA 36-inch diameter gravity trunk wastewater main located south of Old Route 75 along a stream bed in the general direction of Old Route 75. This is a new sewage line (January 24, 2008 phone call to Fred Dancy from Joe Rafferty). The wastewater would subsequently flow into the SGWASA Sewage Treatment Facility. The trunk sewer line that would serve the Umstead Research Farm Site currently has 50% excess flow rate capacity. The existing SGWASA Sewage Treatment Plant has a design capacity of more than 5.5 mgd and is currently operating just below 50% capacity (February 15, 2008, consortium response to DHS data call). Additional information regarding sanitary sewage is evaluated in Section 3.13, Waste Management.

3.3.7.1.5 Steam and Chilled Water

The site does not have existing steam and chilled water infrastructure.

3.3.7.2 Construction Consequences

3.3.7.2.1 Potable Water Supply

Water would be required during the construction of the NBAF for dust suppression and wash down of equipment. Water for construction would likely be obtained through connection to a nearby fire hydrant or other connection, on which a temporary water meter could be attached, or trucked in from a nearby surface water source. The additional demand on the water supply from construction activities for the NBAF site would be negligible.

3.3.7.2.2 Electricity

There would be no additional demand on the electricity supply during construction of the NBAF. Portable electrical generators would be used throughout construction and installation of the facility.

3.3.7.2.3 Fuels and Natural Gas

Natural gas or No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction-associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.7.2.4 Sanitary Sewage

The construction site would be provided with portable chemical toilets in sufficient quantity to accommodate all site construction workers during construction. Periodically, the contents of the chemical toilets would be collected for ultimate discharge into the South Granville Water and Sewer Authority WWTP in Butner for treatment. The impact of this volume of sanitary waste on the treatment capacity of the WWTP would be minimal. Construction equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water.

3.3.7.3 Operation Consequences

3.3.7.3.1 Potable Water Supply

Potable water would be supplied to the NBAF by SGWASA. The NBAF designers recommended that municipal water service be brought to the site via redundant or looped feeds such that maximum water demand may be satisfied with loss of one feed line (NDP 2007b). Projected water consumption at the NBAF ranges between 50,000 gpd and 275,000 gpd, with a peak flow rate of 665 gpm at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption for the Umstead Research Farm Site is projected to be 39,500,000 gallons (NDP 2007b). An irretrievable commitment of 1.98 billion gallons of potable water would be required over the 50-year project life.

The current SGWASA plans to serve the NBAF include a new 8-inch water supply main extending east from the site approximately 5,000 feet to connect with the existing 8-inch water main running adjacent to Old Route 75. The SGWASA water system is a looped system from the water treatment plant to the pumping system of the elevated water tanks, to Central Avenue (SR 1103) north to the junction of Central and 33rd Street and Old Route 75, then to the southwest along Old Route 75 to the junction of Old Route 75 and Veasey Road, then southeast on Veasey Road back to the elevated water storage tank pumping system. The 8 inch water main operating at 50 psi of static pressure along Old Route 75 where the Umstead Research Farm Site would tie in has a current utilization of 30% and an excess capacity of 70% (January 24, 2008, phone call to Fred Dancy from Joe Rafferty). Using an average velocity constraint of 5.0 feet per second, the maximum capacity of the 8-inch water main is approximately 783 gpm or 1,127,997 gpd. At 30% utilization, the excess capacity would be approximately 790,000 gpd. The projected NBAF water usage of 110,000 gpd represents only 14% of the excess capacity from the existing 8-inch water main on Old Route 75. Based on the current SGWASA water system operating capacity of 3.0 mgd, an additional 4.5 mgd in water system treatment and delivery design capacity, and the ability to access nearby surface water sources for future capacity requirements, the SGWASA would have sufficient capacity to handle the NBAF demand in addition to other non-water intensive development within the Umstead Research Farm area (January 15, 2008, phone call to Lindsey Mize from Joe Rafferty).

According to the SGWASA Water and Sewer Regulations, Water Shortage Ordinance of January 8, 2008, the Umstead Research Farm Site is not in a jurisdiction where reclaimed water must be used for construction, landscape, or other non-potable uses, if reclaimed water is available. The SGWASA Water Shortage Ordinance was adopted due to the sustained drought conditions in the general area and relies solely on restrictions for water usage. The reuse or reclamation of raw or treated waste waters is not included in the current SGWASA strategy for coping with water shortage (SGWASA 2008a; SGWASA 2008b).

3.3.7.3.2 Electricity

Two existing, redundant, medium-voltage services with multiple feeders would be provided by Duke Energy to serve the NBAF. Each independent substation would have sufficient capacity for 13.5 mW of dedicated power to the NBAF. Power from the two primary substations would be routed through two new and separate aboveground or underground lines that converge at a new electrical substation located on or adjacent to the site to step the voltage down and distribute the two independent power supplies to the Umstead Research Farm Site.

Operating demand for electricity at the NBAF is projected at 12.8 mW (NDP 2007a), which represents 0.13% of Duke Energy's current generating capacity of 9,832 mW in the Carolinas Service Area. The design requirements for electrical service to the NBAF site include a minimum of two redundant medium-voltage services with multiple feeders, an on-site utility substation at 34.5 kV with two transformers feeding 15 kV Class switchgear in a main-tie-main arrangement. The secondary feeders would provide primary electric service at 13.8 kV to the CUP and to the NBAF buildings (NDP 2008b). Based on current information, Duke Energy would have sufficient capacity to meet the requirements of the NBAF and is confident they can supply any demand.

3.3.7.3.3 Fuels and Natural Gas

Operation of the NBAF is projected to require 1,193,900 ccf /yr of natural gas. On an average basis, the NBAF would be expected to exert a natural gas demand of 3,271 ccf/day. The peak gas demand from the NBAF is estimated at 1,480 ccf/hr at a supply pressure of 10 psi (NDP 2008b).

The CUP, constructed as part of the NBAF, would house multiple dual-fuel (natural gas/No. 2 fuel oil) boilers. The primary fuel source for the boilers is to be determined based on local fuel availability (NDP 2007b). In the case of the Umstead Research Farm Site, natural gas would be the primary fuel source to meet peak demand. Fuel oil would be used in cases where natural gas is not available. Natural gas would be piped to the CUP through a pressure reducing station, at an approximate pressure of 10 psi. Metering equipment and main pressure-reducing valve would be located outside the plant (NDP 2007b).

The PSNC Energy proposed building a 5,600 foot long, 4-inch diameter, 60-psi supply pressure distribution gas line running south from the NBAF site. The new line, which would connect to the existing 4-inch, 60-psi supply distribution gas line running adjacent to Old Route 75 east of the intersection of SR 1120 (Veasey Road) and Old Route 75, would not be sufficient to meet the annual consumption or the peak usage requirements of the NBAF without substantial improvements to the natural gas distribution infrastructure. To meet the connected load requirements for the NBAF PSNC Energy plans to enhance its current system by connecting to an additional distribution main located approximately 14,615 feet to the west of the NBAF site along Old Route 75. A new 6-inch line would then be run from the upgraded distribution main at Old Route 75 approximately 4,475 feet north to the site. Based on current PSNC Energy commitments, the natural gas infrastructure improvements should be sufficient to meet the projected and future gas needs of the NBAF.

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil and natural gas would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.7.3.4 Sanitary Sewage

Operation of the NBAF is projected to result in the discharge of between 50,000 gpd and 150,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 25,250,000 gpy (NDP 2008b). If a tissue digester is used for carcass disposal, the waste stream from the tissue digester, estimated at 2% of the total discharge volume, would be commingled for discharge with the rest of the NBAF wastewater. The projected wastewater constituents in the tissue digester waste stream include BOD – 10,250 mg/l; COD – 19,600 mg/l; suspended solids – 1,400 mg/l; and pH – 9.48 standard units (NDP 2008).

The NBAF would discharge sanitary wastewater into approximately 6,500 feet of new SGWASA-installed, gravity sanitary sewer line from the Umstead Research Farm Site to the existing SGWASA 36-inch diameter gravity trunk wastewater main located south of Old Route 75 along a stream bed in the general direction of Old Route 75 (January 24, 2008, phone call to Fred Dancy from Joe Rafferty). The collected sanitary wastewater from the NBAF would flow through the newly constructed wastewater line, into the existing 36-inch wastewater main, and subsequently into the existing SGWASA Sewage Treatment Facility. Further information regarding the sewer system is found in Section 3.13, Waste Management.

Sewage acceptance criteria and pretreatment requirements would apply to the NBAF wastewater discharge. A listing of SGWASA technically based local limits for industrial wastewater discharge into the SGWASA Sewage Treatment Facility are presented in Table 3.3.7.3.4-1 (SGWASA 2007). The NBAF would be designed and operated as necessary to prevent negative impact to the SGWASA Sewage Treatment Facility treatment capabilities resulting from flow rate or potentially harmful wastewater constituents.

Table 3.3.7.3.4-1 — SGWASA Technically Based Local Limits

Constituent	Limits	Units
BOD	300	mg/l
COD	600	mg/l
Total Suspended Solids	300	mg/l
Ammonia	25	mg/l
Chlorides	200	mg/l
Total Nitrogen	50	mg/l
Total Kjeldahl Nitrogen	40	mg/l
Phosphorus	10	mg/l
Arsenic	0.005	mg/l
Cadmium	0.002	mg/l
Total Chromium	0.043	mg/l
Copper	0.061	mg/l
Cyanide	0.01	mg/l
Lead	0.02	mg/l
Mercury	0.0002	mg/l
Nickel	0.02	mg/l
Silver	0.01	mg/l
Zinc	0.175	mg/l

Source: SGWASA 2007.

3.3.5.3.5 Steam and Chilled Water

The NBAF operation would require a peak steam load of 136,232 lb/hr including 55,000 lb/hr for process loads. To meet the firm capacity of the NBAF, six equally sized boilers at 27,246 lb/hr are required to maintain the firm capacity of 136,232 lb/hr while meeting the requirement for total installed capacity of 163,476 lb/hr. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one boiler (NDP 2008).

The NBAF operation would also require a peak chilled water load of 5,125 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 1,025 tons are required to maintain the firm capacity of 5,125 tons while meeting the requirement for total installed capacity of 6,150 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008).

3.3.8 Texas Research Park

This section describes the existing services available to support the operation of the NBAF at the Texas Research Park and the potential consequences and effects to the existing infrastructure from the addition of the facility. The infrastructure encompasses potable water supply, electrical power, fuels and natural gas, sanitary wastewater treatment facilities, and steam and chilled water.

3.3.8.1 Affected Environment

3.3.8.1.1 Potable Water Supply

Potable water is supplied to the Texas Research Park Site by Bexar Metropolitan Water District (BMWD) Texas Research Park Public Water System using existing water wells and tanks located within the Texas Research Park property (Krauss 2007). The BMWD wells draw from the Edwards Aquifer, the source for most of the potable water supplied by BMWD and other utilities serving Bexar County (BSA 2007). The groundwater is of high quality, requiring minimal treatment prior to distribution. The BMWD method of water treatment is disinfection by chlorination (BSA 2007). The BMWD has indicated that 60 million gallons of water would be available on an annual basis for use by the NBAF (York Duncan, TRP, January 30, 2007 letter from Miyoung Squire, Bexar Metro Water District).

An existing 16-inch water main located at Lambda Drive, which fronts the east property line of the Texas Research Park Site, is part of a looped system that goes through the Texas Research Park property, with the capacity to deliver 2,250 gpm at 85 to 115 psi (M. Persyn, Bexar Metro Water District, e-mail December 19, 2007, to Joe Rafferty, Tetra Tech, Inc.). The water main has approximately 90% excess flow rate capacity at this pressure under current 2006 usage (M. Persyn, Bexar Metro Water District, e-mail December 19, 2007, to Joe Rafferty, Tetra Tech, Inc.).

3.3.8.1.2 Electricity

CPS Energy, the largest municipally owned energy company in the United States, serves a 1,566 square mile area, including all of Bexar County and small portions of the adjacent counties (CPS Energy 2007). CPS Energy owns and operates nine generation plants that utilize nuclear, coal, natural gas, and renewable energy sources to generate a total electrical capacity of 5,468 mW, with a reserve capacity in excess of 20% (York Duncan, January 30, 2007, letter from Al Lujan, CPS).

CPS Energy's current generating capacity of 5,468 mW exceeds peak electrical grid demand of 4,117 mW. CPS Energy has obtained a permit from the Texas Commission on Environmental Quality (TCEQ) and has begun construction on a 750 mW low-sulfur coal-fired generating unit that would be equipped with the latest emissions control technology. The new unit is scheduled for completion by 2010. In addition, CPS acquired renewable energy resources, including 100 mW of new wind power capacity, and 9.6 mW of capacity from a landfill gas facility, during 2005 and 2006 (CPS Energy 2007).

CPS Energy would supply three-phase electricity (i.e., alternating current through three different conductors) to the Texas Research Park Site through two independent 35 kV electrical substations with sufficient capacity for 13.5 mW of dedicated power. Both 35 kV electrical substations are located within 0.5 miles of the Texas Research Park Site and within the Texas Research Park boundaries.

Power from the two substations would be routed to the Texas Research Park Site through two new and separate underground lines within an existing underground electric duct bank running adjacent to Lambda Drive (BSA 2007). The two separate lines would converge at a third electrical substation, to step the voltage down, and distribute the two independent power supplies to the NBAF. The third electrical substation would be located on, or adjacent to, the Texas Research Park Site and would have dual transformers, each with the capacity to handle the entire facility demand as required.

3.3.8.1.3 Fuels and Natural Gas

CPS Energy serves Bexar and Comal Counties, with purchases of approximately 20 to 25 billion cubic feet (bcf) per year for resale to natural gas customers and an additional 30 to 40 bcf per year for electrical power generation (CPS Energy 2007).

The current CPS Energy natural gas infrastructure bordering the Texas Research Park Site is a 4-inch diameter, supply pressure distribution gas line running adjacent to Lambda Drive (Krauss 2007). The nominal operating pressure of this 4-inch supply pressure distribution gas line ranges between 12 and 25 psi. The MAOP for this line is 59 psi. The supply capacity of the 4-inch gas distribution line is 1,470 ccf/hr or 12,877,200 ccf/yr at 5 psi delivery pressure (Mark Blythe, CPS Energy, January 17, 2008, phone call from Joe Rafferty, Tetra Tech, Inc.). The current utilization of natural gas from this supply main averages 310 ccf/hr at 5 psi, resulting in a 79% excess flow rate capacity at this pressure under current conditions (Mark Blythe, CPS Energy, January 17, 2008, phone call from Joe Rafferty, Tetra Tech, Inc.).

3.3.8.1.4 Sanitary Sewage

The Texas Research Park Site would discharge sanitary wastewater into the San Antonio Water System (SAWS) 27-inch diameter gravity wastewater main located approximately 4.6 miles to the southeast, north of Highway 90 and east of SR 211. Approximately 24,000 feet of new sewer main would be required to tie the Texas Research Park Site to the existing 27-inch diameter sewer main (SAWS 2008). Collected sanitary wastewater from the NBAF area would flow through SAWS Far West area lines and eventually into the SAWS Medio Creek Wastewater Reclamation Center (WRC). The Medio Creek WRC has a wastewater treatment capacity of 8.5 mgd (Krauss 2007; SAWS 2007). The 27-inch trunk sewer line that would serve the Texas Research Park Site currently has, or would have, contractually mandated excess flow rate capacity sufficient to accommodate the projected sanitary sewage loading from the NBAF. Additional information regarding sanitary sewage is evaluated in Section 3.13, Waste Management.

3.3.8.1.5 Steam and Chilled Water

The site does not have existing steam and chilled water infrastructure.

3.3.8.2 Construction Consequences

3.3.8.2.1 Potable Water Supply

Water would be required during the construction of the NBAF for dust suppression and wash down of equipment. The water would likely be supplied via tanker truck at the point of use or obtained though a metered connection to an existing fire hydrant or similar connection. The additional demand on water supply from construction activities for the NBAF site would be negligible.

3.3.8.2.2 Electricity

There would not be additional demand on the electricity supply during construction of the NBAF. Portable electrical generators would be utilized throughout facility construction and installation.

3.3.8.2.3 Fuels and Natural Gas

Natural gas or No. 2 Fuel Oil would not be required for construction activities. However, construction activities would require the use of diesel and gasoline as fuel sources for mobile and stationary construction associated equipment. Volume and consumption projections of diesel and gasoline usage during construction activities are not available at this time.

3.3.8.2.4 Sanitary Sewage

The construction site would be provided with portable chemical toilets in sufficient quantity to accommodate all site construction workers during the construction phase of the NBAF. Periodically, the contents of the chemical toilets would be collected for ultimate discharge into the SAWS Medio Creek WRC for treatment. The impact of this volume of sanitary waste on the treatment capacity of the WRC would be minimal. Construction equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water.

3.3.8.3 Operation Consequences

3.3.8.3.1 Potable Water Supply

Potable water would be supplied to the NBAF by BMWD. The NBAF designers recommended that municipal water service be brought to the site via redundant or looped feeds such that maximum water demand may be satisfied with loss of one feed line (NDP 2007b). Projected water consumption at the NBAF ranges between

50,000 gpd and 275,000 gpd with a peak flow rate of 656 gpm at a minimum delivery pressure of 35 psi. The maximum daily consumption projections, substantially impacted by ambient temperature and humidity and, therefore, specific to a geographic region, include cooling tower make-up water for peak cooling days during the summer months and reduced usage projections for the cooler parts of the year. The estimated total annual water consumption for the Texas Research Park Site is projected to be 51,750,000 gallons (NDP 2007b). An irretrievable commitment of 2.59 billion gallons of potable water would be required over the 50-year project life.

The current BMWD infrastructure includes a 16-inch water main located adjacent to the east property line of the Texas Research Park Site on Lambda Drive. The feeder main is part of a looped system that goes through the Texas Research Park property and has the capacity to deliver 2,250 gpm at 85 to 115 psi. This equates to the existing main having approximately 70% excess flow rate capacity at this pressure. With future improvements planned for 2008, the BMWD Texas Research Park Public Water System would have sufficient capacity to handle the NBAF demand, in addition to other non-water intensive development within the Texas Research Park (BSA 2007).

The Texas Research Park Site is not in a jurisdiction where reclaimed water must be used for construction, landscape, or other non-potable uses if reclaimed water is available according to the Code of Ordinances city of San Antonio, Chapter 34, Article IV, Division 5 – Reuse. However, if the area experiences sustained drought conditions, then water conservation requirements to include the use of reclaimed water may be implemented (SATCO 2007a).

3.3.8.3.2 Electricity

Two existing, redundant, medium-voltage services with multiple feeders would be provided by CPS Energy to serve the NBAF. Each independent substation would have sufficient capacity for 13.5 mW of dedicated power to the NBAF. Power from the two primary substations would be routed to the Texas Research Park Site through two new and separate aboveground or underground lines that converge at a new electrical substation located on or adjacent to the site to step the voltage down and distribute the two independent power supplies to the NBAF.

Operating demand for electricity at the NBAF is projected at 12.8 mW (NDP 2007a), which represents only 0.23% of CPS Energy's current generating capacity of 5,468 mW. The design requirements for electrical service to the NBAF include a minimum of two redundant medium-voltage services with multiple feeders, an on-site utility substation at 34.5 kV with two transformers feeding 15 kV Class switchgear in a main-tie-main arrangement. The secondary feeders would provide primary electric service at 13.8 kV to the CUP and to the NBAF buildings (NDP 2008b). Based on current information, CPS Energy would have sufficient capacity to meet the requirements of the NBAF, other developments at Texas Research Park, and projected area population growth (BSA 2007).

3.3.8.3.3 Fuels and Natural Gas

Operation of the NBAF is projected to require 1,002,300 ccf/year of natural gas. On an average basis, the NBAF would be expected to exert a natural gas demand of 2,746 ccf/day. The peak gas demand from the NBAF is estimated at 1,550 ccf/hr at a supply pressure of 10 psi (NDP 2008).

The CUP, constructed as part of the NBAF, would house multiple dual-fuel (natural gas/No. 2 fuel oil) boilers. The primary fuel source for the boilers is to be determined based on local fuel availability (NDP 2007b). In the case of the Texas Research Park Site, natural gas would be the primary fuel source to meet peak demand. Fuel oil would be used in cases were natural gas is not available. Natural gas would be piped to the CUP through a pressure-reducing station, at an approximate pressure of 10 psi. Metering equipment and main pressure-reducing valve would be located outside the plant (NDP 2007b).

The existing 4-inch diameter, CPS Energy supply pressure distribution gas line running adjacent to Lambda Drive with a supply capacity of 1,470 ccf/hr at 5 psi delivery pressure would not be sufficient to meet the peak usage requirements of the NBAF. A new 6-inch high pressure distribution line, approximately 2,550 feet in length, to supply the Texas Research Park Site is recommended by CPS Energy to meet the peak capacity and annual usage requirements of the NBAF (Mark Blythe, CPS Energy, April 17, 2008, phone call from Joe Rafferty, Tetra Tech, Inc.). Therefore, CPS Energy considers their natural gas capacity sufficient to meet the projected and future gas needs of the NBAF operation, other developments at Texas Research Park, and area population growth (BSA 2007).

Fossils fuels would be irretrievably consumed during the construction and operation of the proposed NBAF. Diesel fuel and gasoline would be consumed by construction and maintenance equipment, and fuel oil and natural gas would be consumed during operation of the facility. The loss of these materials would be irreversible.

3.3.8.3.4 Sanitary Sewage

Operation of the NBAF is projected to result in the discharge of between 50,000 gpd and 150,000 gpd of wastewater to the sanitary sewage system. Annual wastewater volume is estimated at 29,250,000 gpy (NDP 2008b). If a tissue digester is used for carcass disposal, the waste stream from the tissue digester, estimated at 2% of the total discharge volume, would be commingled for discharge with the rest of the NBAF wastewater. The projected wastewater constituents in the tissue digester waste stream include BOD – 10,250 mg/l; COD – 19,600 mg/l; suspended solids – 1,400 mg/l; and pH – 9.48 standard units (NDP 2008).

The NBAF would discharge sanitary wastewater into the nearest existing SAWS 27-inch diameter gravity wastewater main, located approximately 4.6 miles to the southeast, north of Highway 90 and east of SR 211, and eventually into the SAWS Medio Creek WRC for treatment. Approximately 24,000 feet of new sewer main would be required to tie the NBAF to the existing 27-inch diameter sewer main (SAWS 2008). Further information regarding the sewer system is found in Section 3.13, Waste Management.

Sewage acceptance criteria and pretreatment requirements would apply to the NBAF wastewater discharge. A listing of SAWS technically based local limits for industrial wastewater discharge into the Medio Creek WRC are presented in Table 3.3.8.3.4-1 (SATCO 2007b). The NBAF would be designed and operated as necessary to prevent negative impact to the Medio Creek WRC treatment capabilities resulting from flow rate or potentially harmful wastewater constituents.

Table 3.3.8.3.4-1 — Medio Creek WRC Technically Based Local Limits

Constituent	Limits	Units
Arsenic	0.7	mg/l
Cadmium	0.7	mg/l
Chromium	5	mg/l
Copper	1.5	mg/l
Total Cyanide	0.17	mg/l
Lead	0.7	mg/l
Mercury	0.05	mg/l
Nickel	5	mg/l
Selenium	0.02	mg/l
Silver	0.5	mg/l
Zinc	2.5	mg/l
Fats Oil and Grease	200	mg/l
pH	5.5 – 10.5	Standard Units
Temperature	<150°	Fahrenheit

3.3.8.3.5 Steam and Chilled Water

The NBAF operation would require a peak steam load of 129,373 lb/hr including 55,000 lb/hr for process loads. To meet the firm capacity of the NBAF, six equally sized boilers at 25,875 lb/hr are required to maintain the firm capacity of 129,373 lb/hr while meeting the requirement for total installed capacity of 155,250 lb/hr. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one boiler (NDP 2008).

The NBAF operation would also require a peak chilled water load of 5,162 tons including 750 tons for process cooling. To achieve appropriate levels of redundancy, six equally sized chillers at 1,032 tons are required to maintain the firm capacity of 5,162 tons while meeting the requirement for total installed capacity of 6,192 tons. This configuration would allow the peak capacity of the facility to be met in the event of the loss of one chiller (NDP 2008).

3.4 AIR QUALITY

3.4.1 Methodology

Baseline data on local and regional climate and air quality were obtained from local, state, and federal sources. Federal sources such as the National Climatic Data Center (NCDC), the Southeast Regional Climate Center (SERCC), and the High Plains Regional Climate Center (HPRCC) were key climate data resources. Additional information on potential factors affecting air emissions from the Proposed Action were derived from projected activities described in the *NBAF Conceptual Design and Feasibility Study* and *Site Characterization Study*, current operational data from the existing PIADC, and studies conducted on similar types of facilities.

The proposed pathological waste disposal method for the NBAF has not been determined at this time and would be an influencing factor on facility air emissions. Three disposal methods are being considered: incineration fueled by natural gas and fitted with afterburner chambers that reduce intermediate gases and particulate matter; alkaline hydrolysis using sodium hydroxide or potassium hydroxide to convert biological material into a sterile aqueous solution; or rendering by converting the carcasses into carcass meal (solids), melted fat, and water using a steam-jacketed pressure vessel. Refer to Section 3.13 for additional waste disposal information. If one of the action alternatives is selected and the disposal method is determined, a state authorization would be required prior to construction and operation of that alternative.

Air emission data for the proposed NBAF, such as but not limited to process data, emission source data, and operating schedules, would be required. These data would be used in formulating a complete air emission inventory, a quantitative and qualitative comparison with area background emissions/attainment status, a federal general conformity analysis, and a compatibility assessment with State Implementation Plan (SIP) efforts. The emission inventory would account for all applicable emission sources and process rates, including potential and projected emissions. The projected emissions would be used in a federal general conformity analysis if the selected alternative is within a nonattainment area. The General Conformity Rule of the *Clean Air Act* requires that all federal projects with the potential of new or expanded air emission sources demonstrate that the proposed activity would not adversely affect a SIP. EPA has developed *de minimis l*evels, of additional/new emissions, that are considered below threshold levels necessary for further General Conformity Rule efforts. If the alternative selected is within a nonattainment area and the projected emissions exceed the *de minimis* thresholds, then a conformity analysis would be completed (EPA 200d). Emissions from the proposed NBAF would not be anticipated to impede a state's plan for restoring an area's pollutant(s) specific National Ambient Air Quality Standards (NAAQS) compliance. Table 3.4.1-1 describes the threshold criteria pollutant emissions, in tons/year, that requires a general conformity determination.

Table 3.4.1-1 — De Minimis General Conformity Analysis Thresholds

Pollutant	Area Type	Tons/ Year
Ozone (VOC or NO_x)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
Carbon Monoxide, Sulfer Dioxide, and Nitrogen Dioxide	All nonattainment & maintenance	100
Particulate Matter (PM_{10})	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Lead	All nonattainment & maintenance	25

Nonattainment area classification	Ozone design value
Serious	0.160 ppm to 0.180 ppm
Severe	0.180 ppm to 0.280 ppm
Extreme	0.280 ppm and higher

(The Ozone design value is the 3-yr average of the annual fourth-highest daily maximum 8-hr ozone concentration.)
VOC = Volatile Organic Compound.
NO_x = Nitogen Oxides.

An emission inventory would further define potential emissions, dictating the level of permitting, such as Title V applicability. EPA's Title V of the *Clean Air Act* considers potential sources of criteria pollutants in excess of 100 tons per year, single Hazardous Air Pollutant (HAP) of 10 tons per year, or combination of HAPs exceeding 25 tons per year as major sources. Through regulatory consultation and emission inventory development/assessment, a facility's operation would be permitted based on a worst-case potential emission scenario. As a Title V source under the *Clean Air Act* of 1990, the proposed NBAF would have permit requirements and conditions such as, but not limited to:

- Enforceable emissions limitations;
- Compliance schedules;
- Monitoring/analysis submittals (no less than every 6 months);
- Inspection/maintenance certifications;
- Annual fee (per ton of emissions);
- Permit applications, renewals, or modifications reviewed and commented on by EPA;
- Notification of permit actions to contiguous and potentially impacted states;
- Notification of permit action to all states within 50 miles of the source; and
- Public comment period on applications or modifications (EPA 2007a; EPA 2007b).

The EPA Screen3 model is an air contaminant concentration evalution tool. This cursory medel is used to determine the potential of a point source to exceed the NAAQS at site specified distances. The screening format for each action alternative would be developed with equivalent terrain features, facility/stack characteristics, and meteorology assumptions. Estimated operational emission rates, as extrapolated from PIADC's 2002-2005 emissions evaluation, conceptual property line locations, and theoretical facility placement would be site specific.

A similar cursory level approach was taken for construction emissions as extrapolated from construction emission estimates for nitrogen oxides (NO_x) and ozone (O_3) for the University of Texas Medical Branch (UTMB) at Galveston National Biocontainment Laboratory (NBL).

The emission inventory would be used in conjunction with structural layouts, property boundaries, meteorological conditions, and background emission levels to produce, if needed, an air dispersion modeling effort that would determine emission concentrations and NAAQS compliance at the compound's property lines. Table 3.4.1- 2 below describes the NAAQS for the criteria pollutants: nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and inhalable particulate matter (PM_{10}: particles with an aerodynamic diameter less than or equal to 10 microns; $PM_{2.5}$: particles with an aerodynamic diameter less than or equal to 2.5 microns) (EPA 2007e).

Table 3.4.1-2 — National Ambient Air Quallity Standards

	Primary Standards		Secondary Standards	
Pollutant	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8 hour[a]	None	
	35 ppm (40 mg/m^3)	1 hour[a]		
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m^3	24 hour[b]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[c] (Arithmetic Mean)	Same as Primary	
	35 µg/m^3	24 hour[d]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8 hour[e]	Same as Primary	
	0.08 ppm (1997 std)	8 hour[f]	Same as Primary	
	0.12 ppm	1 hour[g] (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m^3)	3 hour(1)
	0.14 ppm	24 hour[a]		

[a] Not to be exceeded more than once per year.
[b] Not to be exceeded more than once per year on average over 3 years.
[c] To attain this standard, the 3-yr average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
[d] To attain this standard, the 3-yr average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
[e] To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
[f] (a) To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
[g] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.
(b) As of June 15, 2005, EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.
mg/m^3 – milligrams per cubic meter
µg/m^3 – micrograms per cubic meter
ppm – parts per million

Based on the ambient air concentrations of these pollutants, EPA evaluates individual Air Quality Control Regions to establish compliance or non-compliance with NAAQS. Areas that meet the NAAQS are classified as attainment areas, and areas that exceed the NAAQS for a particular pollutant(s) are classified as nonattainment areas for that specific pollutant(s). Ambient air monitoring networks are established nationwide to report air pollutant concentration data to EPA (EPA 2007f). An air pollution monitor may be sited to evaluate ambient air contaminant concentrations or specific facility emissions. The data generated from these networks are evaluated in terms of meeting or exceeding the established primary and secondary criteria pollutant standards. If a monitoring site persistently exceeds the EPA set standards, then the region may be classified as nonattainment for that specific pollutant. States with nonattainment areas must develop a SIP that describes proposed measures to restore NAAQS compliance to the region.

In an effort to describe potential construction emissions, an emission comparison was developed using 2005 construction emission estimates (ozone precursors volatile organic compounds [VOC] and nitrogen oxides [NO_x]) developed from the Galveston National Laboratory (GNL) at the UTMB preliminary design (UMTB 2005). This comparison was selected due to the similarities between the GNL and the NBAF as large biocontainment facilities. A comparison for potential operational traffic emissions was also developed using the Emissions Factor (EMFAC) 2002 Burden Model for California Air Resource Board. If an action alternative is selected then air emission evaluations including construction and operational sources would facilitate air permitting efforts that would be produced, submitted, and agency reviewed, with authorization, prior to operational start-up.

SCREEN3, version 96043, an EPA dispersion modeling program was used to estimate the impact of emissions from the NBAF at each alternative site on the ambient air concentrations (Earth Tech 2008). Although the program has the capability to model both area and volume sources, when applied to mobile construction sources, numerous assumptions have to be made which reduce the confidence in the results.

Predicted maximum offsite impacts for each criteria pollutant were estimated by the ratio of the calculated emission rate to the unity emission rate. The analysis also scaled the impacts for the appropriate time-averaging period for each pollutant, and added in the background concentration of each pollutant. Conservative parameters were assumed for the combined stack relative to those that might be expected for the individual source stacks (i.e. low stack height, temperature and velocity).

Emission rates were determined from existing emission estimates from similar facilities. Emissions from several sources associated with the proposed agricultural research laboratory, including boilers, generators, and an incinerator were summed, and are assumed to be emitted from a single stack. This simplifying assumption was deemed appropriate for this preliminary screening phase of the site selection process, where specific individual source stack parameters are lacking. Only emissions from operations were presented; construction activities are temporary, and would be modeled separately if required.

The model-predicted ambient impacts for each pollutant were added to the background concentrations for the state where the proposed site may be located, and this sum was then compared to the National Ambient Air Quality Standards (NAAQS). States vary how pollutant background concentrations are calculated. For the purpose of this preliminary evaluation, measured concentrations of pollutants were obtained from the EPA AirData website for locations nearest the proposed site for the year 2007.

3.4.2 No Action Alternative

3.4.2.1 Affected Environment

3.4.2.1.1 Climate and Severe Weather

The Long Island area climate, including Plum Island, is classified as temperate-humid-continental and characterized by four defined seasons. The Atlantic Ocean brings afternoon sea breezes that temper the heat in the warmer months and that routinely limit the frequency and severity of thunderstorms. This maritime influence affects the island’s weather patterns and temperatures. Long Island has warm, humid summers and cold winters. Wintertime temperatures at Plum Island are warmer than inland areas, and mainland snowstorms may fall as island rain. However, in winter months more intense storms called “nor'easters” can produce blizzard conditions with snowfalls of 1-2 feet and near-hurricane force winds (BNL 2008).

The mean temperature for Suffolk County ranges from 32.4°F in the winter to 71.9°F in the summer. The highest temperature recorded at the Brookhaven National Laboratory since 1949 has been 100.5°F, and the lowest temperature recorded was −23°F (BNL 2008). Average rainfall for Suffolk County is approximately 42 inches per year and snowfall averages approximately 27 inches per year (www.longisland.com). Regional wind patterns are dominated by westerly winds, primarily northwest in the winter and southwest in the summer (BNL 2008).

3.4.2.1.2 Air Quality

Suffolk County is a nonattainment area for O_3 and $PM_{2.5}$ and usually exceeds the NAAQS limits during the summer months. This nonattainment status is based on the monitoring stations on Long Island and other densely populated areas to the west (e.g., New York City). Plum Island’s relatively remote location coupled with the island’s prevailing sea breezes arguably affects the potential for exceeding NAAQS for these two pollutants. Suffolk County is in compliance with all other NAAQS (EPA 2008h).

Mobile and stationary air emission sources currently operating on Plum Island may influence local air quality, and a New York State Facility Air Permit is required for all PIADC facility air emission sources, which currently include generators, boilers, and 3 incinerators. Mobile air emission sources at Plum Island are vehicles used to support the current PIADC. These mobile sources include automobiles, light trucks, and a small number of diesel-powered vehicles. Currently, there are 32 gas-powered light vehicles, 3 diesel-powered buses, 3 diesel-powered fire/rescue vehicles, 11 pieces of diesel-powered heavy equipment, and three propane-fueled forklifts operating on the island (K. Klotzer, PIADC Environmental Specialist, personal communication, January 26, 2008). Additional mobile sources include the government transport ferries and other marine traffic transiting the surrounding waters.

Generators

PIADC currently has two trailer-mounted generators that are used as emergency back-up power. An emission summary is not currently available for these units. For comparison purposes, refer to Tables 3.4.3.3.2-1 and 3.4.3.3.2-2 for operational emission estimates developed for a potential NBAF back up generator system.

Boilers

PIADC currently uses three low sulfur fuel oil powered boilers to provide steam for heating and decontamination procedures. The facility routinely operates one boiler 8,760 hrs/yr and the remaining two units each operate approximately 4,380 hrs/yr (K. Klotzer, PIADC, April 1, 2008). The average rated emissions for these boilers are: particulates 0.23 lb/hr; carbon monoxide 0.57 lb/hr; sulfur oxide 8.10 lb/hr; and volatile organics 0.06 lb/hr. Table 3.4.2.1.2-1 assumes one boiler operating year round and two boilers each operating for half of the year.

Table 3.4.2.1.2-1 — Average Rated PIADC Boiler Emissions

Boiler Systems	Annual Operating Hours	Particulate Emissions 0.23 lb/hr	Carbon Monoxide Emissions 0.57 lb/hr	Nitrogen Oxides Emissions 2.28 lb/hr	Sulfur Oxides Emissions 8.10 lb/hr	Volatile Organic Emissions 0.06 lb/hr
	hr	lb/year	lb/year	lb/year	lb/year	lb/year
Boiler A	8,760	2,015	4,993	19,973	70,956	526
Boiler B	4,380	1,007	2,497	9,986	35,478	263
Boiler C	4,380	1,007	2,497	9,986	35,478	263
Total by Pollutant ton/year		2	5	20	71	0.53

Incinerators

PIADC currently operates three incinerators, fueled by No. 2 fuel oil. In 2004, PIADC stack tested its incinerators. By applying the 2004 stack testing results to average operational hours and load rates, a facility emissions evaluation was developed for the 2002-2005 operational period. During this timeframe (extrapolated), the incineration procedure typically occurred 100 days per year, with an average daily burn time of 10 hours per day (1,000 hour/year). The annual average weight of incinerated refuse was 124,225 lbs/year or an actual average incineration rate of 124 lbs/hour. See Tables 3.4.2.1.2-2 and 3.4.2.1.2-3 below.

Table 3.4.2.1.2-2 — PIADC Incineration Emissions Evaluation, 2002-2005

Pollutant	Average Emissions tons\yr
Particulates	0.125
Nitrogen Oxides	0.358
Carbon Monoxide	0.002
Hydrochloric Acid	0.039

Table 3.4.2.1.2-3 — PIADC Incineration Emissions Evaluation for Metals, 2002-2005

Metals	Average Emissions lbs\yr
Mercury	0.005
Arsenic	0.009
Beryllium	0.004
Cadmium	0.011
Chromium	0.088
Lead	0.145
Total Metals	0.262

3.4.2.2 Construction Consequences

3.4.2.2.1 Climate and Severe Weather

Approved enhancements and upgrades for PIADC would meet or exceed all general construction requirements. The construction techniques would mirror current facility construction, and any new or modified construction specifications or guidelines would be complied with. The upgrade designs would not result in significant adverse environmental effects and would meet or exceed all required wind loads, site specific seismic design criteria, and would not be constructed within a floodplain. Construction upgrades for PIADC would not have an anticipated adverse effect on the region's climate, and all necessary weather response plans would be administered during the construction phase.

3.4.2.2.2 Air Quality

Construction enhancements and upgrades for PIADC would not result in significant air emission increases. The upgrades would be serviced by existing boiler, generator, and incinerator infrastructures. During site preparation and construction, the use of heavy equipment, delivery trucks, worker vehicles, and land clearing efforts would generate short-term air emissions. These emissions would be brief and similar to those experienced during any ordinary construction effort. Through implementation of good engineering practices and overall good housekeeping, enhancements and construction at PIADC would not have an anticipated adverse effect on ambient air quality of Plum Island.

3.4.2.3 Operation Consequences

3.4.2.3.1 Climate and Severe Weather

Once the enhancements and upgrades are completed, PIADC operations would fall within current or modified weather response plans. The current infrastructure would support the upgrades, and potential infrastructure improvements would further improve the facility's compliance and response capabilities. Operation upgrades for PIADC would not have an anticipated adverse effect on the region's climate, and all inclement weather response plans would be continued.

3.4.2.3.2 Air Quality

Upgrades to the PIADC would be in accordance with the required permits. The current infrastructure would support any needed enhancements. Therefore, any enhancements to PIADC operations would not have an anticipated adverse effect on the ambient air quality at Plum Island.

3.4.3 South Milledge Avenue Site

3.4.3.1 Affected Environment

3.4.3.1.1 Climate and Severe Weather

Athens, Georgia, has a temperate, four-season climate with generally mild winters and warm summers. The climate in Georgia is primarily controlled by the clockwise air-flow that dominates the mid-Atlantic ocean known as the Azores high-pressure system. Associated sub-systems are the Gulf and Bermuda highs that regulate the summertime temperatures and precipitation. Winter conditions are dictated by systems originating in Colorado or larger systems moving southeastward out of Canada.

The monthly average maximum temperature is 72.6°F, the monthly average minimum temperature is 51.0°F, and the monthly average rain precipitation is 4.0 inches (SERCC 2007a). The Ben Epps Airport, which serves Athens, is located approximately 5 miles northeast of the University of Georgia, Whitehall Farm, and is the reporting station; the period of record for these data is July 1, 1948 to June 30, 2007.

A wind speed reporting station, located in Athens, summarized wind data gathered from 1930 to 1996. The prevailing wind direction, as compass points, is west-northwest and the mean wind speed is 7 miles per hour (mph). Six tornadoes were documented in Athens-Clarke County for the period between January 1, 1950 and April 30, 2007 (NCDC 2008). The two most severe events occurred in 1973 (Table 3.4.3.1.1- 1).

Table 3.4.3.1.1-1 — Severe Climatic Events

County	Event	Date	Time	Magnitude[a]	Property Damage ($)
Clarke	Tornado	03/31/1973	18:15	F2	$250 million
Clarke	Tornado	05/28/1973	15:20	F3	$25 million

[a]Fujita Scale; F0 = gale winds <73 mph; F1 = moderate winds 73-112 mph; F2 = significant winds 113-157 mph; F3 = severe winds 158-206 mph; F4 = devastating winds 207-260 mph; F5 = incredible winds 261-318 mph; F6 = inconceivable winds >318 mph.

3.4.3.1.2 Air Quality

The Air Protection Branch of Georgia's Department of Natural Resources (GDNR), Environmental Protection Division, operates and oversees an Ambient Monitoring Program (AMP). AMP has monitored EPA-defined criteria pollutants for over 30 years. In 2006, the Georgia air sampling network collected data at 65 locations in 37 counties (GDNR 2007). The monitoring is conducted to protect public health and air quality in Georgia. The data are used in regulatory efforts, research programs, and public information outreach. In 2005, an ambient air O_3 and $PM_{2.5}$ monitoring site was established on College Station Road in Athens. Based on the AMP 2006 Ambient Air Surveillance Report, all of Georgia is in attainment for CO, NO_2, SO_2, Pb, and PM_{10}. Statewide compliance with the O_3 and $PM_{2.5}$ standards continues to be a challenge.

Georgia adheres to the EPA major source definition and requires an issued permit before construction and operation of such facilities. The UGA Athens is a Title V source with potential emissions exceeding 100 tons/yr of SO_2, NO_X, and CO. The Title V Permit held by the University (Number 8221-059-0059-V-02-0) has an effective date of November 16, 2007, and is valid for 5 years (GDNR 2008a). The major emission sources under the permit are eight boilers, one spray paint booth, and three pathological waste incinerators with load rates ranging from 175 to 500 lb/hr.

3.4.3.2 Construction Consequences

3.4.3.2.1 Climate and Severe Weather

Construction of the NBAF South Milledge Avenue Site would not have an adverse effect on meteorological or regional climatic conditions. The Manhattan Campus Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 119 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building’s interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building’s primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF at the South Milledge Avenue Site would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction would not have an adverse effect on meteorological or regional climatic conditions, and inclement weather response plans would be implemented.

3.4.3.2.2 Air Quality

Air emissions generated during construction are subject to state regulations limiting nuisance conditions such as fugitive dust. Construction activities could generate an increase in fugitive dust (airborne particulate matter that escapes from a construction site) from earthmoving and from other construction vehicle movements. Techniques would be evaluated to minimize fugitive dust generated during construction. Additionally, the construction equipment and construction workers’ vehicles would generate combustion exhaust emissions. An emission comparison was developed using 2005 estimated ozone precursors (VOC and NO_x) construction emission estimates developed from the preliminary design for the GNL at the UTMB. This comparison was selected due to the similarities between the GNL and the proposed NBAF as large biocontainment facilities. The GNL project includes a seven-story biocontainment facility with an area of 82,411 square feet. The estimated construction emissions from the GNL for these NO_x and VOC were developed for a 4-yr construction period—the same construction duration of the proposed NBAF. Construction emission sources used in this evaluation included concrete trucks/paving equipment, generators, heavy equipment, non-road vehicles, delivery vehicles, and construction employees’ personal vehicles (UTMB 2005). Using the proposed

500,000-square-foot area for NBAF and an equivalent 4-yr construction timeframe, Table 3.4.3.2.2-1 extrapolates estimated annual NBAF VOC and NO_x construction emissions.

Table 3.4.3.2.2-1 — Estimated Annual VOC and NO_x NBAF Construction Emissions

Construction Year	NBAF VOCs (tons/yr)	NBAF NO_x (tons/yr)
1	32.8	135.3
2	32.8	135.3
3	28.5	62.5
4	9.7	15.2

Through implementation of approved fugitive dust control measures, good engineering practices, and overall good housekeeping, the potential adverse effects on ambient air quality from construction of the NBAF South Milledge Avenue Site would be temporary, localized, and would not have an anticipated permanent adverse effect on regional air quality.

3.4.3.3 Operation Consequences

3.4.3.3.1 Climate and Severe Weather

The operation of the NBAF at the South Milledge Avenue Site would meet or exceed all general structural requirements. The NBAF would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. The operation of the NBAF would not have an anticipated adverse effect on the region's climate, and all necessary weather response plans would be executed.

3.4.3.3.2 Air Quality

Gaseous and particulate air contaminant emissions (including biological toxins, chemical agents, and hazardous air pollutants) would be generated during normal laboratory operations but would be prevented from escaping to the outdoor air through the use of engineering controls, as described in Chapter 2. For a discussion on potential accident scenarios where air contaminant emissions could be released to the outdoor air, refer to Section 3.14, Health and Safety. In addition, the proposed NBAF would provide the highest possible level of safety for investigators through the use of state-of-the-art biocontainment techniques, described in Chapter 2, as well as in the *NBAF Conceptual Design and Feasibility Study*. A discussion of potential accident scenarios posing a risk to NBAF personnel is included in Section 3.14, Health and Safety.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system (Tables 3.4.3.3.2-1, 3.4.3.3.2-2, 3.4.3.3.2-3, and 3.4.3.3.2-4). The potential back-up generator emissions reflect two scenarios: an anticipated use and an extreme event.

Table 3.4.3.3.2-1 — Operational Emission Estimates, Back-up Generators – Anticipated Routine Use (80 hr Annually Back-up Power and 2 hr/week Testing)

Pollutant	Number of Units	Operations hr/yr	Emission Factor lb/hr	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	8	184	21.6	31,795	15.9
CO	8	184	2.2	3,238	1.6
VOC	8	184	1.3	1,914	1.0

Table 3.4.3.3.2-2 — Operational Emission Estimates, Back-up Generators – Extreme Event (30-Day Back-up Power and 2 hr/week Testing)

Pollutant	Number of Units	Operations hr/yr	Emission Factor lb/hr	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	8	824	21.6	142,387	71.2
CO	8	824	2.2	14,502	7.3
VOC	8	824	1.3	8,570	4.3

Table 3.4.3.3.2-3 — Operational Emission Estimates, Boiler (Natural Gas)

Pollutant	Annual Production (MMBtu)	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	110,630	0.035	3,872	1.9
PM_{10}	110,630	0.010	1,106	0.6
VOC	110,630	0.016	1,770	0.9
SO_x	110,630	0.001	111	0.1
CO	110,630	0.040	4,425	2.2

Table 3.4.3.3.2-4 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	146,259	73
PM_{10}	1,106	0.6
VOC	10,340	5.2
SO_x	111	0.1
CO	18,927	9.5

If incineration is the selected waste disposal method, the proposed NBAF would likely be considered a major Title V air emission source, based on an operationally flexible scenario. However, by approaching authorization with potential emissions, the facility would be in compliance with all operational scenarios. Actual operating events would likely result in far less air emissions than those authorized under a potential worst-case scenario. Table 3.4.3.3.2- 5 presents an emission correlation developed using 2002-2005 estimated annual average emissions for PIADC developed from the 2004 PIADC stack testing results. The refuse used during the 2004 evaluation was screened of all metals and municipal wastes, and the stack testing refuse loads were only carcasses, bedding, and waste feed. The PIADC emissions evaluation used an annual average load rate of 62 tons/year and the ratio association included the PIADC permitted (worst case) rate 7,008 tons/year. The NO_x emissions were fuel based and not refuse based. The NO_x ratio was developed from the PIADC annual average hours of operations of 1,000 hr/yr and a worst-case year-round operation (8,760 hr/yr). The ratio exercise was an order of magnitude analysis and would be refined following final alternative and waste disposal method determination.

Table 3.4.3.3.2-5 — Estimated Incinerator Emissions

Pollutants	Ratio Emissions NBAF (tons/yr)
Particulates	14.00
Carbon Monoxide	0.23
Hydrochloric Acid	4.40
Nitrogen Oxides	40.00
Mercury	0.56
Arsenic	1.01
Beryllium	0.45
Cadmium	1.24
Chromium	9.90
Lead	16.30

Employee and service vehicle emission estimates were developed using the Emissions Factor 2002 Burden Model for California Air Resource Board. The estimated emissions equation is (EFx((ET+TT)xTL). Table 3.4.3.3.2-6 describes the estimated vehicular emissions.

Table 3.4.3.3.2-6 — Vehicle Emission Estimates

Pollutant	Emission Factor EF	Employee Trips ET	Truck Trips TT	Trip Length TL	Emissions	Emissions
	lb/mile	trip/day	trip/day	miles/trip	lb/day	tons/year
CO	0.0191	700	100	30	459	84
NO_x	0.0268	700	100	30	642	117
SO_x	0.0002	700	100	30	6	1
PM_{10}	0.0009	700	100	30	21	4
VOC	0.0028	700	100	30	67	12

Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. It should be noted that $PM_{2.5}$ exceeded the NAAQS at all sites.

Further differentiation of potential sites from an air quality compliance perspective, in particular as related to $PM_{2.5}$, would likely not be cost effective from a dispersion modeling standpoint given the currently known operational parameters. Meaningful refined dispersion modeling, using the currently accepted EPA model, AERMOD, would require an extensive effort, on a site by site basis. A preferred course of action to demonstrate compliance of the $PM_{2.5}$ emissions would include one or more of the following steps:

- Enter into detailed discussions with respective state regulators to ascertain whether or not available ambient $PM_{2.5}$ background values are representative of proposed site conditions and whether or not adjustments are appropriate.
- Refine stack parameters to incorporate less conservative assumptions (higher temperature, higher velocity, taller stack, etc).
- Refine emissions inventory to better reflect the actual particle size distribution to be emitted from the proposed sources.
- Obtain a more definitive description of the proposed air emissions control technologies and associated removal efficiencies of $PM_{2.5}$.

If this approach fails to demonstrate compliance for a preferred site, then a refined dispersion modeling demonstration may be appropriate, using the refined emissions inventory and stack parameters determined in the above methodology.

Cumulative Effects

The economy of Clarke County was historically agricultural through World War II, after which industrial development to process poultry and timber led to substantial growth. More recently, the economy has shifted to one based on educational, health, and social services spurred by the growth of the UGA in Athens, which is the leading employer in the county. Retail trade, manufacturing, health care, and accommodation services also make up a substantial portion of the current economy and have contributed to recent development trends within the region.

The Athens area, including UGA, is home to existing biocontainment facilities including BSL-3Ag facilities at the Animal Health Research Center (AHRC) and USDA Southeast Poultry Research Lab (SEPRL), and BSL-3 facilities at UGA. Three BSL-3 laboratories are currently operational at UGA, with 10 more coming on-line soon. Two of the eight BSL-3 laboratories in the AHRC are operational and used in the development of vaccines and therapeutic agents for Sudden Acute Respiratory Syndrome (SARS) and West Nile virus. An operational BSL-3 laboratory in the College of Veterinary Medicine is used for studies of tuberculosis virus and rabbit fever virus, and four additional BSL-3 laboratories in the infectious disease intervention center will soon be operational.

According to the University of Georgia Office of the University Architects for Facilities Planning (Kevin Kirsche, UGA, January 25, 2008), the UGA has no immediate projects of significant consequence planned for areas surrounding the proposed South Milledge Avenue Site. However, the USDA – SEPRL is in the preliminary planning stages of designing new BSL-2 and BSL-3 to replace existing facilities originally constructed in the 1960s (Don Jones, USDA Chief, Ames Modernization Branch, April 23, 2008). Five significant development projects anticipated by UGA over the next 5 years, which were submitted to the University System of Georgia Board of Regents, are to be located on main campus and are not within reasonable distance of the South Milledge Avenue Site to contribute to cumulative impacts. In addition, there are no proposed regional development projects within a 2-mile radius of the site (Brad Griffin, Athens-Clark County Planning Director, January 24, 2008). UGA at Athens currently has a Title V Permit as a major source of potential air emissions.

It is unknown at this time the potential contribution of the future projects to air emissions in Clarke County. However, it is anticipated that the rapid population growth of Clarke County would continue, and air emissions from vehicular traffic would increase accordingly.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.4.4 Manhattan Campus Site

3.4.4.1 Affected Environment

3.4.4.1.1 Climate and Severe Weather

The Kansas climate is generally referred to as a continental climate—areas with limited influence from major water bodies. Kansas lies across the path of warm, moist air moving north from the Gulf, and cold, dry air moving southeast from Canada. The favorable weather conditions and the arable lands account for the prominent livestock, grain, and dairy production in the state. Weather aberrations in Kansas, although normally short in duration, can result in significant property and crop damage. The western open areas of the state experience occasional dust storms during periods of drought, while intense spring and summer rain events can result in area flooding. Winter storms are regular climatic features that may include heavy snow, increased wind speed, and ice. An area from central Texas north through northern Iowa and from central Kansas and Nebraska east to western Ohio is commonly known as “Tornado Alley.” This region is ideally positioned for the development of super-cell thunderstorms, resulting in the potential for tornadoes. Tornadoes can occur in any season, but by mid-summer most of Tornado Alley is active.

The monthly average maximum temperature is 67.3°F the monthly average minimum temperature is 43.3°F and the annual total average rain precipitation is 2.8 inches. The reporting station for this data is in Manhattan, and the period of record covers January 1, 1900 to June 30, 2007 (HPRCC 2007).

A wind speed reporting station is located in Topeka, Kansas, approximately 50 miles east of Manhattan, and has summarized the wind data gathered from 1930 to 1996. The prevailing wind direction in compass points is north, and the annual average mean wind speed is 10 mph. Twenty tornadoes were documented in Riley County from the period between January 1, 1950 and August 31, 2007 (NCDC 2008). Table 3.4.4.1.1-1 describes the worst two events in terms of property damage.

Table 3.4.4.1.1-1 — Severe Climatic Events

County	Event	Date	Time	Magnitude	Property Damage ($)
Riley	Tornado	June 8, 1966	16:00	F3	2.5 million
Riley	Tornado	November 27, 2005	15:12	F1	800,000

3.4.4.1.2 Air Quality

The Kansas Department of Health and the Environment (KDHE) operates and oversees an ambient air monitoring network. The goals of the network are to determine if Kansas residents are exposed to criteria pollutant levels exceeding federal limits, determine attainment or nonattainment status, confirm modeled and monitored pollutant concentrations, determine air pollution trends, and evaluate public education. Kansas has positioned most of its monitors in metropolitan areas, which serve to describe the exposure of larger populations to air pollutants. Ambient air data for Kansas are reported quarterly and maintained within a national database by EPA. KDHE released the 2005-2006 Kansas Air Quality Report and has summarized the air monitoring results comparing the data to the NAAQS. Table 3.4.4.1.2-1 briefly summarizes the ambient air monitoring locations, data gathered by location, and compliance status (KDHE 2007a). Based on these data, the Manhattan Campus Site would appear as an attainment area.

Table 3.4.4.1.2-1 — 2005-2006 Ambient Data Summary Table

Community (County)	SO_2	CO	NO_2	O_3	$PM_{2.5}$	Compliant
Mine Creek (Linn County)	•	•	•	•		Yes
Coffeyville (Montgomery County)	•					Yes
Coffeyville-Buckeye (Montgomery County)	•					Yes
KC JFK (Wyandotte County)	•	•	•	•	•	Yes
Peck (Sumner County)	•		•	•		Yes
Cedar Bluff (Trego County)	•			•		Yes
Wichita Health Department (Sedgwick County)		•	•	•	•	Yes
Douglas and Main (Sedgwick County)		•				Yes
Park City (Sedgwick County)				•		Yes
Lawrence (Douglas County)				•		Yes
Heritage Park (Johnson County)				•		Yes
Leavenworth (Leavenworth County)				•		Yes
Justice Center (Johnson County)					•	Yes
McClure Elementary (Shawnee County)					•	Yes

When issuing air operating permits, the primary goals of KDHE are to protect public health, conserve air quality, control air pollution, and provide optimal service to the state's industrial customers. The air permit application evaluations are centered on the potential emissions of a facility and the associated air pollution abatement equipment the facility requires to comply with state and federal emission standards. The potential emissions of a source will determine the level or status of its air operating permit. KDHE refers to sources with potential Title V emission levels as Class I sources and issues the equivalent of a Title V operating permit. KDHE is responsible for evaluating air quality permit applications and ultimately issuing construction and operating permits that meet both state and federal air regulations. Table 3.4.4.1.2-2 describes KDHE emission thresholds that require new or modified construction permits.

Table 3.4.4.1.2-2 — Permit Thresholds

Pollutant	Emission Threshold (tons/yr)
PM	25
PM_{10}	15
SO_2	40
SO_3	40
SO_x	40
VOCs	40
NO_x	40
CO	100
Lead	0.6
Single HAP	10
Combination of HAPs	25

The hazardous air pollutants are listed at Kansas Administrative Regulations (K.A.R.) 28-19-201(a). The volatile organic compounds are listed at K.A.R. 28-19-201(b).

The Manhattan Campus Site is on the KSU campus, which holds a Class I Air Operating Permit because of the potential for the facility to emit over 100 tons/yr of NO_x, SO_x, and CO. The KSU permit has several emission sources such as, but not limited to, residential boilers, emergency generators, grain mills, and an animal carcass incinerator with a waste feed rate not to exceed 60 lb/hr. KSU reported 2005 facility emissions of 46.66 tons of NO_x, 0.56 tons of PM_{10}, 0.32 tons of SO_x, 24.79 tons of CO, 1.62 tons of VOCs, and 0.00 tons of HAPs.

3.4.4.2 Construction Consequences

3.4.4.2.1 Climate and Severe Weather

Construction of the NBAF Manhattan Campus Site would not have an adverse effect on meteorological or regional climatic conditions. The Manhattan Campus Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 119 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building's interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building's primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF Manhattan Campus Site would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction of the Manhattan Campus Site would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented.

3.4.4.2.2 Air Quality

Air quality construction effects for the NBAF at the Manhattan Campus Site would be similar to those described for the South Milledge Avenue Site. Refer to Section 3.4.3.2.2 for additional information.

3.4.4.3 Operation Consequences

3.4.4.3.1 Climate and Severe Weather

Operations of the NBAF at the Manhattan Campus Site would be similar to those previously described for the South Milledge Avenue Site, would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented. Refer to Sections 3.4.3.3.1 and 3.14 for additional information.

3.4.4.3.2 Air Quality

Gaseous and particulate air contaminant emissions generated during normal laboratory operations have been previously described. Refer to Section 3.4.3.3.2 and 3.14 for additional internal and external accidental release information.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system. The estimated emissions vary from site to site due to variations in projected boiler use, but the estimated emissions do not vary significantly (see Tables 3.4.4.3.2-1 and 3.4.4.3.2-2).

Table 3.4.4.3.2-1 — Operational Emission Estimates, Boiler (Natural Gas)

Pollutant	Annual Production MMBtu	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	141,000	0.035	4,935	2.5
PM_{10}	141,000	0.010	1,410	0.7
VOC	141,000	0.016	2,256	1.1
SO_x	141,000	0.001	141	0.1
CO	141,000	0.040	5,640	2.8

MMBtu = million British thermal units
lb = Pounds

Table 3.4.4.3.2-2 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	147,322	73.6
PM_{10}	1,410	0.7
VOC	10,826	5.4
SO_x	141	0.1
CO	20,142	10.1

Operational effects for the NBAF at the Manhattan Campus Site would be similar to those of the South Milledge Avenue Site. Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. As previously stated, $PM_{2.5}$ exceeded the NAAQS at all sites. Measures to demonstrate compliance of the $PM_{2.5}$ emissions were previously described in Section 3.4.3.3.2.

If the Manhattan Campus Site is selected, the potential emissions from the facility would be evaluated, release models implemented (if needed), and the applicable authorizations applied for and received prior to operation.

<u>Cumulative Impacts</u>

Riley County historically relied on agriculture and mining industries for economic growth and development. The presence and growth of KSU in Manhattan continues to drive development trends for the county, and projected expansion at Fort Riley would result in additional growth in the county, although the majority of development has traditionally occurred in adjacent Geary County. The only BSL facility currently located on the KSU campus is the Biosecurity Research Institute that conducts BSL-3 and BSL-3Ag research.

According to KSU (Ron Trewyn, KSU, January 28, 2008), KSU has two major projects planned within a 2-mile radius of the Manhattan Campus Site. These projects, the Kansas State Equine Education Center and the Flint Hills Horse and Park Events Center, are related and would be located at the same site north of Kimball Avenue and east of Denison Avenue, encompassing 85 to100 acres and include both the educational and competitive event components. These projects would result in 150 to 180 full-time and part-time jobs. The increase in traffic is estimated to be 500 to 700 vehicles per week, primarily on weekends. The projects are in the preliminary planning stages, so any increase in public service demands and environmental impacts are not known.

There are additional projects planned on the KSU campus. One noteworthy project is the Jardine Complex Phase II, which includes 544 new bedrooms. Phase I added 608 bedrooms and over 2,000 daily trips, while Phase II is adding 347 apartments and another 2,000 daily trips. Another project is the Equestrian Center Phase I for the College of Agriculture, Department of Animal Sciences, at Kansas State Athletic Department.

There are 80 equestrian team members/coaches, a 40-seat classroom, and scheduled 400-person stadium events. This project would result in over 1,000 daily trips.

The Region of Influence (ROI) for air quality is Riley County. As previously discussed, KSU is a Title V source of potential air emissions in Manhattan. The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time.

The total overall cumulative traffic impacts would be 23,580 daily trips for the ROI. This includes the current traffic, the proposed NBAF site, the new KSU project traffic, the increase of commercial/industrial employment traffic, and additional freight traffic. Air emissions were due to the additional traffic in the ROI. The California Air Resources Board's EMFAC 2002 Burden Model was used, and its assumptions were applied herein. The cumulative impacts on air quality in the ROI are 9,926 lb/day or 0.32 tons/day for CO; 1,876 lb/day or 0.44 tons/day for NO_x; and, 1,091 lb/day or 0.46 tons/day for reactive organic gases (ROG) or VOC.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must:

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.4.5 Flora Industrial Park Site

3.4.5.1 Affected Environment

3.4.5.1.1 Climate and Severe Weather

The climate in Mississippi can be defined as temperate, with long, warm summers and short, mild winters. The terrain of Mississippi varies from rolling hills in the north to sandy beaches along the Gulf of Mexico. The coastal zone of Mississippi is influenced by and exposed to tropical weather conditions.

The monthly average maximum temperature is 76.6°F, the monthly average minimum temperature is 53.8°F, and the annual total average rain precipitation is 4.10 inches (SERCC 2007b). The reporting station for these data is Jackson, Mississippi, located approximately 25 miles southeast of Flora, and the period of record for these data is January 2, 1930 to May 31, 1971.

A wind speed reporting station is located in Jackson, Mississippi, which summarized wind data gathered from 1930 to 1996. The annual prevailing wind direction by compass point is north-northwest, and the annual mean wind speed is 7 mph. Forty tornadoes were documented in Madison County for the period between January 1, 1950 and March 31, 2007; the two largest cited were level F4s (Fujita Scale). These data also show four tropical events impacting Madison County from the same time period; the largest of these systems being Hurricane Katrina, with regional impacts exceeding $5.9 billion (NCDC 2008).

3.4.5.1.2 Air Quality

The Mississippi Department of Environmental Quality (MDEQ) monitors the ambient air concentrations of PM, SO_2, O_3, and NO_2 at numerous sampling sites across the state. The ambient air quality data are used to determine regulatory compliance, progress on regulatory compliance, air contaminant reduction strategies, and successes of current air pollutant reduction strategies. Based on MDEQ 2006 data, Mississippi, is in compliance with all EPA criteria pollutant standards. Table 3.4.5.1.2-1 briefly summarizes 2006 MDEQ ambient air quality monitoring data from the two sampling sites nearest the Flora Industrial Park Site (MDEQ 2007a).

Table 3.4.5.1.2-1 — Ambient Air Quality Compliance Summary

Pollutant	Averaging Times	Ambient Standards	Concentrations Reported	County	City
Ozone	Primary & Secondary 8 hr	84 ppb	72 ppb	Hinds	Jackson
$PM_{2.5}$	Primary & Secondary Annual Average	15 ug/m^3	12.5 ug/m^3	Hinds	Jackson
$PM_{2.5}$	Primary & Secondary 24 hr Average	35 ug/m^3	29 ug/m^3	Hinds	Jackson
PM_{10}	Primary & Secondary Annual Average	50 ug/m^3	20 ug/m^3	Jackson	Pascagoula
PM_{10}	Primary & Secondary 24 hr Average	150 ug/m^3	50 ug/m^3	Jackson	Pascagoula
NO_2	Primary & Secondary Annual Average	0.053 ppm	0.007 ppm	Jackson	Pascagoula
SO_2	Primary & Secondary Annual Average	0.03 ppm	0.002 ppm	Jackson	Pascagoula
SO_2	Primary & Secondary 24 hr Average	0.14 ppm	0.01ppm	Jackson	Pascagoula
SO_2	Secondary 3 hr Average	0.5 ppm	0.0 ppm	Jackson	Pascagoula

Source: MDEQ 2006 data.
ppb = parts per billion m^3 = cubic meters
ppm = parts per million ug = micrograms

The Mississippi Commission on Environmental Quality, which is staffed by appointed officials, adopted Air Emissions Operating Permit Regulations for the purposes of Title V compliance with the *Federal Clean Air Act* (October 27, 1993, as amended December 29, 2000). Examples of industrial activities/emissions that are considered by MDEQ as potential Title V major source are

1. Solid waste incinerators;
2. Stationary sources, potential to emit 10 tons/yr or more of a hazardous air pollutant;
3. Stationary sources with the potential to emit 25 tons/yr or more in aggregate of hazardous air pollutants; and
4. Stationary sources with the potential to emit 100 tons/yr or more of any air pollutant.

There are no Title V major stationary sources located in Flora, Mississippi.

3.4.5.2 Construction Consequences

3.4.5.2.1 Climate and Severe Weather

Construction of the NBAF Flora Industrial Park Site would not have an adverse effect on meteorological or regional climatic conditions. The Manhattan Campus Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 119 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building's interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building's primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction of the NBAF would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented.

3.4.5.2.2 Air Quality

Air quality construction effects of the NBAF at the Flora Industrial Park Site would be similar to those described for the South Milledge Avenue Site. Refer to Section 3.4.3.2.2 for additional information.

3.4.5.3 Operation Consequences

3.4.5.3.1 Climate and Severe Weather

Operation of the NBAF at the Flora Industrial Park Site would be similar to those previously described for the South Milledge Avenue Site, would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented. Refer to Section 3.4.3.3.1 for additional information.

3.4.5.3.2 Air Quality

Gaseous and particulate air contaminant emissions generated during normal laboratory operations have been previously described. Refer to Sections 3.4.3.3.2 and 3.14 for internal and external accidental release information.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system. The estimated emissions vary from site to site due to variations in projected boiler use, but the estimated emissions do not vary significantly. Refer to Section 3.4.3.3.2 and Tables 3.4.3.3.2-1 and 3.4.3.3.2-2 for additional information.

Table 3.4.5.3.2-1 — Operational Emission Estimates, Boiler (Natural Gas)

Pollutant	Annual Production MMBtu	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	107,240	0.035	3,753	1.9
PM_{10}	107,240	0.010	1,072	0.5
VOC	107,240	0.016	1,716	0.9
SO_x	107,240	0.001	107	0.1
CO	107,240	0.040	4,290	2.1

MMBtu = million British thermal units
lb = Pounds

Table 3.4.5.3.2-2 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	146,140	73.1
PM_{10}	1,072	0.5
VOC	10,286	5.1
SO_x	107	0.1
CO	18,792	9.4

Operational effects of the NBAF at the Flora Industrial Park Site would be similar to those of the South Milledge Avenue Site. Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. As previously stated, $PM_{2.5}$ exceeded the NAAQS at all sites. Measures to demonstrate compliance of the $PM_{2.5}$ emissions were previously described in Section 3.4.3.3.2.

<u>Cumulative Impacts</u>

In Madison County, there are several public and private activities proposed or ongoing that would have potential to impact air quality. According to the Metro Jackson Chamber of Commerce, there are several new residential projects being planned in the Town of Flora or in Madison County. Terra Subdivision is located within the town limits of Flora with 19 lots available and 60 acres being developed. Depending on the density allowed for the subdivision, there is a potential of up to 240 additional lots. Another future development project is Andover Subdivision, which is located off State Highway 22 within 5 miles of the proposed site in an unincorporated area. Phase I of the subdivision has approximately 73 lots. Numerous phases are predicted for this development over the next 5 years, but data are not available on the additional number of lots to be developed. The Highlands Subdivision is another future planned project located off Mount Leopard and would be accessed from Highway 22. It is within 5 miles of the proposed NBAF site. The data provided did not state the number of lots predicted for this development, but all of the lots would be greater than 5 acres. Other noted subdivisions that have not announced their density allocations are Magnolia Heights and Woodlands of Flora.

There is a proposed major development (Galeria-Madison) approximately 15-20 miles from the proposed NBAF site and includes a mix of single-family homes, condominiums, an office park, and a shopping center. The acreage, square footages, and density numbers are not available for this development. There are other developments occurring, but they are not of major regional significance.

The Metro Jackson Chamber of Commerce that stated no non-residential economic development projects are scheduled for Flora within the next 5 years. There are currently no BSL facilities in the region.

The ROI for air quality is Madison County. As discussed in Section 3.4.5.1, there are no Title V air emission sources in Flora. The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time.

An air quality analysis was undertaken to calculate on-road mobile source emissions in Madison County due to projected traffic increases with future growth. The Emission Factors 2002 Burden Model was applied to derive emissions data for specified EPA air quality guidelines. The total cumulative impacts for air quality in the ROI are as follows: 9,282 lb/day or 4.91 tons/day for CO; 1,866 lb/day or 0.93 tons/day for NO_X; and, 1,080 lb/day or 0.54 tons/day for ROG or VOCs. These impacts would be in addition to the NBAF vehicle emissions presented in Table 3.4.3.3.2-6.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.4.6 Plum Island Site

3.4.6.1 Affected Environment

The affected environment sections, air quality and climate, for the Plum Island Site are addressed in previous Sections 3.4.2.1.1 and 3.4.2.1.2.

3.4.6.2 Construction Consequences

3.4.6.2.1 Climate and Severe Weather

Construction of the NBAF Plum Island Site would not have an adverse effect on meteorological or regional climatic conditions. The Plum Island Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 156 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building's interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building's primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction of the NBAF at the Plum Island Site would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented.

3.4.6.2.2 Air Quality

The air quality construction effects at the Plum Island Site would be similar to those described for the South Milledge Avenue Site. Refer to Section 3.4.3.2.2 for additional information.

3.4.6.3 Operation Consequences

3.4.6.3.1 Climate and Severe Weather

Operations of the NBAF at the Plum Island Site would be similar to those previously described for the South Milledge Avenue Site and would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented. Refer to Section 3.4.3.3.1 for additional information.

3.4.6.3.2 Air Quality

Gaseous and particulate air contaminant emissions generated during normal laboratory operations have been previously described. Refer to Sections 3.4.3.3.2 and 3.14 for additional internal and external accidental release information.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system. The estimated emissions vary from site to site due to variations in projected boiler use, but the estimated emissions do not vary significantly. Refer to Section 3.4.3.3.2 and Tables 3.4.3.3.2-1 and 3.4.3.3.2-2 for additional information.

Table 3.4.6.3.2-1 — Operational Emission Estimates, Boiler Emissions (No. 2 Fuel Oil)

Pollutant	Annual Production MMBtu	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	143,700	0.187	26,872	13.4
PM_{10}	143,700	0.025	3,593	1.8
VOC	143,700	0.030	4,311	2.2
SO_x	143,700	0.520	74,724	37.4
CO	143,700	0.070	10,059	5.0

MMBtu = million British thermal units
lb = Pounds

Table 3.4.6.3.2-2 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	169,259	84.6
PM_{10}	3,593	1.8
VOC	12,881	6.4
SO_x	74,724	37.4
CO	24,561	12.3

Operational effects of the NBAF at the Plum Island Site would be similar to those of the South Milledge Avenue Site. As stated earlier, Suffolk County is currently categorized as nonattainment for O_3 and $PM_{2.5}$. Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. As previously stated, $PM_{2.5}$ exceeded the NAAQS at all sites. Measures to demonstrate compliance of the $PM_{2.5}$ emissions were previously described in Section 3.4.3.3.2.

If the Plum Island Site is selected, air permit requirements would be required to comply with the SIP to assist Suffolk County in becoming reclassified as an attainment area for O_3 and $PM_{2.5}$ (as does the current PIADC permit). Potential emissions from the NBAF would be evaluated, release models implemented (if needed), and the applicable authorizations applied for and received prior to operation.

Cumulative Impacts

In Suffolk County, no major development projects have been identified in the reasonably foreseeable future that would have potential to impact air quality. The only project scheduled for Plum Island in the foreseeable future consists of the expansion of the PIADC BSL-3 facilities to house more research animals, upgrade and expansion of the existing necropsy facilities, conversion of underutilized space in the existing containment facility to increase laboratory space, and upgrade and expansion of existing utility systems including the chilled water system, power distribution system, wastewater decontamination system, and potable and water supply system.

Suffolk County is typical of many communities that experienced rapid growth following World War II. Its proximity to New York City led the population of Suffolk County to quadruple between 1950 and 1970, and residential development and associated service industries and roadways were the major development categories during that time. In recent years, growth has slowed, and the population has remained stable. Major employers in the region include health care providers and retail traders. The local economy base is currently becoming more diversified, and growth sectors include health, education and social services, tourism, the arts, and emerging technologies. Currently, PIADC has the only BSL facility (BSL-3) in the county.

The ROI for the air quality assessment includes Suffolk County. Suffolk County is a nonattainment area for ozone and $PM_{2.5}$ and usually exceeds the NAAQS limits during the summer months. The nonattainment status is based on monitoring stations on Long Island and other densely populated areas to the west.

Vehicle traffic generated from the construction and operation of the NBAF, operation of boilers, emergency back-up generators, and either incineration or tissue digestion would all be sources of pollutant emissions. Because the design of the NBAF is still in the planning phase, the potential for air emissions can only be estimated.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.4.7 Umstead Research Farm Site

3.4.7.1 Affected Environment

3.4.7.1.1 Climate and Severe Weather

There are three distinct geographic regions in North Carolina: the western mountains, the central piedmont, and the eastern coast. The climate of North Carolina varies significantly due to the Gulf Stream influence on the coastal counties and the Appalachian Mountains on the western counties. The Umstead Research Farm Site is located in the north-central piedmont area and experiences distinct seasonal changes.

The monthly average maximum temperature is 70.9°F, and the monthly average minimum temperature is 43.6°F. Lake Michie, North Carolina, is a reporting station located approximately 5 miles west of the Umstead Research Farm. The Butner Filter Plant reporting station provided the monthly average total rain precipitation of 3.8 inches. The period of record for temperature and precipitation data, respectively, is August 1, 1948 to January 31, 1973, and February 1, 1956 to June 30, 2007 (SERCC 2007c).

A wind speed reporting station is located in Raleigh, North Carolina, approximately 26 miles south of the Umstead Research Farm Site. Wind data summary, from 1930 to 1996, show the prevailing wind direction as southwest and the mean wind speed as 8 mph. Six tornadoes and five hurricanes have been documented in

Granville County from January 1, 1950 to March 31, 2007 (Table 3.4.7.1.1-1). The most damaging tornado, in terms of property, was an F1 (Fujita Scale) in May 1989, where damage estimates approached $2.5 million. Hurricane Floyd in September 1999 resulted in devastating flooding with regional property damage reaching $3 billion (NCDC 2008).

Table 3.4.7.1.1-1 — Severe Climatic Events – Granville County

Event	Date	Time	Magnitude	Property Damage ($)
Tornado	05/05/1989	18:05	F1	2.5 million
Tornado	03/20/1998	18:55	F2	100 thousand
Hurricane Floyd	09/15/1999	16:00	-	3 billion
Hurricane Isabel	09/18/2003	09:00	-	7.3 million

3.4.7.1.2 Air Quality

The North Carolina Department of Environment and Natural Resources, Division of Air Quality (NCDAQ), Ambient Monitoring Section (AMS) operates and oversees ambient air quality monitoring program in North Carolina. The AMS manages 60 monitoring stations statewide, measuring outdoor concentrations of regulated pollutants such as O_3, Pb, PM, NO_x, SO_2, and CO (NCDENR 2007a). North Carolina continues to be challenged by two criteria pollutants, $PM_{2.5}$ and O_3. As of 2006, Charlotte, in Mecklenburg County, remains in nonattainment for O_3; however, NCDAQ expects the area to achieve attainment by mid-2010. The annual $PM_{2.5}$ standard is being exceeded in Catawba and Davidson Counties; NCDAQ believes the area will be in compliance with the annual $PM_{2.5}$ standard by the end of 2009 (NCDENR 2007f. An ambient air O_3 monitoring site is located in Butner at the John Umstead Hospital water treatment plant. This monitoring site has been operational since 1979 and has not reported any O_3 concentrations that exceed the NAAQS (H. Kimball, DAQ, December 14, 2007).

The NCDAQ is also responsible for the issuance of air quality operating permits. North Carolina adheres to the EPA definition of a major source and requires an issued permit before such facilities may operate.

3.4.7.2 Construction Consequences

3.4.7.2.1 Climate and Severe Weather

Construction of the NBAF Umstead Research Farm Site would not have an adverse effect on meteorological or regional climatic conditions. The Manhattan Campus Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 119 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building's interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building's primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction of the NBAF at the Umstead Research Farm Site would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented.

3.4.7.2.2 Air Quality

Air quality construction effects at the NBAF Umstead Research Farm Site would be similar to those described for the South Milledge Avenue Site. Refer to Section 3.4.3.2.2 for additional information.

3.4.7.3 Operation Consequences

3.4.7.3.1 Climate and Severe Weather

Operations of the NBAF at the Umstead Research Farm Site would be similar to those previously described for the South Milledge Avenue Site and would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented. Refer to Section 3.4.3.3.1 for additional information.

3.4.7.3.2 Air Quality

Gaseous and particulate air contaminant emissions generated during normal laboratory operations have been previously described. Refer to Sections 3.4.3.3.2 and 3.14 for additional internal and external accidental release information.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system. The estimated emissions vary, from site to site, due to variations in projected boiler use, but the estimated emissions do not vary significantly. Refer to Section 3.4.3.3.2 and Tables 3.4.3.3.2-1 and 3.4.3.3.2 2 for additional information.

Table 3.4.7.3.2-1 — Operational Emission Estimates, Boiler Emissions (Natural Gas)

Pollutant	Annual Production MMBtu	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	102,190	0.035	3,577	1.8
PM_{10}	102,190	0.010	1,022	0.5
VOC	102,190	0.016	1,635	0.8
SO_x	102,190	0.001	102	0.1
CO	102,190	0.040	4,088	2.0

MMBtu = million British thermal units
lb = Pounds

Table 3.4.7.3.2-2 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	145,964	72.9
PM_{10}	1,022	0.5
VOC	10,205	5.1
SO_x	102	0.1
CO	18,590	9.3

Operational effects of the NBAF at the Umstead Research Farm Site would be similar to those of the South Milledge Avenue Site. Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. As previously stated, $PM_{2.5}$ exceeded the NAAQS at all sites. Measures to demonstrate compliance of the $PM_{2.5}$ emissions were previously described in Section 3.4.3.3.2.

If the Umstead Research Farm Site is selected, potential emissions from the facility would be evaluated, release models implemented (if needed), and the applicable authorizations applied for and received prior to operation. Refer to Section 3.4.3.3.2 and Tables 3.4.3.3.2-1 and 3.4.3.3.2-2 for additional information.

Cumulative Impacts

In Granville County, there are few other reasonably foreseeable future planned public or private projects that would have potential to impact air quality. According to the Granville County Economic Development Commission (EDC) (Leon Turner, EDC, February 20, 2008), there are currently no major new projects being planned in Granville County. Development Services has permitted around 3,000 new homes, but it is uncertain how many will be built with the current housing slowdown. It is unknown when the housing market will return to its level of previous years.

Historically, Granville County has been rural with agriculture as the main economic driver. However, recent factors have caused portions of the county to experience growth more rapidly than others. The central portion of the county is experiencing moderate growth due to economic opportunities near Oxford, and the southern portion of the county has experienced rapid growth due to spillover from Durham and Wake counties. However, indications from the Granville EDC shows that growth and residential development are slowing similar to general nationwide trends (Leon Turner, EDC, February 20, 2008).

The new Central Regional Hospital is the first of three new state-operated psychiatric hospitals and is scheduled to open sometime in 2008. The hospital has 432 private rooms and will employ a staff of more than 1,600. Although Granville County does not currently have any BSL-3 or BSL-4 facilities, several universities, research institutes, state agencies, and private companies in the Research Triangle have established and operate at least 22 BSL-3 and BSL-3Ag laboratories.

Vehicle traffic generated from the construction and operation of the NBAF, operation of boilers, emergency back-up generators, and either incineration or tissue digestion would all be sources of pollutant emissions. Because the design of the NBAF is still in the planning phase, the potential for air emissions can only be estimated. However, DHS is committed to ensuring that the NBAF project would comply with all relevant air county quality control.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.4.8 Texas Research Park Site

3.4.8.1 Affected Environment

3.4.8.1.1 Climate and Severe Weather

San Antonio, situated between a semi-arid area to the west and a coastal region to the southeast, has a subtropical climate. The area is characterized by July summers with mean temperatures of 84.7°F, and

January winters with mean temperatures of 50.7°F. More than 80% of the daily summer temperatures exceed 90°F, while winter temperatures fall below freezing only about 20 days/yr (USACE 2006).

Annual precipitation for the region averages from less than 20 inches to over 40 inches. Normally, the annual average precipitation is approximately 28 inches but varies greatly from year to year. The heaviest rain events traditionally occur during spring and fall thunderstorms. Light hail frequently accompanies the springtime thunderstorms; however, damaging hail is rare (USACE 2006).

The San Antonio wind regime is dominated by northerly winds in the winter and southeasterly winds from the Gulf of Mexico during the summer. The severe weather in this area is normally associated with tornadoes, but such events are fairly rare and isolated. On April 17, 1988, the remnants of Class 5 Hurricane Gilbert generated 10 to 12 area tornadoes (USACE 2006).

3.4.8.1.2 Air Quality

The TCEQ adopted the NAAQS as the ambient air quality standards for Texas. Local air monitors have recorded O_3 levels above the allowed 8-hr concentration. In June 2004, EPA designated Bexar, Comal, and Guadalupe Counties as nonattainment areas under the 8-hr O_3 NAAQS but with a deferred Early Action Compact (EAC) agreement. Since the EPA guidance suggested that the San Antonio Metropolitan Statistical Area (MSA) be considered the boundaries of the new 8-hr O_3 nonattainment area, air quality planning has focused on Bexar, Comal, Guadalupe, and Wilson counties, termed the "San Antonio EAC Region" (SAER). Currently, the San Antonio MSA comprises the counties of Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina, and Wilson (USACE 2006). EPA set the nonattainment designation for the SAER to take effect in December 2007 (EPA 2007g). Although the procedural requirements of the General Conformity Rule would have to be determined, conformity with area SIPs or a Federal Implementation Plans still must be ensured (USACE 2006).

The closest ambient air monitoring station to the site is the Camp Bulls site located approximately 22 miles northeast of San Antonio. The Camp Bulls station monitors for NO_x and O_3. The former Elm Creek Elementary School site, located 12.5 miles southeast in Atascosa, Texas, was deactivated in November 2007. There are no other monitored air pollutants in Bexar or Medina County.

TCEQ has issued 16 air permits for facilities in the region, but no major sources are within 10 miles of the Texas Research Park Site. The majority of the permitted operations near the proposed Texas Research Park Site are small emission sources that qualify for a TCEQ Permit by Rule. To qualify under this rule, the operation must not emit more than 25 tons/yr of SO_2, particulate matter, or VOCs and not more than 250 tons/yr of NO_x or CO. Oberthur Gaming Technologies and Maxim Integrated Products, Inc., are the two largest emission sources near the Texas Research Park Site, and both are located about 7.5 miles northeast of the proposed site.

3.4.8.2 Construction Consequences

3.4.8.2.1 Climate and Severe Weather

Construction of the NBAF Texas Research Park Site would not have an adverse effect on meteorological or regional climatic conditions. The Manhattan Campus Site would be equipped to withstand the normal meteorological conditions that are present within the geographic area of the selected site. The NBAF would be constructed in accordance with the International Building Code, ASCE 7, and the codes of the local jurisdiction, which take into account the functional use of the facility as a laboratory. Similar facilities in the United States, such as the laboratories at the Centers for Disease Control and Prevention which houses the Coordinating Center for Infectious Diseases, are designed and constructed using these same criteria. The exterior of the building would be designed to withstand wind pressures which are the equivalent of a 119 mph wind, which has a calculated and accepted probability of occurring to any specific property only once every 50 years.

In the unlikely event that a significant wind storm strikes the facility, the exterior walls and roofing of the building would likely be damaged. This breach in the exterior skin would cause a dramatic increase in internal pressures leading to further failure of the building's interior and exterior walls. However, the loss of these architectural wall components would actually decrease the overall wind loading as applied to the building structure and therefore further decrease the possibility of damage to the building's primary structural system. Still, even if the interior and exterior walls failed during an extreme wind loading event, the BSL-3Ag and BSL-4 spaces, which would be constructed within the interior of the facility as reinforced cast-in-place concrete, should not be breached.

Construction of the NBAF at the Texas Research Park Site would not result in significant adverse environmental effects, would meet or exceed all required wind loads and site-specific seismic design criteria, and would not be constructed within a floodplain. Construction of the NBAF would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented.

3.4.8.2.2 Air Quality

Air quality construction effects of the NBAF at the Texas Research Park Site would be similar to those described for the South Milledge Avenue Site. Refer to Section 3.4.3.2.2 for additional information.

3.4.8.3 Operations Consequences

3.4.8.3.1 Climate and Severe Weather

Operations of the NBAF at the Texas Research Park Site would be similar to those previously described for the South Milledge Avenue Site and would not have an adverse effect on meteorological or regional climatic conditions, and all inclement weather response plans would be implemented. Refer to Section 3.4.3.3.1 for additional information.

3.4.8.3.2 Air Quality

Gaseous and particulate air contaminant emissions generated during normal laboratory operations have been previously described. Refer to Sections 3.4.3.3.2 and 3.14 for additional internal and external accidental release information.

Operational emission estimates have been developed for a potential back-up generator system and a site-specific boiler system. The estimated emissions vary from site to site due to variations in projected boiler use, but the estimated emissions do not vary significantly. Refer to Section 3.4.3.3.2 and to Tables 3.4.3.3.2-1 and 3.4.3.3.2-2 for additional information.

Table 3.4.8.3.2-1 — Operational Emission Estimates, Boiler (Natural Gas)

Pollutant	Annual Production MMBtu	Emission Factor lb/MMBtu	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	100,230	0.035	3,508	1.8
PM_{10}	100,230	0.010	1,002	0.5
VOC	100,230	0.016	1,604	0.8
SO_x	100,230	0.001	100	0.1
CO	100,230	0.040	4,009	2.0

MMBtu = million British thermal units
lb = Pounds

Table 3.4.8.3.2-2 — Operational Emission Estimates Generators and Boiler

Pollutant	Estimated Emissions lb/yr	Estimated Emissions tons/yr
NO_x	145,895	72.9
PM_{10}	1,002	0.5
VOC	10,174	5.1
SO_x	100	0.1
CO	18,511	9.3

Operational effects of the NBAF at the Texas Research Park Site would be similar to those of the South Milledge Avenue Site. Bexar County in currently categorized as nonattainment for O_3 and $PM_{2.5}$. Most criteria pollutant impacts were less than NAAQS, Only $PM_{2.5}$ exceeded the NAAQS. The ratio of background concentration of $PM_{2.5}$ to the NAAQS ranges from 69% to 89%, making demonstration of compliance with the $PM_{2.5}$ standard difficult without further evaluation. As previously stated, $PM_{2.5}$ exceeded the NAAQS at all sites. Measures to demonstrate compliance of the $PM_{2.5}$ emissions were previously described in Section 3.4.3.3.2.

If the Texas Research Park Site is selected, air permit requirements would be required to comply with the SIP to assist Bexar County in becoming reclassified as an attainment area for O_3 and $PM_{2.5}$. The potential NBAF emissions from construction, operations, and facility-related mobile sources would be a source of additional ozone precursor pollutants. Potential emissions from the NBAF would be evaluated, release models implemented (if needed), and the applicable authorizations applied for and received prior to operation.

Cumulative Impacts

In Bexar County, there are several other public and private activities proposed or ongoing that would have potential to impact air quality. Vehicle traffic generated from the construction and operation of the NBAF, operation of boilers, emergency back-up generators, and either incineration or tissue digestion would all be sources of pollutant emissions. Because Bexar County is currently in nonattainment for at least one air pollutant, the proposed NBAF could contribute to cumulative effects on the county's ability to meet future air quality goals. Additional analysis was performed to determine the extent to which the potential air emissions from NBAF would add to the anticipated effects on air quality from other sources. This cumulative impact analysis on air is described below.

Because the design of the NBAF is still in the planning phase, the potential for air emissions can only be estimated. However, DHS is committed to ensuring that the NBAF project would comply with all relevant air quality control requirements, including permitting requirements, to protect the air quality of Bexar County.

Prior to the mid 20th century, Bexar County was predominately agricultural, with cash crops, cotton, and livestock as the main economic drivers. World War II saw Bexar County's already large military presence grow, spurring development trends. The area's military presence has remained an important economic driver. During the 1980s and 1990s, as a result of attempts to diversify the area's economy, San Antonio and Bexar County became the site of a number of electronics and biotechnology companies. A number of BSL facilities are located in the San Antonio and Bexar County region. The Southwest Foundation for Biomedical Research currently operates three BSL-3 laboratories and one BSL-4 laboratory; the University of Texas Health Science Center at San Antonio operates three BSL-3 laboratories; the Brooks City Base has two BSL-3 laboratories, one of which is operated by the San Antonio Metropolitan Health District; and the University of Texas at San Antonio, the Veterans Administration, the Wilford Hall Medical Center, and the Brooke Army Medical Center all operate one BSL-3 laboratory.

A number of new residential development projects are planned that would result in over 13,000 new residential units in the region. The estimated population generated from these planned developments would be 31,200 people for just residential—not including commercial, office, or industrial population from employment in the area.

The air quality analysis used to calculate mobile source emissions in the ROI applied the California Air Resources Board's EMFAC 2002 Burden Model to extrapolate emissions factor data for the ROI. The total impact of both passenger vehicles and delivery trucks associated with the planned residential developments were estimated at 75,897 lb/day or 39.24 tons/day for CO; 14,417 lb/day or 9.01 tons/day for NO_X; and, 8,719 lb/day or 4.36 tons/day for ROG or VOC. These impacts would be in addition to the NBAF vehicle emissions presented in Table 3.4.3.3.2-6.

The NBAF would contribute to air emissions in the region, although the amount of contribution is not known at this time. The permitting agency would require that DHS show that the cumulative impact of the NBAF together with all other existing and proposed sources must:

- Not result in a violation of a NAAQS, or
- Not significantly contribute to an existing measured and modeled violation of a NAAQS.

3.5 NOISE

3.5.1 Methodology

To describe the existing and future acoustic environments of each alternative, data were obtained from available noise studies, records and information pertaining to noise-producing sources, and supplemented by observations from site visits. These data were evaluated by site to assess potential audible effects from construction and operation of the proposed alternatives. Baseline noise levels and construction noise levels were determined by comparing proposed NBAF site activities with standard noise levels obtained during literature review. Operational noise levels were determined relative to those currently experienced at the existing PIADC.

3.5.2 No Action Alternative

3.5.2.1 Affected Environment

PIADC is the primary source of man-made noises at Plum Island. Acoustic emissions at the current research facility include light vehicle traffic, maintenance machinery, generators, wastewater treatment, and the heating/cooling system. Additional noise sources located adjacent or near the island include navigational beacons, maritime waterway traffic, and the daily ferry traffic to and from the island. A baseline noise level survey has not been conducted; however, Table 3.5.2.1-1 presents typical source/location noise levels (NPC 2000). Considering the location and operations of PIADC, routine noise levels from the facility would likely be comparable to an urban or suburban decibel (written as dBa) range or less. A-weighted decibels are expressions used to describe a sound's relative loudness in air as perceived by the human ear.

Table 3.5.2.1-1 — Noise Levels of Common Sources

Sound Source	Decibel
Air raid siren at 50 ft	120
Maximum levels in audience at rock concerts	110
On platform by passing subway train	100
On sidewalk by passing heavy truck or bus	90
On sidewalk by typical highway	80
On sidewalk by passing automobiles with mufflers	70
Typical urban area background/busy office	60
Typical suburban area background	50
Quiet suburban area at night	40
Typical rural area at night	30
Isolated broadcast studio	20
Audiometric (hearing testing) booth	10
Threshold of hearing (person without hearing damage)	0

The island currently has no high decibel noise emission sources, and there are no noise sensitive receptors within close proximity of PIADC. Refer to Section 3.3.2.1 for additional PIADC facility information.

3.5.2.2 Construction Consequences

Ongoing PIADC enhancements would result in additional temporary noise sources associated with potential land grading and facility renovations/upgrades. The construction period and location would dictate the noise emission sources, audible levels, and potential effects. Additional temporary acoustic emissions from renovation/enhancement efforts at PIADC would likely include general vehicular traffic and heavy lift equipment. These renovation-related audible emissions would be limited in duration and would likely be restricted to specific contract hours and locations. No significant direct adverse noise effects are anticipated from renovation/enhancement efforts at PIADC.

Indirect effects from the renovation and enhancement activities would occur from construction-related traffic transporting workers and construction materials/equipment to Plum Island via the Orient Point or Old Saybrook government ferries. These noise effects would be minor, and temporary, and noise levels would not be anticipated to measurably increase over existing conditions.

3.5.2.3 Operation Consequences

Operation and maintenance of the upgraded facilities would result in minimal noise increases. The noise-levels and sources would be comparable to the current PIADC operations; however, an audible emissions reduction may be realized by facility upgrades to the heating, cooling, and filtration systems. A potential significant source of noise emissions would be the emergency generators; however, PIADC's upgraded equipment would likely include additional operational efficiencies and safety features that are not currently associated with the aged infrastructure. The generators are an emergency back-up response system and would not be a routine noise emission source. PIADC is within 1 mile of coastal shorelines and freshwater marshes; however, due to the noise emission levels and location of the the renovated facility, no adverse noise effects are anticipated on the island or surrounding area. Indirect effects to noise levels are not expected.

3.5.3 South Milledge Avenue Site

3.5.3.1 Affected Environment

The South Milledge Avenue Site is located on UGA property. The site is primarily undeveloped woodlands and pastures. The South Milledge Avenue and Whitehall Road intersection is less than 1 mile northeast of the site. South Milledge Avenue and UGA academic facilities abut the site to the north and northeast, a residence is adjacent to the northwest, undeveloped forests are to the west and east, and the Middle Oconee River is adjacent to the southern border. The State Botanical Gardens, UGA Bio-conversion Facility, Forestry Services Facility, and the UGA livestock arena are noise receptors within the proposed site's proximity (Figure 3.5.3.1-1). Forested areas to the east and west and the Middle Oconee River to the south would also represent noise receptors. The South Milledge Avenue Site baseline noise levels have not been documented; however, ambient decibel levels at the site would likely be comparable to a suburban or semi-rural location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels.

3.5.3.2 Construction Consequences

The University facilities and the few non-University neighbors, including the State Botanical Gardens, may experience temporary construction noise effects. Also, construction noise would temporarily disperse wildlife from adjacent undeveloped areas. Potential noise sources would include variable pitch and volumes from vehicles and equipment involved in site clearing and grading, creating, and/or placing engineered structures and conducting interior/exterior finish work. The construction phases would dictate the equipment types, thereby influencing the audible emissions. These acoustic sources would vary with the construction timeline, such as earthwork noise emissions, progressing into concrete pours, and with transitioning to steel erection associated with framing the superstructure of the facility. These construction noises would be limited in duration and restricted to normal construction hours dictated by local noise ordinances. Acoustical construction emissions from the South Milledge Avenue Site would not have an anticipated adverse effect on surrounding noise sensitive receptors.

Indirect effects from construction activities would occur from workers and construction materials/equipment traveling to and from the site. These effects would be temporary in nature and would be similar for all action alternatives.

3.5.3.3 Operation Consequences

Operation of the NBAF at the South Milledge Avenue Site would not result in anticipated adverse effects on noise-sensitive receptors. The most audible noises would emanate from the traffic related to the facility and the heating, cooling, and filtration systems. Wildlife would be expected to return to adjacent undeveloped areas following construction; however, operational noises from the NBAF would likely discourage on-site fauna rehabitation. Early design considerations would reduce both internal and external noise levels. Interior partitions within and between offices would have sound-attenuating insulation materials. All laboratory doors would be insulated for sound reduction, and mechanical systems would have sound-attenuation equipment based on standard design practices. Laboratory fans would have packless-type sound-reducing devices on the exhaust mains and outside air by-pass ducts.

A potentially significant noise emission source would be the emergency generators; however, the generators are a back-up response system and would not be a routine noise emission source. Operation of the NBAF would not significantly affect any adjacent noise receptors above the current audible emissions associated with South Milledge Avenue, Whitehall Road, and adjacent UGA facilities. The acoustical emissions would not have anticipated adverse effects on local noise sensitive receptors.

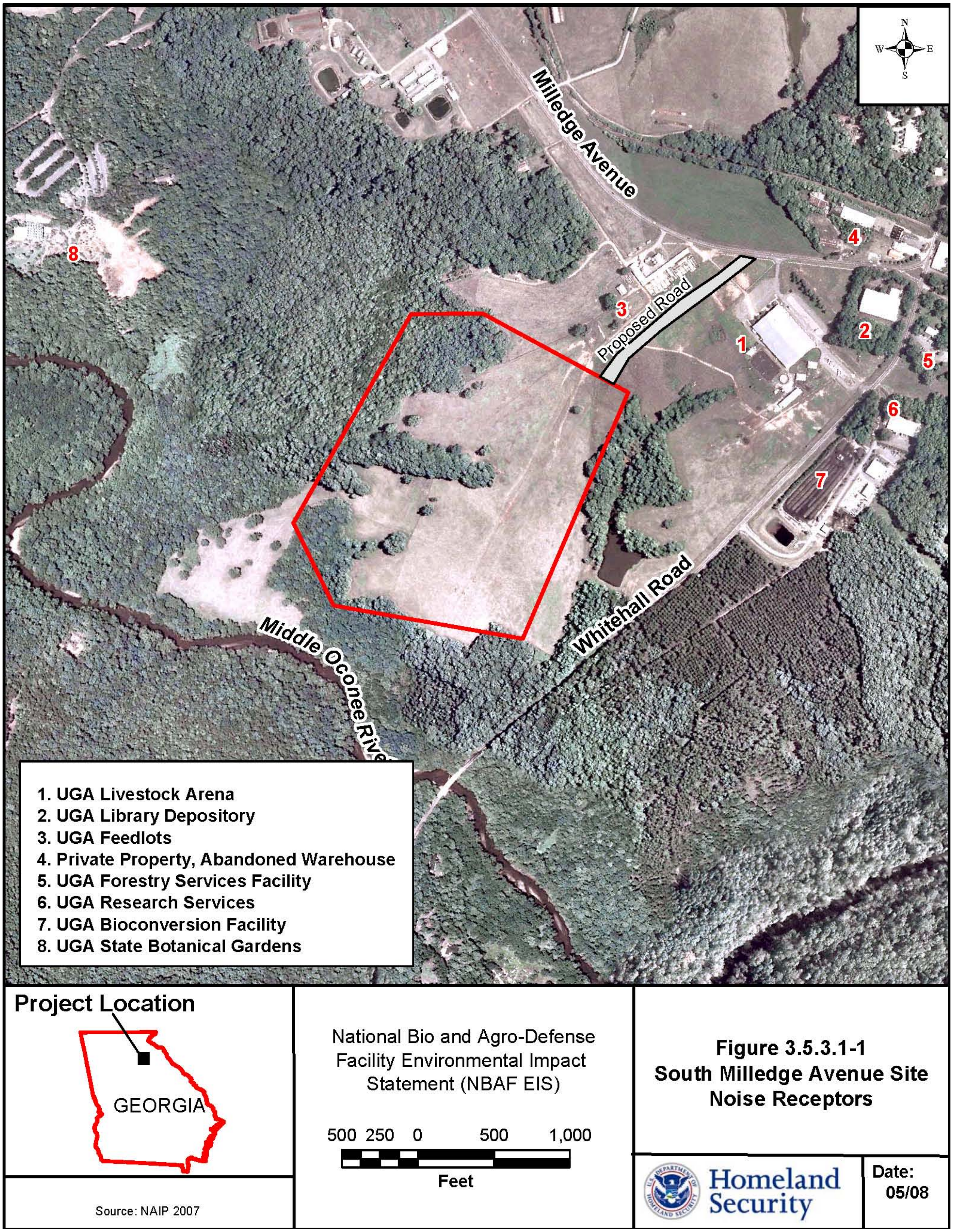

Figure 3.5.3.1-1 — South Milledge Avenue Site Noise Receptors

Indirect effects from operations would occur from traffic transporting employees, operational and maintenance materials, and equipment to the the NBAF at the South Milledge Avenue Site. These effects would be similar to other technology or research-based institutions and are similar for all action alternatives.

3.5.4 Manhattan Campus Site

3.5.4.1 Affected Environment

The Manhattan Campus Site is located on KSU's northeast campus. The site is within the City of Manhattan city limits, located adjacent to and southeast of the intersection of Kimball Avenue and Denison Avenue, and is immediately north and adjacent to the KSU BRI. The Manhattan Campus Site is improved with several university-related buildings, a material recycling storage building, and university-related open pasture areas. The baseline noise levels have not been documented; however, ambient decibel levels would likely be comparable to an urban location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels. Potential anthropogenic noise receptors and locations are shown on Figure 3.5.4.1-1. Potential noise receptors include the Mercy Health Center and Bramlage Coliseum to the west, Goodnow Museum and Historical Site, Pioneer Park, Riley County Hospital, Mercy Health Center, Finney State Fishing Lake and Wildlife Area, and Aggieville Shopping Center to the south. The potential receptors are all at least 3,500 feet from the Manhattan Campus Site.

3.5.4.2 Construction Consequences

KSU's BRI is an agricultural-based research and laboratory facility, constructed in 2006. The city upgraded adjacent Denison Avenue, improving traffic flow and ingress and egress to the BRI. Audible construction emissions at the Manhattan Campus Site would be very similar to the BRI construction and the Denison Avenue improvements. Refer to Section 3.5.3.2 for additional construction noise information. No adverse noise effects would be anticipated from construction of the NBAF at the Manhattan Campus Site. Indirect effects from construction were previously described in Section 3.5.3.2.

3.5.4.3 Operation Consequences

Audible operational emissions of the NBAF at the Manhattan Campus Site would be similar to the current KSU BRI operation, with the most audible emissions emanating from traffic and facility heating, cooling, and filtration systems. Refer to Section 3.5.3.3 for additional operational noise information. Operations at the NBAF would not have anticipated adverse effects on the surrounding area, and potential noise receptors are not close enough to experience a measurable noise level increase. Indirect effects from operations at the NBAF were previously described in Section 3.5.3.3.

3.5.5 Flora Industrial Park Site

3.5.5.1 Affected Environment

The Flora Industrial Park Site is primarily undeveloped open pastureland situated west-northwest of Flora, Mississippi, and 1.75 miles north of Highway 22 and U.S. Highway 49 intersection. The Flora Industrial Park Site is immediately bordered to the west by U.S. Highway 49 and to the east by the Illinois Central Gulf Railroad. Primos Manufacturing is the southern neighbor, and an open pasture with a residence abuts the site to the north. Noise receptors in the vicinity of the Flora Industrial Park Site are shown on Figure 3.5.5.1-1. The nearest potential noise receptors (Woodman Hill Missionary Baptist Church Cemetery and Woodman Hill Church) are located east of the Flora Industrial Park Site and are immediately east of the Central Gulf Railroad line. The Tri-County Academy is located approximately 2,000 feet south of the Flora Industrial Park and over 4,000 feet south of the proposed NBAF site. Baseline noise levels for the Flora Industrial Park Site have not been documented; however, ambient decibel levels at the site would likely be comparable to a suburban or semi-rural location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels.

3.5.5.2 Construction Consequences

The Flora Industrial Park Site is predominately an open field pasture with limited neighboring developments. Typical construction noise effects have been previously described in Section 3.5.3.2. The Woodman Hill Missionary Baptist Church Cemetery and Woodman Hill Church, in particular, would experience noise increases during construction due to the activities previously described for the duration of the construction. However, the increase in noise levels would be less than noise levels from passing trains currently experienced at the site. No other adverse noise effects would be anticipated. Indirect construction effects were previously described in Section 3.5.3.2.

3.5.5.3 Operation Consequences

Audible emissions from the NBAF would not adversely affect adjacent noise receptors and would be comparable to or less than those audible emissions associated with U.S. Highway 49 and Central Gulf Railroad. Refer to Section 3.5.3.3 for additional operational noise information. The acoustical emissions resulting from operation of the NBAF would not have an anticipated adverse effect on surrounding noise sensitive receptors. Indirect operational effects from the NBAF were previously described in Section 3.5.3.3.

3.5.6 Plum Island Site

3.5.6.1 Affected Environment

PIADC is the primary source of man-made noises at Plum Island. Acoustic emissions emanating from the facility include light vehicle traffic, maintenance machinery, generators, wastewater treatment, and heating/cooling systems (Section 3.5.2.1). Plum Island is somewhat isolated, limiting the anthropogenic noise receptors. The Plum Island Site is bordered by a scattered boulder/rock shoreline to the north, undeveloped woods to the east, PIADC to the west, and the PIADC wastewater treatment plant and island freshwater wetlands to the south. Baseline noise levels at the Plum Island Site have not been documented; however, ambient decibel levels at the site would likely be comparable to an urban or suburban location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels.

3.5.6.2 Construction Consequences

PIADC staff may experience temporary construction noise effects. The audible construction emissions would be similar to noise emissions from the renovation/enhancement of PIADC. Refer to Sections 3.5.2.2 and 3.5.3.2 for additional construction noise information. No adverse noise impacts would be anticipated from construction of the NBAF at Plum Island. Indirect construction effects were previously described in Section 3.5.3.2.

3.5.6.3 Operation Consequences

Operations of the NBAF at the Plum Island Site would not result in anticipated adverse effects on noise-sensitive receptors. Noise would be similar to the current PIADC operation, with most audible emissions emanating from operation-related traffic and the normal heating, cooling, and filtration systems at the facility. Refer to Sections 3.5.2.3 and 3.5.3.3 for additional operational noise information. The acoustic emissions would not have an anticipated adverse effect on the surrounding area. Indirect effects from the NBAF operations were previously described in Section 3.5.3.3.

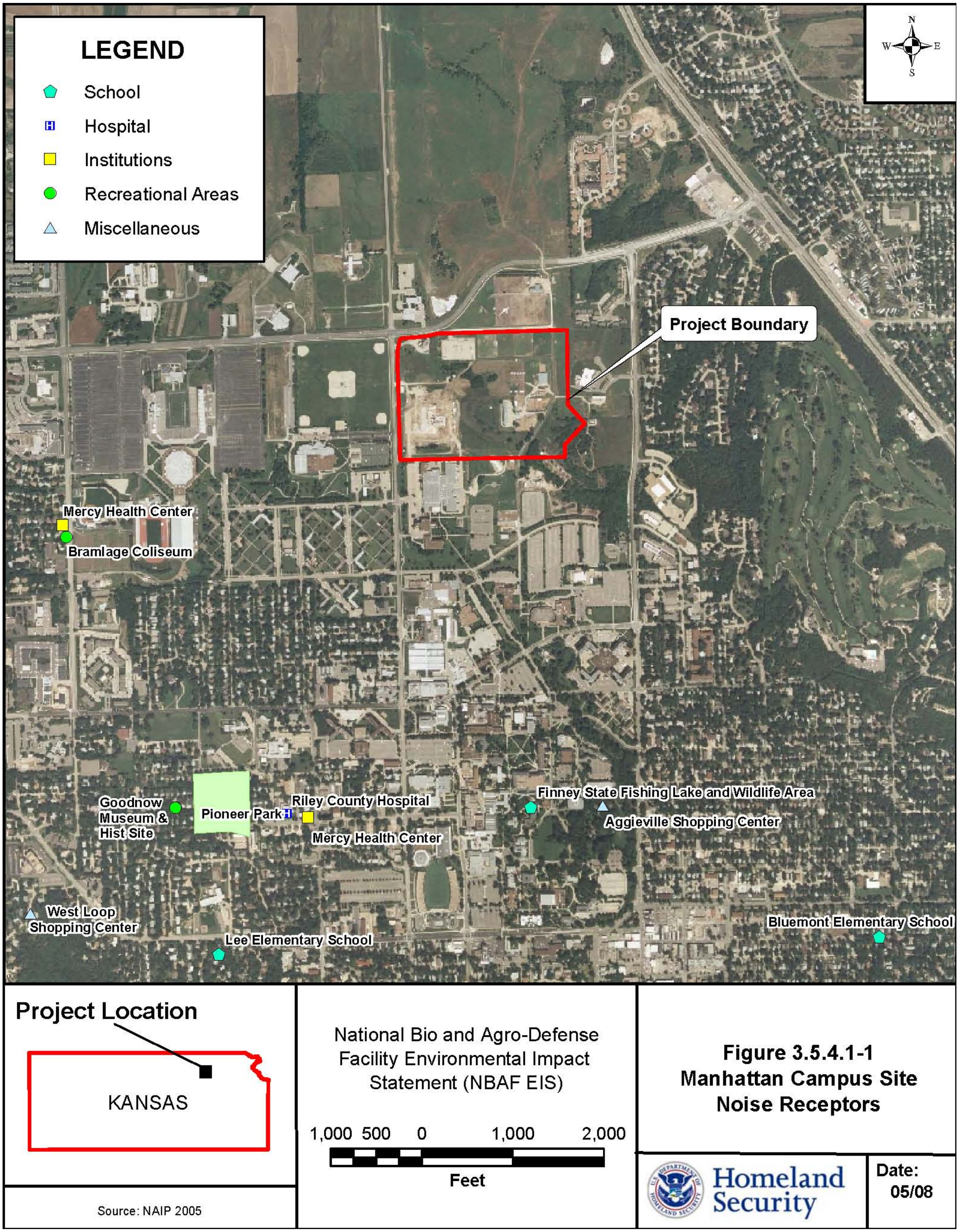

Figure 3.5.4.1-1 — Manhattan Campus Site Noise Receptors

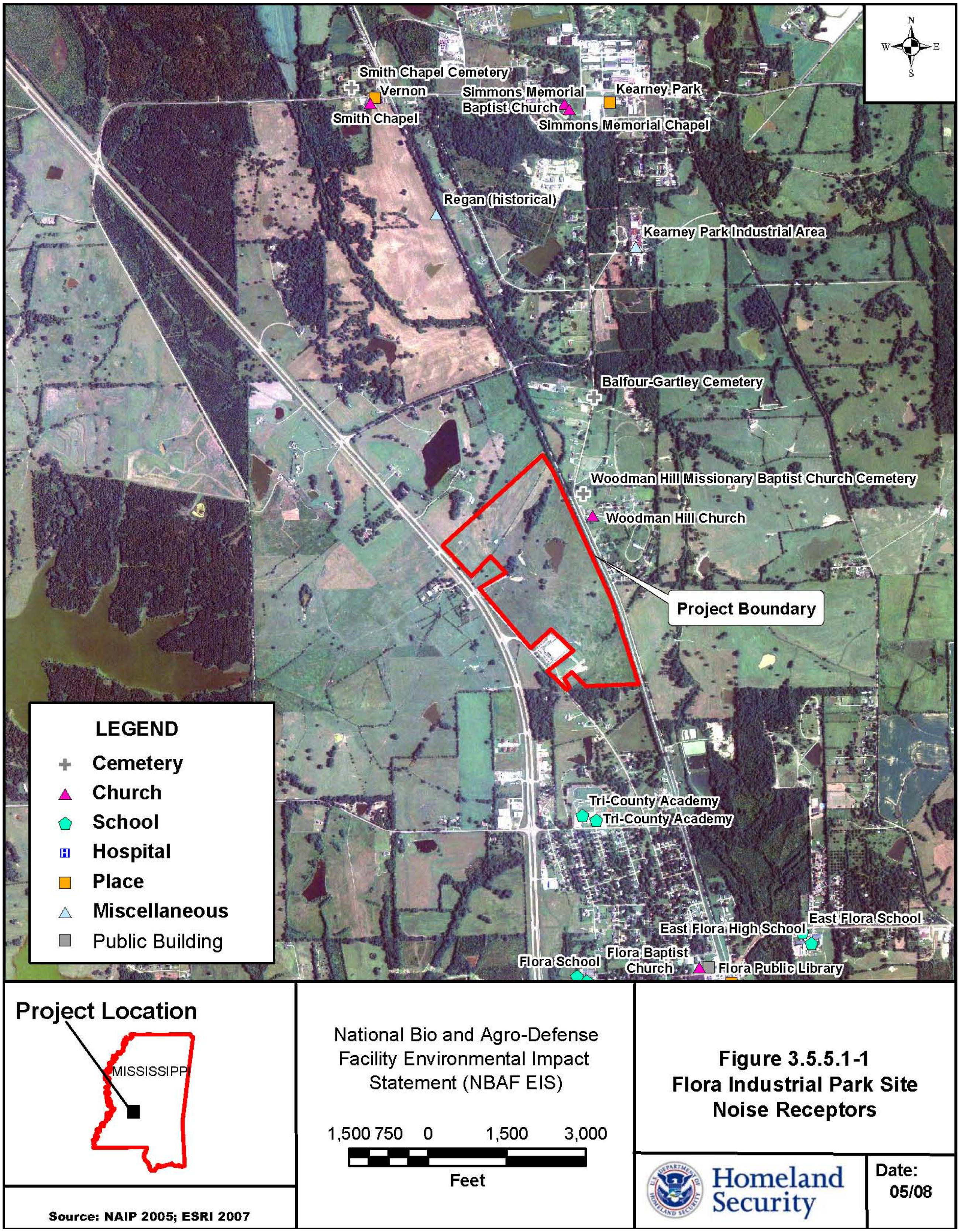

Figure 3.5.5.1-1 — Flora Industrial Park Site Noise Receptors

3.5.7 Umstead Research Farm Site

3.5.7.1 Affected Environment

The Umstead Research Farm Site is northwest of Old Route 75, less than 5 miles west of Butner. The proposed site is an undeveloped woodland area located in western Granville County. Currently, local sources of ambient noises emanate from Butner, the Dillon School, Umstead Research Farm, the nearby correctional facilities, and the adjacent state roads to the west and north. Potential noise receptors within 1 mile of the proposed facility include Dillon School, the Federal Corrections Institute, Butner, and the Umstead Research Farm (Figure 3.5.7.1-1). Baseline noise levels at the Umstead Research Farm Site have not been documented; however, ambient decibel levels at the site would likely be comparable to an urban or suburban location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels.

3.5.7.2 Construction Consequences

The Dillon School south of the Umstead Research Farm Site may experience temporary noise effects resulting from construction activities. Refer to Section 3.5.3.2 for a description of potential sources of construction noise emissions. No other adverse noise effects would be anticipated from construction of the NBAF at the Umstead Research Farm Site. Indirect construction effects were previously described in Section 3.5.3.2.

3.5.7.3 Operation Consequences

Operations at the NBAF would result in audible emissions related to substantially increased traffic volumes and from the normal heating, cooling, and filtration systems at the facility. Refer to Section 3.5.3.3 for additional operational noise information. Operation of the NBAF would not have an anticipated adverse effect on surrounding noise-sensitive receptors. Indirect effects from operations of the NBAF were previously described in Section 3.5.3.3.

3.5.8 Texas Research Park Site

3.5.8.1 Affected Environment

The Texas Research Park Site is currently located in a rural, undeveloped area west of San Antonio but has been designated as a future industrial and research park site. There are no known sensitive noise receptors at the site. The size and rural location of the Texas Research Park reduce the likelihood of site-sensitive noise receptors. Baseline noise levels have not been documented; however, the ambient decibel levels at the site would likely be comparable to a suburban or semi-rural location. Refer to Table 3.5.2.1-1 for typical source/location decibel levels.

3.5.8.2 Construction Consequences

The Texas Research Park Site is predominately an open range and pastureland. No adverse noise effects would be anticipated from construction of the NBAF at the Texas Research Park Site. Refer to Section 3.5.3.2 for additional construction noise information. Indirect construction effects were previously described in Section 3.5.3.3.

3.5.8.3 Operation Consequences

Operation of the NBAF would result in audible emissions related to increased traffic and normal heating, cooling, and filtration systems at the facility. Noise emissions from the facility would be similar to other Texas Research Park facilities. Refer to Section 3.5.3.3 for additional operational noise information. Acoustic emissions at the facility would not have an anticipated adverse effect on local noise receptors. Indirect effects from operation of the NBAF were previously described in Section 3.5.3.3.

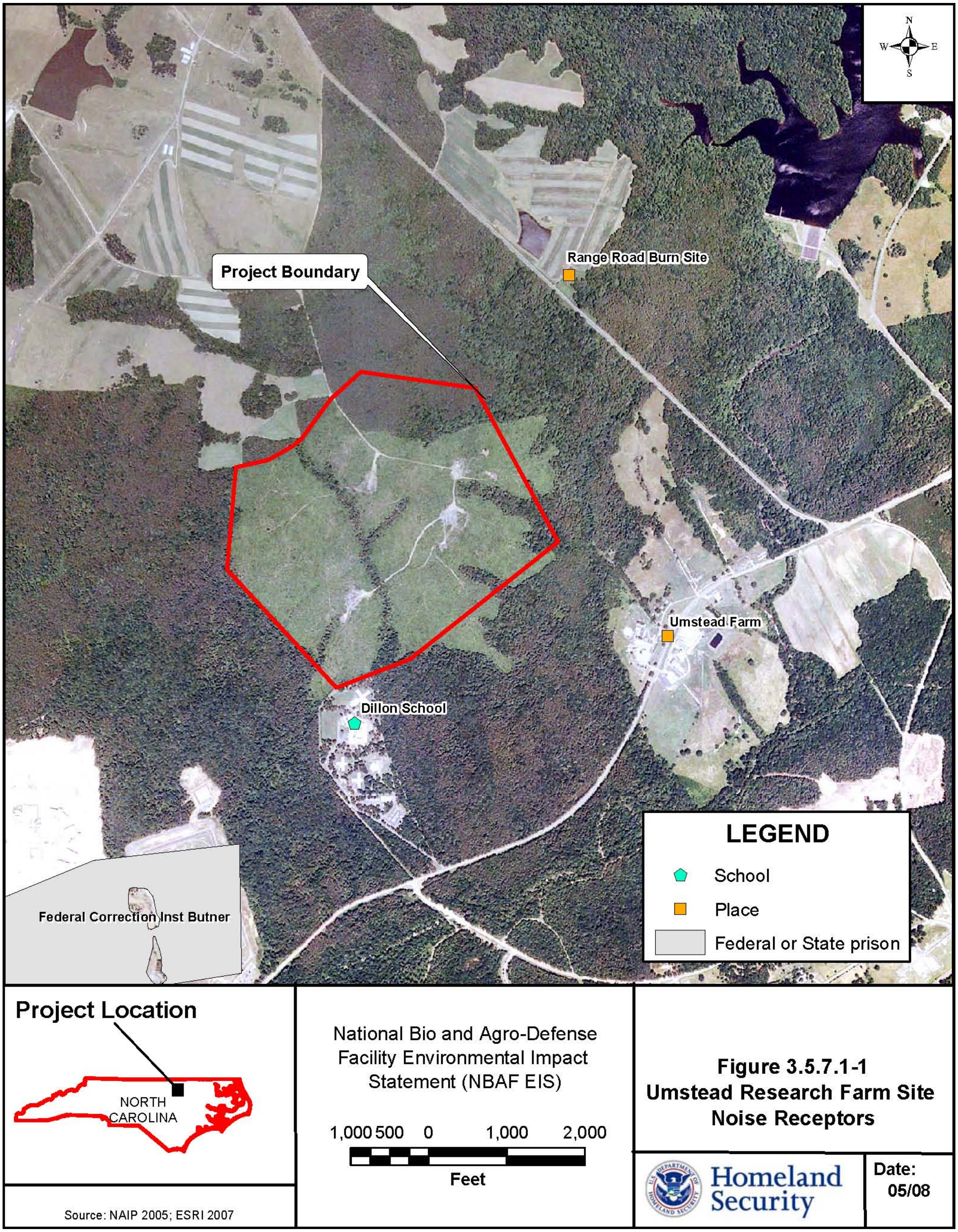

Figure 3.5.7.1-1 — Umstead Research Farm Site Noise Receptors