3.9 CULTURAL RESOURCES

3.9.1 Methodology

The *National Historic Preservation Act* of 1966 (NHPA) requires federal agencies to record, evaluate, preserve, and plan for management of cultural resources. The NHPA further requires federal agencies to consult with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation before modifying, removing, or demolishing any historic structure potentially eligible, eligible, or listed in the National Register of Historic Places (NRHP). The NRHP is the official national list of cultural resources that are deemed worthy of preservation. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Additional historic preservation laws and executive orders that must be adhered to include the *Archeological and Historic Preservation Act* of 1974, the *Archeological Resources Protection Act* of 1979, *Native American Graves and Repatriation Act* of 1990, *American Indian Religious Freedom Act* of 1978, Executive Order 13007: Indian Sacred Sites, and Executive Order 11593: Protection and Enhancement of the Cultural Environment.

Database searches were conducted for known archaeological and historically significant resources at each of the proposed NBAF sites. Archaeological and historical sites were identified and the footprint for the conceptual design was overlaid on the site boundaries to assist in determining the potential for adverse effects from the proposed construction and operation of the proposed NBAF. Intensive archaeological surveys were performed for sites with significant potential for archaeological resources. Once compiled for each of the sites, in compliance with Section 106 consultation requirements under NHPA, the resulting information pertaining to archaeological and historical resources and potential effects from proposed construction was submitted to the appropriate SHPO for review and concurrence with the findings. In the event it is determined historic or archaeological resources that are listed or eligible for listing in the NRHP would be harmed, either a legally binding agreement would be developed to establish how DHS would address the adverse effects or the ACHP would issue advisory comments that the head of DHS must consider in making a final decision (ACHP 2002).

A list of contacts was generated for each site by the respective SHPO, identifying Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF. In some instances, the contacts included state-recognized tribes. An information package was sent to each of the contacts, describing the proposed project and its anticipated effects. One response has been received to date. Copies of the letters and additional responses received will be provided in the Fnal EIS.

3.9.2 No Action Alternative

3.9.2.1 Affected Environment

PIADC's continued operation constitutes the No Action Alternative. DHS indicated in their April 7, 2007 letter to the New York State Office of Parks, Recreation, and Historic Preservation (NYPR&HP) that an extensive survey of all buildings, structures, and related appurtenances on the island was undertaken by a historic preservation consultant in 1998. In 2003, a historic preservation plan was prepared for the historical features documented in the 1998 survey. The preservation plan serves to satisfy the requirements of Section 106 of the NHPA, and provides specific preservation actions for historically significant buildings and structures on the island. The plans were developed to accommodate potential future construction/expansion of PIADC. No known archaeological studies have been conducted at PIADC to date, and it is currently unknown if any prehistoric archaeological resources eligible for listing in the NRHP or NYPR&HP are present.

3.9.2.2 Construction Consequences

No construction would occur under the No Action Alternative, although the infrastructure improvements previously authorized would proceed. A Categorical Exclusion determined that the improvements would not

affect any listed or eligible for listing archaeological or cultural resources (DHS 2007). The historic preservation plan developed in 2003 provides specific preservation actions for historic buildings and structures on Plum Island. Adherence to the preservation plan will preclude adverse consequences to historically significant features from any potential future construction activities.

3.9.2.3 Operation Consequences

Continued operation of PIADC is not likely to result in adverse effects to historically significant features.

3.9.3 South Milledge Avenue Site

3.9.3.1 Affected Environment

The 67-acre site consists primarily of pastureland, but the northwestern and southwestern portions contain mature hardwood forest. The site has been undeveloped since at least 1936, and all lands adjacent to the site currently exist as undeveloped open lands or woodlands (Terracon 2007f).

An intensive archaeological survey of the site was conducted in December 2007 (SAS 2007). The survey also included 26 acres southwest of the site and adjacent to the Middle Oconee River. No historical resources that are listed or eligible for listing with the NRHP or the Historic Preservation Division (HPD) of GONR were found on or adjacent to the site. However, the field survey identified 11 archaeological sites within the project area. None are listed or would be considered eligible for listing in the NRHP or HPD (Personal communication, Chad Braley, Southeastern Archaeological Services, Inc., January 11, 2008). A formal Section 106 review of the site was requested in April 2008. No response has been received from HPD as of yet.

The list of contacts generated for Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF at the South Milledge Avenue Site is included in Table 3.9.3.1-1.

Table 3.9.3.1-1 — Native American Contacts Consulted, South Milledge Avenue Site

The Cherokee of Georgia Tribal Council Mr. Ralph Crews Blackshear, Georgia	The Georgia Tribe of Eastern Cherokee Mr. Walker Dan Davis Dahlonega, Georgia
Georgia Council on American Indian Concerns Ms. Nealie McCormick, Chairman Palham, Georgia	The Lower Muskogee Creek Tribe Ms. Marian S. McConnick Whigham, Georgia

3.9.3.2 Construction Consequences

No adverse effects would likely occur to historical sites from the construction of the proposed NBAF because none are located on the South Milledge Avenue Site. Adverse effects to the 11 known archaeological sites adjacent to the proposed project area are not likely to occur from construction associated with the proposed project. Ten of the 11 archaeological sites identified within the 92-acre survey area are either highly disturbed or have low research potential and, therefore, would have little significance. These 10 sites have been recommended as ineligible for listing in the NRHP. If the review agencies concur the sites are ineligible, then no additional archaeological work would be necessary in these areas. The eleventh site is a small prehistoric site that would have research potential, and although the site would be eligible for listing, it is located well outside the 67-acre construction zone and would not likely be affected by the proposed development (SAS 2007).

3.9.3.3 Operation Consequences

Adverse effects to cultural resources would not likely occur as a result of operation of the proposed NBAF on the South Milledge Avenue Site.

3.9.4 Manhattan Campus Site

3.9.4.1 Affected Environment

The approximately 48.4-acre site proposed for development near Manhattan, Kansas is part of a land grant dating back to the mid-1800s. The property is open, agricultural land that has been used for agricultural purposes, primarily animal husbandry, research, and education (AEC 2007). A review of Kansas State Historical Society (KSHS) records indicated no cultural resources are listed on or in the vicinity of the site proposed for development. The nearest listed historical site is the Washington and Julia Marlatt Homestead, which is located approximately 0.6 miles west of the proposed NBAF site. KSHS concluded in their December 7, 2007 letter that they have no objections to the project and asserted the site has low archaeological potential. They furthered that the proposed project would have no effect on archaeological sites.

The list of contacts generated for Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF at the Manhattan Campus Site is included in Table 3.9.4.1-1.

Table 3.9.4.1-1 — Native American Contacts Consulted, Manhattan Campus Site

Delaware Tribe of Indians Dr. Brice Obermeyer Emporia Kansas	Kaw Nation Kaw City, Oklahoma

3.9.4.2 Construction Consequences

Because no archaeological resources are known to exist on or in the immediate vicinity of the site, no adverse impacts are likely to result from the construction of the proposed NBAF at the Manhattan Campus Site. KSHS records indicate that no historical sites are in the project area. Although KSHS has requested review of final construction plans for reassurance that sites listed or eligible for listing in the NRHP or KSHS would remain unaffected, it is unlikely that any adverse impacts would occur as a result of the proposed NBAF, given the distance between the nearest historical site and the proposed NBAF site.

3.9.4.3 Operation Consequences

Operation of the proposed NBAF would not likely cause any adverse effects to culturally significant resources.

3.9.5 Flora Industrial Park Site

3.9.5.1 Affected Environment

The Flora Industrial Park Site is open, agricultural land that has historically been used as pastureland. No cultural resources on, or in, the vicinity of the site are listed in Mississippi Department of Archives and History (MDAH) records. A Phase I Cultural Resource Survey was conducted for the site in November 2007. Neither the literature search, nor the field testing associated with this survey, revealed any cultural resources on, or near, the site (AMI 2007). In their letter dated November 27, 2007, MDAH documented their concurrence that no known cultural resources listed or eligible for listing in the NRHP would be affected and indicated that they have no objections to the proposed NBAF.

The list of contacts generated for Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF at the Flora Industrial Park Site is included in Table 3.9.5.1-1.

Table 3.9.5.1-1 — Native American Contacts Consulted, Flora Industrial Park Site

Chickasaw Nation The Honorable Bill Anoatubby Ada, Oklahoma	Jena Band of Choctaw Indians Ms. Christine Norris, Chief Jena, Louisiana
Chickasaw Nation Ms. Gingy Nail, THPO Ada, Oklahoma	Mississippi Band of Choctaw Indians Mr. Beasley Denson, Chief Philadelphia, Mississippi
Chickasaw Nation Mr. Kirk Perry, Administrator of Cultural Preservation Ada, Oklahoma	Mississippi Band of Choctaw Indians Mr. Ken Carleton, THPO Philadelphia, Mississippi
Choctaw Nation of Oklahoma Mr. Gregory E. Pyle, Chief Durant, Oklahoma	Quapaw Tribe of Oklahoma Ms. Carrie V. Wilson, NAGPRA Representative and Program Director Fayetteville, Arkansas
Choctaw Nation of Oklahoma Mr. Terry Cole, THPO Durant, Oklahoma	Tunica-Biloxi Indians of Louisiana, Inc. Mr. Earl J. Barbry, Sr., Tribal Chairman and THPO Marksville, Louisiana

3.9.5.2 Construction Consequences

No cultural resources are known to exist on, or in the vicinity of the Flora Industrial Park Site; therefore, no adverse effects to culturally significant resources would likely result from the construction of the proposed NBAF on the site.

3.9.5.3 Operation Consequences

No adverse effects to culturally significant resources would likely result from the operation of the proposed NBAF on the site.

3.9.6 Plum Island Site

3.9.6.1 Affected Environment

The proposed NBAF site was formerly utilized as a dumping area for various wastes associated with the PIADC but has since been remediated (Terracon 2007a). Details on the remediation efforts that have been undertaken on the site are included in Section 3.1.2.6. No site-specific cultural resource survey has been performed, but efforts are underway to conduct a survey and complete Section 106 coordination with the SHPO prior to completion of the FEIS. Additional information about the affected environment at the PIADC is included in Section 3.9.2.1.

The list of contacts generated for Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF at the Plum Island, New York, site is included in Table 3.9.6.1-1.

Table 3.9.6.1-1 — Native American Contacts Consulted, Plum Island Site

Delaware Nation Ms. Tamara Francis, NAGPRA Director Anadarko, Oklahoma	Stockbridge-Munsee Community Band of Mohican Indians Ms. Sherry White, THPO Bowler, Wisconsin
Shinnecock Nation (State Recognized) Ms. Margaret Smith, Attorney Southhampton, New York	Unkechauga Nation (State Recognized) Chief Harry B. Wallace Mastic, New York
Shinnecock Indian Nation Southhampton, New York	

3.9.6.2 Construction Consequences

Construction of the proposed NBAF would not likely affect cultural or archaeological resources at the Plum Island Site. However, as previously stated, a cultural resource survey is being conducted, and coordination with the SHPO will be completed prior to completion of the FEIS.

3.9.6.3 Operation Consequences

Operation of the proposed NBAF would not likely affect cultural or archaeological resources at the Plum Island Site. Upon completion of the cultural resource survey, coordination with the SHPO will be documented and included in the FEIS.

3.9.7 Umstead Research Farm Site

3.9.7.1 Affected Environment

Prior to World War II, the 249-acre site proposed for development was maintained as a combination of woodlands and open fields used for agricultural production. In August 1942, the site was included as part of an approximately 40,000-acre tract dedicated as a combat training facility that was utilized for training until the end of the war. After the war, the land was allowed to naturally regenerate back to woodlands. There are no known historic or archaeological resources on or adjacent to the site. and in their letter dated January 17, 2008, the North Carolina State Historic Preservation Office (NCSHPO) indicated that no known cultural resources listed or eligible for listing in the NRHP would be affected by the proposed construction. No archaeological surveys are known to have been performed on the site, but NCSHPO asserted in their correspondence that due to the location and topography of the proposed project area, it is unlikely that archaeological sites eligible for inclusion in the NRHP would be affected.

Consultation with the NCSHPO identified no recognized Native American tribes that consider the Butner area, including the Umstead Research Farm Site, part of their ancestral lands. Native American consultation is, therefore, not required.

3.9.7.2 Construction Consequences

Because no cultural resources exist on or in the vicinity of the site, no adverse impacts would likely result from the construction of the proposed NBAF at the Umsead Research Farm Site.

3.9.7.3 Operation Consequences

Operation of the proposed NBAF on the Umstead Research Farm Site is not likely to cause adverse impacts to culturally significant resources.

3.9.8 Texas Research Park Site

3.9.8.1 Affected Environment

A desktop analysis evaluating cultural resources on or adjacent to the Texas Research Park Site was performed by Raba-Kistner Consultants, Inc. (Raba-Kistner) in December 2007. The analysis indicated that no NRHP-listed sites or State Archaeological Landmarks (SALs) are located within or adjacent to the boundaries of the site proposed for development. The associated database search identified a total of six archaeological sites that have been documented within a 1-mile radius of the site. Of the six sites, one is historic and five are prehistoric, but none are considered eligible for listing in the NRHP or for designation as a SAL. An intensive cultural resource survey was performed on the proposed NBAF site by Raba-Kistner in January 2008. The survey, which included a pedestrian survey of the entire site supplemented with shovel testing, resulted in finding no cultural materials or artifacts. Cultural resource clearance was recommended (Raba-Kistner 2008), and the SHPO issued Section 106 clearance on February 4, 2008.

The list of contacts generated for Native American Indian tribes whose ancestral lands could be affected by the proposed NBAF at the Texas Research Park Site is included in Table 3.9.8.1-1.

Table 3.9.8.1-1 — Native American Contacts Consulted, Texas Research Park Site

Alabama-Coushatta Tribe of Texas Livingston, Texas	Kiowa Tribe of Oklahoma Carnegie, Oklahoma
Apache Tribe of Oklahoma Anadarko, Oklahoma	Tonkowa Tribe of Oklahoma Tonkowa, Oklahoma
Commanche Tribe of Oklahoma Lawton, Oklahoma	Ysleta del Sur Pueblo of Texas El Paso, Texas
Kickapoo Traditional Tribe of Texas Eagle Pass, Texas	

3.9.8.2 Construction Consequences

NRHP and Texas Historical Commission records indicate no historical sites on or within a 1-mile radius of the project area. No adverse effects would likely occur to historical sites from the construction of the proposed NBAF. No cultural resources were identified onsite by the intensive cultural resource survey. Of the six known archaeological sites recorded within a 1-mile radius of the site, none are considered to have enough significance to warrant protection afforded sites that are eligible for listing in the NRHP or for designation as a SAL. Any effects on these resources from construction of the proposed NBAF should therefore be considered negligible.

3.9.8.3 Operation Consequences

No adverse impacts to culturally significant resources would likely result from the operation of the proposed NBAF on the Texas Research Park Site.

3.10 SOCIOECONOMICS

3.10.1 Methodology

An analysis of the socioeconomic impacts of the proposed facility was carried out identifying the possible impacts on the affected environment arising from the construction and operation of the facility. The geographic definition of the economically affected environment represents the anticipated area where workers at the proposed facility would most likely live and the facility-related industry linkages. The geographical definition was made based on an analysis of the commuting patterns to and from the proposed site location at an appropriately granular level (county, U.S. Census, or place code level), depending on the availability of

data, and in relation to the metropolitan statistical area (MSA) definition where applicable. Information on commuting patterns was obtained largely from journey-to-work data contained in U.S. Census statistics describing daily commuting patterns to and from a given location. These data were used to define the affected environment by considering any county that constituted approximately 5% or more of the worker flows into or out of a selected site location as comprising the affected environment. Supporting data for this section are found in a series of tables in Appendix C.

To address anticipated concerns regarding the possible impacts of pathogen release on the local agricultural industry in each region (animal production and hunting activity in particular), an expanded area of study comprising all counties adjacent to the proposed site was defined for the agricultural livestock vulnerability analysis and discussion in Appendix D.

The socioeconomic impacts analysis first focuses on descriptive parameters of the affected environment such as the labor market environment and local employment base, the demographic composition of the population and trends in growth, the local housing inventory and housing values assessment, and quality of life measures such as access to schools, health care, and police and fire protection. The data used in this evaluation are organized into census counties, tracts, and block groups. A census tract is a geographic subdivision of a county and is further divided into U.S. Census block groups. Various analysis tools were used to examine and present the descriptive parameters. For example, school-aged children and the elderly are sensitive population groups that have additional needs and require additional services. Therefore, populations 18 years of age and under and populations 65 years of age and older are highlighted in the affected environment analyses.

Environmental Systems Research Institute (ESRI) data were used to estimate demographic statistics such as housing occupancy and median household income. These estimates are obtained using time series data from annual household surveys – to establish a trend line – in conjunction with federal sources of data including the Current Population Survey, American Community Survey and the Census of Employment and Wages from the Bureau of Labor Statistics (ESRI BIS 2007).

Housing characteristics are also described in terms of housing units and contract rent. Such characteristics describe the availability and affordability of various living arrangements in the study areas. A housing unit is defined either as a house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters or, if vacant, intended for occupancy as separate living quarters. A housing unit is considered owner occupied if the owner or co-owner lives in the unit. All other occupied units that are not owner occupied are classified as renter-occupied whether rented for monthly cash rent or occupied without payment of monthly cash rent.

The socioeconomic impacts analysis then focuses on the anticipated impacts of the facility on the local community. The expected consequences of both construction and operations phases of the NBAF on the descriptive parameters are estimated and outlined. These include anticipated changes in employment opportunities, labor income, population growth, housing demand, and housing values, as well as anticipated changes in the quality of life as measured by the expected change in the demand for general public services.

Impact Analysis for Planning modeling system (IMPLAN) was used to estimate the economic effects on the study region. IMPLAN is a widely used economic impact assessment modeling system, provided by Minnesota IMPLAN Group, Inc., that allows the user to create area-specific multipliers that describe interindustry linkages and consumer spending patterns. Because the interindustry linkages and consumer spending patterns vary from region to region, the outputs of the impact analysis such as the amount of labor employed for the construction of each site, will vary according to the site-specific interindustry linkages. IMPLAN estimates the total economic effects arising from a Proposed Action by accounting for direct, indirect, and induced effects of the projected investment. Direct impacts are the changes in economic activity directly resulting from the initial investment, while indirect impacts refer to the increased economic activity from industry sectors supplying goods and services to the initial investment, and induced impacts refer to the increased consumer spending by earners in the study industry and all other supporting industries. Together,

the total sum of direct, indirect, and induced impacts constitute the multiplier, effect which is defined as the ratio between the total estimated impact and the direct economic impact.

The economic impact analysis was conducted for both the construction of the facility, a 4-year period, and the operation of the facility, commencing in 2014. The facility construction and operation budgets were used as inputs into the model. The output from the model (economic effects on the study region) are reported as direct and total employment, total labor income, and federal, state, and local taxes. The total labor income is the sum of the labor compensation and proprietor income generated within the regional boundaries. The economic impact analysis is explained in more detail in the construction and operations consequences sections.

3.10.2 No Action Alternative

3.10.2.1 Affected Environment

The geographic definition of the economically affected area for the No Action Alternative was determined primarily based on journey-to-work information of the currently operating facility on Plum Island, New York. Journey-to-work data are typically obtained from U.S. Census statistics describing the daily commuting patterns of workers to and from a given location. Based on journey-to-work information, it was determined that the affected environment should include Suffolk County, New York, as well as Middlesex and New London Counties, Connecticut (Figure 3.10.2.1-1).

3.10.2.1.1 Employment and Income

3.10.2.1.1.1 Employment

In general, the civilian labor force for all three counties has grown from 923,075 in 1990 to 1,024,266 in 2006, an increase of 11% over a period of 16 years, which lags the growth rate of the national civilian labor force (20.3%) during the same time period (Table C-1[1]). This sluggish growth is exemplified in New London County, which had less than a 1% growth in its civilian labor force over the 10-year period from 1990 to 2000.

The unemployment rate in the three study area counties tracked the movement in the national unemployment rate for the 3 years observed (1990, 2000, and 2006) – dropping between 1990 and 2000 but then subsequently rising again between 2000 and 2006 (Table C-1). Individually, each county had an unemployment rate lower than the national unemployment rate, and when taken together, the unemployment rate for the combined three-county region has generally been about a percentage point lower than the national average rate over the 3 years noted.

[1] Derived from Bureau of Labor Statistics historic data.

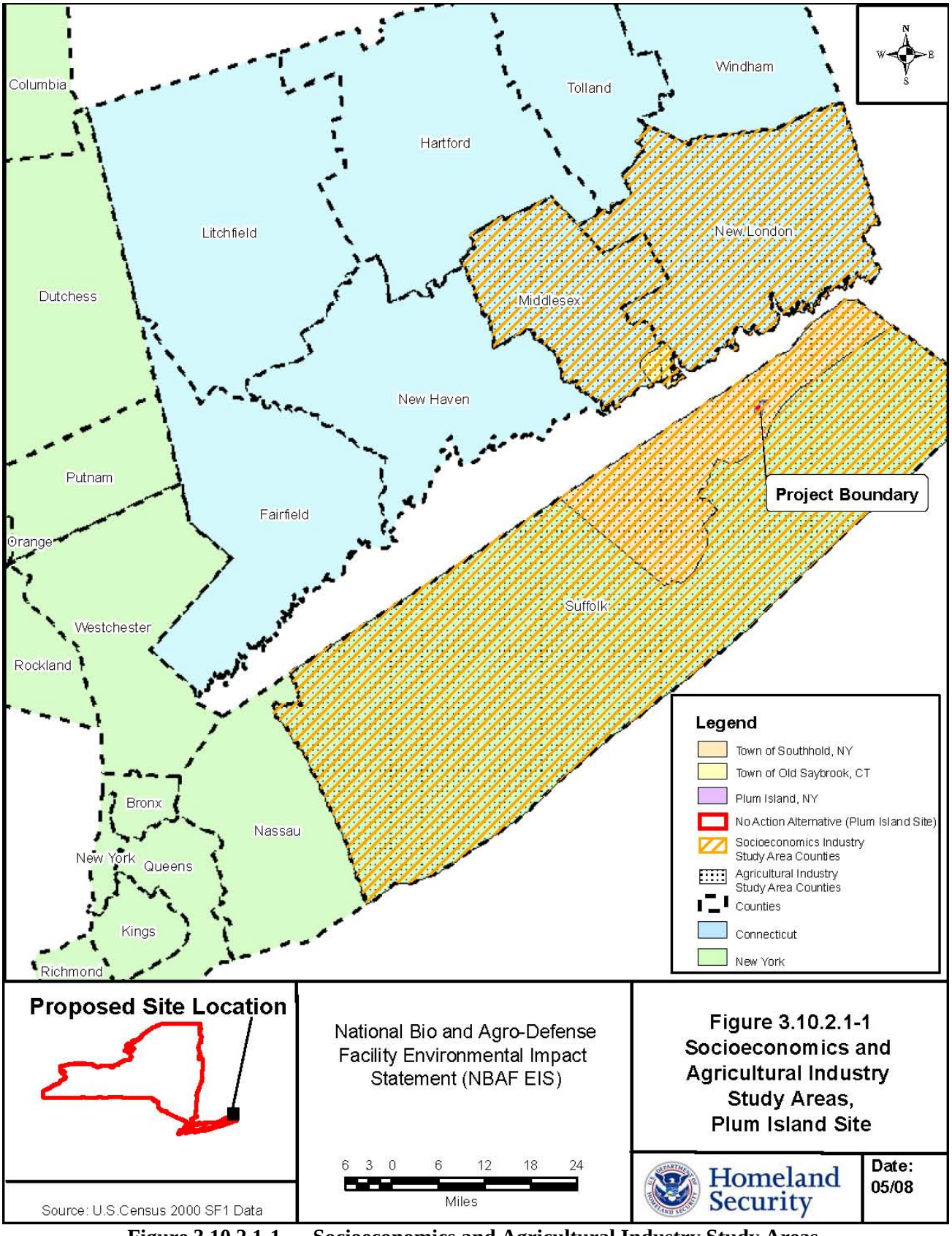


Figure 3.10.2.1-1 — Socioeconomics and Agricultural Industry Study Areas, No Action Alternative

All three counties have the majority of their labor forces commuting to work within county borders (Table C-2). Middlesex County has slightly more than half of its labor force working in Middlesex and approximately 24% working in neighboring Hartford County, which is home to Hartford – Connecticut's state capital and third largest city. Approximately 83% of New London County residents work in the county with a small fraction working in Hartford County (5.5%) and Middlesex County (3.8%). About three-quarters of Suffolk County residents work in Suffolk County, with another 14% commuting daily to neighboring Nassau County for work.

Employment can be measured as either a count of workers (e.g., see Table C-1) or as a count of actual jobs. The following employment base analysis uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the study area (Tables C-3 and C-4).

Suffolk County was home to 793,253 of the 1,062,027 jobs held in the three-county region in 2005 (Table C-4). New London contributes 172,961 jobs, while Middlesex contributes 95,813 jobs towards the three-county total.

Government and government enterprises are the largest source of employment for both Suffolk and New London Counties. In Middlesex County, however, this sector is only the fourth most significant contributor of employment opportunities. Together with the government enterprise industry, health care and social assistance and the retail trade industries are also common major contributors to employment opportunities in all three counties (Tables C-3 and C-4).

Suffolk and Middlesex Counties show a slightly more even industry contribution to local employment compared to New London County (Table C-4). The top five industry employers in Suffolk and Middlesex account for a total of 51% and 55%, respectively, of total employment in each county, while New London's top five account for 66%. A large part of the asymmetry in New London can be explained by the size of government employment that makes up 28% of local employment in the county.

The information on leading employers in Suffolk County was obtained from sources that pooled some employer data with the adjacent Nassau County, and exact estimates of the number of employees working strictly within the county boundaries cannot be determined (Table C-5). Nonetheless, the leading employer noted in that region was the North Shore Health System, which is a network of 14 hospitals spread over the two counties, that had nearly 32,000 workers in 2005. Health care-associated jobs in the county support 11% of total employment (Table C-4), and as anticipated, other health care providers, such as the Winthrop Health System and Stony Brook University Hospital, were among the leading employers in Suffolk County. Also, retail traders such as Wauldbums, Pathmark, and King Kullen Supermarkets are among leading employers in the county (Table C-4).

The information on leading employers for the two Connecticut counties was obtained from a list of the top 50 leading employers in the state. Four of the leading five companies (Table C-5) are located in New London, Connecticut and seem to be representative of the five leading industry employers (Table C-3): manufacturing, health care, and accommodation and food services. The one leading firm from Middlesex County is Middlesex Hospital, which is a health care institution supporting approximately 2,800 jobs in 2007.

Government and government enterprises are the largest sources of employment in terms of total wages paid in the three-county region and in the cases of both Suffolk and New London Counties—they comprise approximately 23% of the total wages in all three counties combined, paying out approximately $10.6 billion in wages (Tables C-6 and C-7).

3.10.2.1.1.2 Agricultural Industry

An analysis of the agricultural industry used IMPLAN and DHS data to describe the importance of the industry on the local economy. This is in response to public comments expressing concern about the possible

impacts of the proposed facility's operations on agricultural production–particularly animal production–in the affected environment.

Agriculture directly supported an estimated 6,897 jobs in the three counties studied in 2006 (Table C-8), with Suffolk and New London Counties contributing 6,078 jobs (88%) towards that total. Of the 6,897 jobs directly supported by the agricultural industry, only 1,167 jobs are attributed to animal production enterprises, with the bulk of agricultural maintained and provided by crop production. The agricultural industry generally constituted less than 1% of employment both in terms of total jobs supported and in terms of total compensation paid in all three counties together and individually. The only exception is in New London County where it supports 1.3% of total jobs in the county. The employment in the agricultural industry paid out $121 million in total compensation in the three counties with most of that amount being paid out in Suffolk County ($69 million) (Table C-8).

Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Crop production generated $389 million towards the total output of the North American Industry Classification System (NAICS) code classified agriculture and hunting industry (Table C-8) with animal production contributing an additional $65 million.

The value of cattle livestock inventory was also estimated for the regional economy based on data obtained from the National Agricultural Statistics Service (NASS) (NASS 2006). There were approximately 1,473,000 head of cattle and calves at the end of 2006 within the two states of New York and Connecticut (1,420,000 and 53,000, respectively), with an estimated inventory value of $1.7 billion (averaging out to a unit value $1,170 per head). There are no sources of data describing the distribution of the total cattle population among the individual counties in New York and Connecticut in 2006, but according to the 2002 NASS census data, cattle inventory for the states of New York and Connecticut totaled 1,507,612 head of cattle; however, the three counties studied only contributed 13,062 towards that total. Therefore, it is reasonable to assume that the study area still accounted for a very small proportion of the two state's livestock population in 2006.

3.10.2.1.1.3 Hunting

An analysis of the hunting industry is used to assess the importance that hunting activity has on the local economy. U.S. Census and IMPLAN data are utilized to describe the depth of this industry and address public concerns about the possible impacts of the proposed facility's operations on this industry and subsequently on the local economy.

Using the IMPLAN data, industry output from hunting and trapping did not support any jobs in the three counties (Table C-8). There is no direct compensation recorded for this industry, though by definition, the NAICS code classification of this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers, and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

U.S. Census data from 2001 that are limited to the statewide level shows that total expenditures related to recreational hunting activities in the states of New York and Connecticut totaled $882 and $44 million, respectively (USCEN 2001). The data show that of the 749,000 individuals who participated in hunting activities in both states in 2001, 697,000 were involved in big game hunting (e.g., deer) and spent $473 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

The following sections analyze a less inclusive study area than is examined with regard to Hunting and Agriculture.

3.10.2.1.1.4 Income and Poverty

In 1999, median household incomes ranged from $50,659 in New London County to $64,885 in Suffolk County. Per capita incomes showed less variation and were lowest in New London County ($24,678). Overall, the median household income in the study area was $62,006 and the per capita income $26,450.

Of the study area counties, Middlesex County had the lowest proportion of persons living below poverty in the study area, and New London County contained the highest proportion of persons living below the poverty line. The percentage of persons living below poverty in the study area was 5.9%, substantially smaller than the poverty rate in New York (14.59%), Connecticut (8.0 %), and the United States (12.4%) (Table C-9) (USCEN 2000a).

In 2007, the estimated median household income for the study area was $79,586, above the expected median household incomes for New York ($56,704), Connecticut ($68,430), and the United States ($53,154). Suffolk County was estimated to have a per capita income of $36,351, higher than in New York ($31,116) and the United States ($27,916), but lower than in Connecticut ($37,645) (ESRI BIS 2007).

3.10.2.1.2 Population and Housing

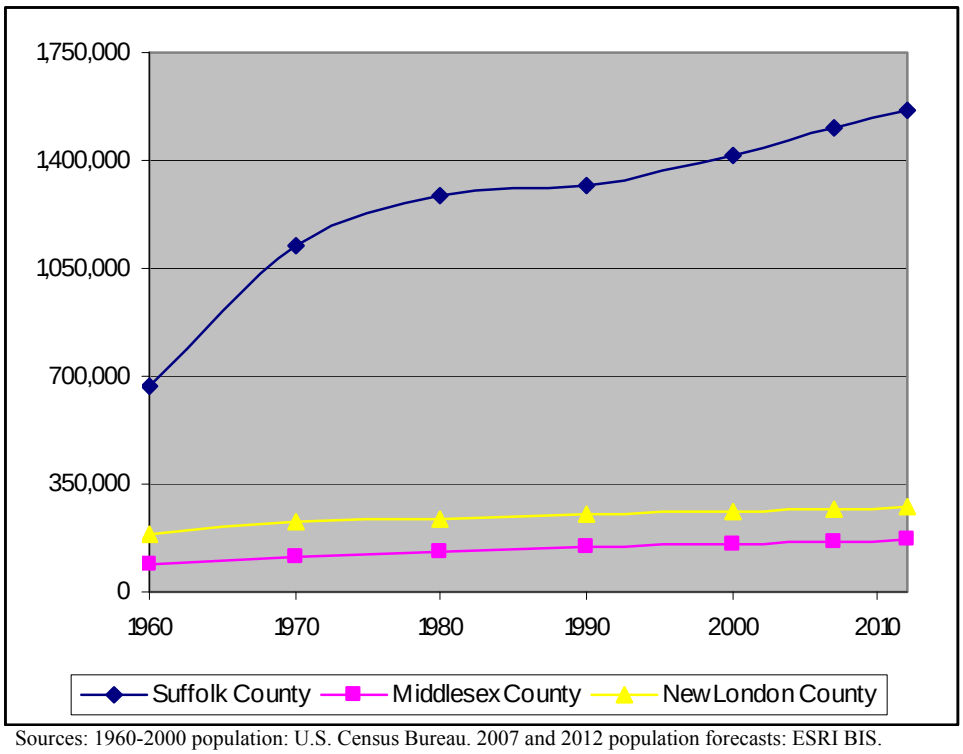
3.10.2.1.2.1 Population

According to population growth trends in the No Action and Plum Island study area counties (Suffolk County, New York, and Middlesex and New London Counties, Connecticut), the total population of the study area has increased by 892,634 persons between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, show an additional 180,522 residents are estimated to be added to the study area between 2000 and 2012 (Figure 3.10.2.1.2.1-1) (USCEN 2000b).

While the population of all of the study area counties has increased every decade since 1960, the total population of the study area has been most influenced by the rapid growth of Suffolk County. Factors influencing the observed population trends in Suffolk County include suburban development (particularly in western Suffolk County, with workers commuting to New York City) and the location of new major institutions in the county such as State University of New York at Stony Brook in 1962 (USCEN 2000a).

Plum Island has no residential population. Although separated by approximately 1 mile of waterway, the nearest residential population is located on Orient Point. Orient Point refers to the easternmost coast of North Fork, Long Island, in the Town of Southold. Government owned and contractor operated ferries connect Orient Point to the study area island location and Old Saybrook, Connecticut. Access is restricted to the employees, contractors, and visitors of the current facility. Because the Town of Southold in Suffolk County is the nearest residential location to Plum Island within the study area, it is included in this socioeconomic discussion.

Between 2007 and 2012, the population of the study area is estimated to grow slightly faster than New York and Connecticut, but slower than the United States. Middlesex County was the fastest growing county in the study area between 1990 and 2000 and is estimated to continue to grow faster than the study area as a whole between 2000 and 2012. Suffolk County's share of the total study area population (77%) is estimated to remain relatively constant between 2000 and 2012. The Town of Southold is estimated to grow at double the rate of the study area between 2007 and 2012, adding 601 residents (Table C-10) (USCEN 2000b).



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.2.1.2.1-1 — Population, Suffolk County, New York and Middlesex County, and New London County, Connecticut, 1960-2012

3.10.2.1.2.1.1 Ethnicity and Race

In 2000, persons of Hispanic origin comprised the largest percentage minority group in the study area (9.1%), which was smaller than in New York (15.1%) and the United States (12.5%), but was greater than the percentage Hispanic population in Connecticut (6.5%). African Americans comprised 6.5% of the study area, which was a smaller proportion than in New York (15.9%), Connecticut (8.6%), and the United States (12.2%). Overall, the proportion of minorities in the study area (19.5%) was smaller than in the United States (30.1%), New York (38.0%), and Connecticut (22.5%) (Table C-11) (USCEN 2000b).

3.10.2.1.2.1.2 Age

In 2000, approximately 26.8% of the population of the study area was aged 18 years and under, and 12.1% was aged 65 years and older. The population of Suffolk County 18 years of age and under was the largest in the study area, and its population aged 65 years and older was the smallest in the study area (Table C-12) (USCEN 2000b).

In 2007, the proportion of the Suffolk County population estimated to be 18 years of age and under (27.7%) was greater than in New York (25.4%), Connecticut (25.7%), and the United States (25.8%). The proportion of the population of Suffolk County estimated to be 65 years of age and older (6.31%) was substantially smaller than in New York (113.0%), Connecticut (13.9%), and the United States (12.5%) (ESRI BIS 2007).

3.10.2.1.2.1.3 Educational Attainment

In 2000, 13.6% of the study area population 25 years of age and older did not graduate from high school, 50.7% of the population graduated from high school or had some college education, 7.9% had an associate's degree and 27.9% had a bachelor's degree, or higher level of education (Table C-13). The proportion of

residents that did not graduate from high school in the study area (13.6%) was smaller than in New York (20.9%), Connecticut (16.0%), and the United States (19.6%) (USCEN 2000a).

3.10.2.1.2.2 Housing

In 2007, 90.8% of the housing units in the study area were estimated to be occupied, and 9.2% were estimated to be vacant (See Table C-14). The proportion of vacant units in the study area was estimated to be greater than in New York (8.7%) and Connecticut (6.1%) and similar to the United States (9.9%), yet the majority of vacant units in the study area, nearly double of those in New York and Connecticut, were used for seasonal and recreational use (ESRI BIS 2007).

In 2007, New London County was estimated to have the highest proportion of renter-occupied housing units. The percentage of owner-occupied housing units in the study area (71.9%) was estimated to be greater than in New York (50.8%), Connecticut (65.5%), and the United States (61.3%) (Table C-14) (ESRI BIS 2007).

In 2000, the single-family detached house was the predominant form of housing in the study area and comprised 544,414 units (77.7%). The majority of housing units in buildings with over 10 units were located in the Suffolk County (Table C-15) (USCEN 2000b).

In 2000, in all three study area counties, the majority of the housing stock was built before 1969, with a median year built of 1966 in Suffolk and Middlesex Counties and 1963 in New London County. In the study area as a whole, 69,136 housing units (9.9%) have been built since 1990 (Figure 3.10.2.1.2.2-1) (USCEN 2000b).

Between 2000 and 2007, housing values in the study area were estimated to grow the fastest in Suffolk County and the Town of Southold. The Town of Southold was estimated to have the highest median housing value ($456,934), and New London County was estimated to have the lowest median housing value ($279,094). In 2007, the median housing value for Suffolk County was estimated to reach $384,349, substantially higher than the estimated values for New York ($296,301), Connecticut ($297,091), and the United States ($192,285) (Table C-16) (USCEN 2000b; ESRI BIS 2007).

In 2007, the largest proportion of housing units with estimated values less than $50,000 was in New London County with 1,518 units, which represented just 2.1%. Overall, the proportion of housing units valued at over $150,000 in the study area (96.8%) was estimated to be much greater than in New York (79.3%), Connecticut (91.9%), and the United States (61.7%) (Table C-17) (ESRI BIS 2007).

Between 1990 and 2000 (the most recent available data), median monthly rent in the study area grew the fastest in the Town of Southold and Suffolk County. In 2000, Suffolk County had the highest median rent, and New London County had the lowest median rent. The 2000 median rent in the Town of Southold ($854) was higher than the median rents for New York ($605), Connecticut ($588), and the United States ($519) (Table C-18) (USCEN 2000b).

New London County had the largest proportion of housing units with a rent of less than $200. Suffolk County had the largest number and proportion of housing units with rents over $1,000. Overall, the proportion of housing units with rents over $1,000 in the study area (21.1%) was greater than in New York (13.7%), Connecticut (9.4%), and the United States (8.4%) (Table C-19) (USCEN 2000b).

In 2005, the majority of new housing units in the study area were permitted in Suffolk County relative to New London County and Middlesex County. The least expensive housing units in the study area are being constructed in Middlesex County, and the most expensive housing units are being built in Suffolk County (Table C-20) (USCEN 2000b).

3.10.2.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.2.1.3.1 Public Schools

There are no residents of Plum Island, and the island is not part of any school district. School districts nearest to the island on the mainland include the Oysterponds Union Free School District in Orient Point, Suffolk County, and the New London School District in New London County.

Providing education for students through grade 6, the Oysterponds Union Free School District, had a total enrollment of 103 and an average class size of 15 during the 2005-2006 school year (New York State Department of Education 2007). The New London School District consists of nine schools, serving grades kindergarten through 12. Total enrollment during the 2003-2004 school year was 3,178 with average class sizes ranging from 17.1 in kindergarten to 21.5 in grade 5. The average class size for high school was 21.7 (CSDE 2004).

3.10.2.1.3.2 Law Enforcement

The Federal Protective Service (FPS) provides full-time law enforcement on the island, as well as contract security. FPS personnel verify contractors' and visitors' backgrounds before these individuals enter the biocontainment area.

Also included in the study area was the east end of Suffolk County, which is served by numerous local police departments, including the Southold Town Police Department, the Greenport Police Department, and the East Hampton Police Department. Local police departments are supported by services available through the Suffolk County Police Department, which includes the following specialized units:

- The Emergency Services Section, which handles accidents, rescue operations, and hazardous materials.
- The Marine Bureau patrols the waters surrounding Suffolk County and includes 83 officers and maintains extensive marine search and rescue capabilities (SCPD 2007).

Likewise, New London County receives similar services from the New London Police Department and the local Old Saybrook Town Police Department (OSPD 2008; CoNL 2008).

3.10.2.1.3.3 Fire Protection

The Southold Fire Department is a volunteer fire department, with 189 volunteer members, two fire stations, and 20 support vehicles. It receives approximately 600 calls per year (SFD 2007).

The Suffolk County Department of Emergency Management and the Suffolk County Department of Fire, Rescue and Emergency Services coordinate responses to fire and other emergencies in the county (SCG 2007). Fire protection services are also provided to the study area by the New London and Middlesex County fire departments. The Plum Island Fire Department provides primary fire protection to Plum Island and PIADC. The Plum Island Fire Department participates in a mutual aid plan to provide assistance and protection for all Suffolk County communities (including Plum Island) in case of fire, medical emergencies, and other emergencies.

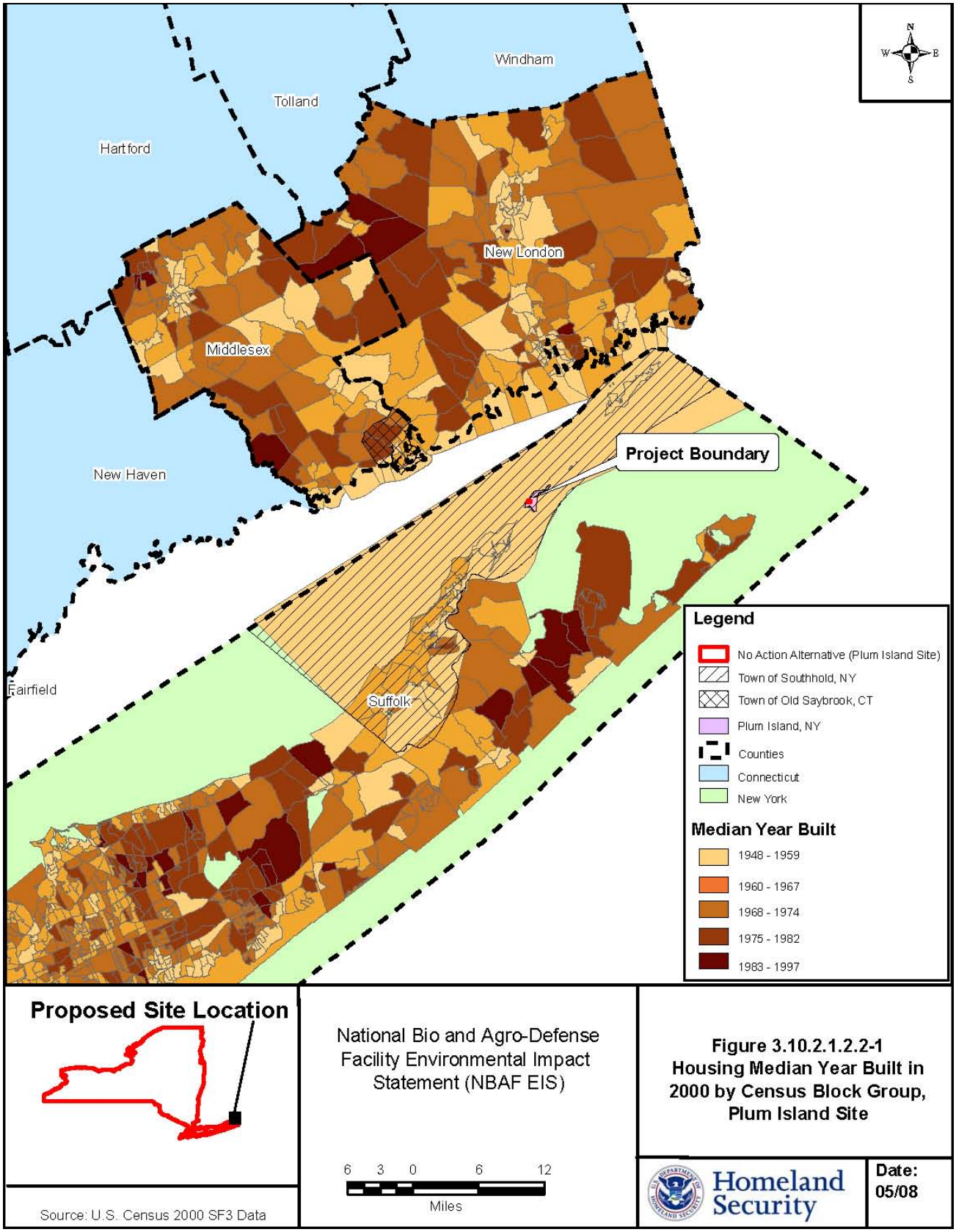


Figure 3.10.2.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group

3.10.2.1.3.4 Medical Facilities

The closest hospital to the island is the Eastern Long Island Hospital in the Village of Greenpoint, approximately 15 miles from Plum Island. Eastern Long Island Hospital is an 80-bed facility. The Emergency Department was expanded in 2005 to nine beds (ELIH 2007). Large regional hospitals in the area include the University Hospital at Stony Brook. The study area is also served by Lawrence and Memorial Hospital and Middlesex Hospital.

3.10.2.1.3.5 Recreation

The Suffolk County Parks Department manages over 46,000 acres of park land. Suffolk County recreational resources include numerous parks, both inland and on beaches and islands. Large county parks in eastern Suffolk County include:

- Cedar Point County Park, East Hampton – 607 acres. Features include recreational fishing, hiking, picnicking, camping, playground, rowboat rentals, bicycling, saltwater fishing, scuba diving, and hunting.
- Cupsogue Beach County Park West Hampton – 296 acres. Features include swimming and camping.
- Indian Island County Park, Riverhead – 275 acres. Features include hiking, picnicking, camping, fishing, an activity field, and a playground (SCDP 2007).

There are also numerous parks and entertainment venues located throughout New London and Middlesex Counties that offer additional recreational activities to the study area.

3.10.2.2 Consequences

3.10.2.2.1 Employment and Income

Infrastructure improvements are estimated to be made to the current operating facility on Plum Island with the No Action Alternative, but these improvements are not anticipated to increase the existing facility's impact on the local economy.

3.10.2.2.2 Population and Housing

There would be no increase in the population of the study area under the No Action Alternative. Therefore, no effects on housing availability or prices would occur.

3.10.2.2.3 Quality of Life (Community Services)

There would be no increase in the population of the study area under the No Action Alternative. Therefore, it would have no effect on the availability of public services such as schools, medical services, law enforcement, fire protection, or recreational facilities.

3.10.3 South Milledge Avenue Site

3.10.3.1Affected Environment

South Milledge Avenue, in the city of Athens, Georgia, is the proposed location for the NBAF and the geographic definition of the affected environment for this location was determined primarily based on a journey-to-work analysis. Any county that constituted approximately 5% or more of the worker flows into or out of Athens (FIPS Place Code 03440) was considered to comprise the affected environment for the proposed site. This included Clarke, Madison, and Oconee Counties (USCEN 2000a: USCEN 2000c).

The expanded area of study to be used for the agricultural livestock vulnerability analysis and discussion in Appendix D added Barrow, Jackson, and Oglethorpe Counties to the original economically described affected area (Figure 3.10.3.1-1).

3.10.3.1.1 Employment and Income

3.10.3.1.1.1 Employment

The civilian labor force for the three counties combined has grown from 64,229 in 1990 to 95,596 in 2006, an increase of 48.8% (Table C-21). With the exception of 1990, all three counties had unemployment rates lower than Georgia's percentage, and lower than the national average percentage rate.

The unemployment rates for all three counties have followed the Georgia unemployment trend, falling between the years of 1990 and 2000, and then subsequently rising between the years 2000 and 2006. Clarke and Madison Counties had unemployment rates similar to those of the state, whereas the unemployment in Oconee County has consistently remained at least one percentage point lower than the state's average in the 3 years observed (1990, 2000, and 2006).

Clarke County is the region's primary generator of employment (Table C-22). Approximately 81% of its workers are employed within the county, and it also attracts about a half of the labor forces in Madison and Oconee Counties. This concentration of commuters into Clarke County is mainly due to the presence of the urban center of Athens, which is located in Clarke County.

Employment can be measured as either a count of workers (e.g., see Table C-21) or as a count of actual jobs. The following employment base analysis uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the study area (Tables C-23 and C-24).

In 2005, Clarke County was home to 80,825 jobs, while Madison and Oconee Counties held 8,138 and 11,855 jobs, respectively (Table C-24). The concentration of jobs in Clarke County is consistent with the journey-to-work analysis that found the county to be a center of regional employment. Athens is home to UGA and is largely considered a college town. As a public university with associated research centers, UGA is the leading employer in the county. Of the 80,825 jobs in Clarke County, 21,155 are attributed to government and government enterprise, and approximately 15,000 of these jobs are state government enterprise and may be related to UGA.

There is a diverse mix of leading employers by industry in each county, although retail industries and government enterprise are common to all three counties. Even though Clarke County is more urbanized than Madison or Oconee, service industries are not entirely dominant in the county. Retail trade and manufacturing contribute approximately 20% of the jobs in the county. Health care and accommodation services, however, combine to generate about 16% of the jobs in the county (Tables C-23 and C-24).

A list of major employers in the study region was obtained (Table C-25). Due to the concentration of jobs in Athens, the top employers in Clarke County appear to have much larger operations with eight firms/businesses supporting over 500 jobs. Neither Madison nor Oconee Counties have any firms employing more than 500 workers. According to this list, UGA is the largest employer in the region with over 10,000. Even though Table C-24 shows only 1,091 jobs associated with educational services, the 10,000 plus jobs supported by UGA are most likely reported as "government enterprise." As already mentioned, 15,000 jobs in Clarke County are associated with state government enterprise.

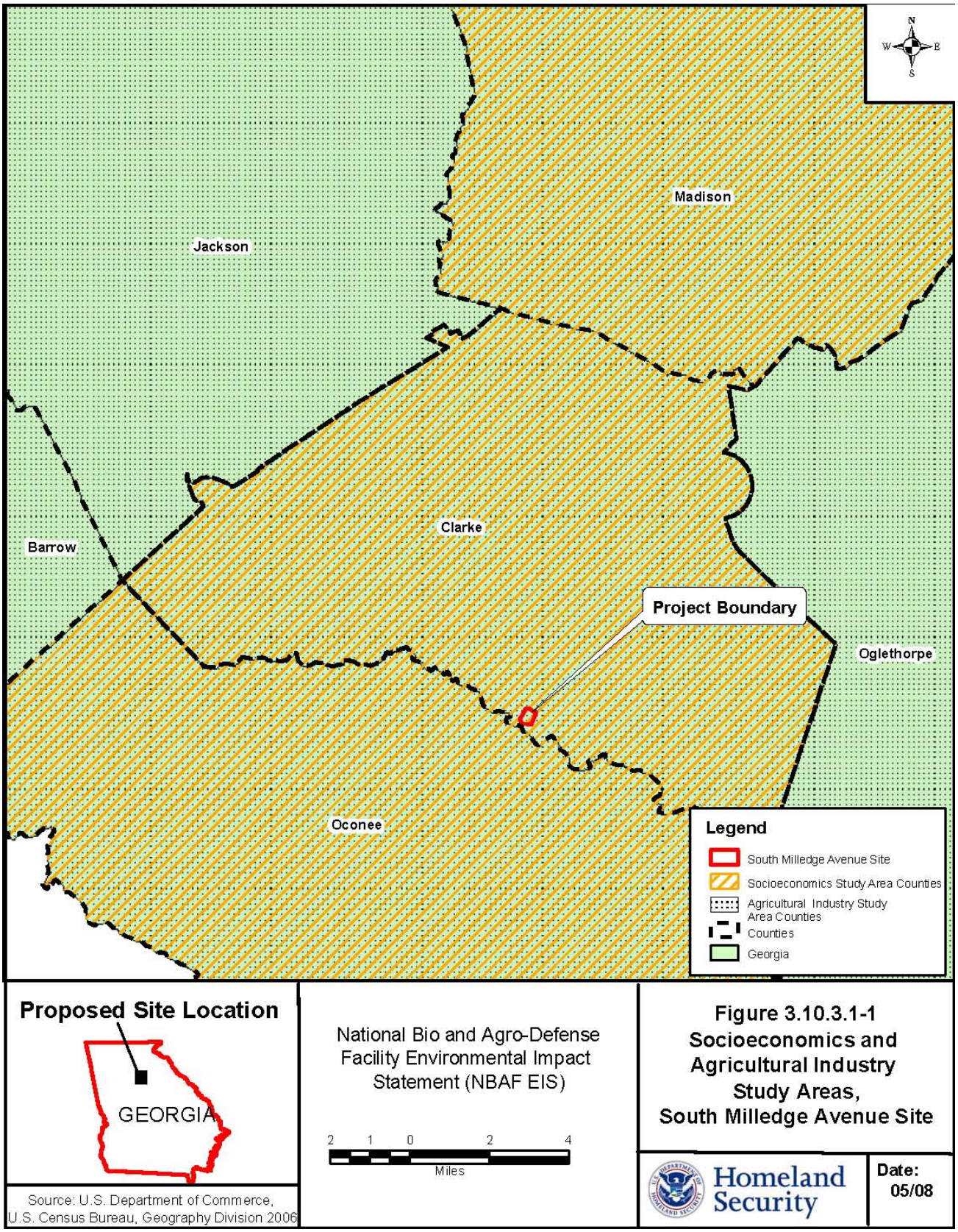


Figure 3.10.3.1-1 — Socioeconomics and Agricultural Industry Study Areas

Government and government enterprises are ranked as the largest sources of employment in terms of total wage compensation paid both for the general study area of study and for each individual county. With the exception of the manufacturing industry, which plays a significant role in employment compensation in all three counties, there is a fairly diverse mix of top contributors to employment compensation within each county. Even though Clarke County is more urbanized than the other two, its employment base in terms of wages paid is still not yet dominated by service industries — retail trade and manufacturing also play a major role (Tables C-26 and C-27).

3.10.3.1.1.2 Agricultural Industry

For the purposes of this analysis, an expanded area of study comprising all counties adjacent to the proposed South Milledge Avenue Site was defined for the agricultural livestock discussion. The relative importance of the agricultural industry was assessed in the following counties: Clarke, Madison, Oconee, Barrow, Jackson, and Oglethorpe.

In 2006, agriculture directly generated an estimated 2,866 jobs in the six counties studied (Table C-28), with Jackson County contributing 973 jobs towards that total. Animal production makes up 2,284 of the 2,886 jobs directly supported by the agricultural industry with poultry and egg production providing the bulk of those jobs in the six-county region. Agriculture makes up about 2% of all the jobs in the six-county region and ranges between 0.4% and 5.4% in the six individual counties. In Clarke, the most urban of the six, agriculture comprises less than 1% of total industry employment, while in Oglethorpe the figure is more than 15%.

The six-county region's output from the NAICS code classified agriculture and hunting industry in the six-county region totaled $644 million (Table C-28). Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Animal production generated $559 million towards the agriculture and hunting industry's total output with crop production contributing an additional $81 million. Poultry and egg production in the six-county region accounted for approximately $512 million (80%) of the agriculture and hunting industry's total output, making it the most valuable overall industrial component.

Livestock statistics in the counties surrounding the proposed facility show the total number of livestock found in the six-county region is 132,900, with Oglethorpe County providing 52,598 (40%) of the total (Table C-29). The term livestock includes all hoofed animals (e.g., cattle, hogs, sheep, goats, horses, and mules). The number of poultry in the six-county region is 48,123,119 (34%), and Madison County provides 16,500,000 of the total (NDP 2007a).

At the end of 2006, there were approximately 1,170,000 head of cattle and calves within Georgia, with an estimated inventory value of $924 million (averaging out to a unit value $790 per head within the state). The six-county region made up 7.6% of that total with 89,500 head of cattle found within those counties (NASS 2006). Based on the state's estimated unit price, the inventory value of cattle within the six-county region would be approximately $70.7 million.

3.10.3.1.1.3 Hunting

This analysis also uses the expanded study area outlined in the analysis of the agricultural industry (all other subsequent sections related to this site refer to the affected environment outlined in Section 3.10.3.1). Industry output from hunting and trapping supported only 27 jobs for the six counties with a corresponding industry output of $3.2 million (Table C-28). There is no direct compensation recorded for this industry although by definition the NAICS code classification of this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers, and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

The 2001 U.S. Census data, which are limited to the statewide level, shows that total expenditures related to recreational hunting activities in the State of Georgia totaled $504 million (USCEN 2001). The data show that of the 417,000 individuals who participated in hunting activities in 2001, 342,000 were involved in big game hunting (e.g., deer) and spent $277 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

3.10.3.1.1.4 Income and Poverty

In 1999, median household incomes ranged from $28,482 in Clarke County to $54,714 in Oconee County. Per capita incomes ranged from $16,998 in Madison County to $24,153 in Oconee County. Overall, the median household income in the study area was $33,514 and the 2000 per capita income $18,303.

Of the study area counties, Oconee County had the lowest proportion of persons living below poverty, and Clarke County contained the highest proportion of persons living below the poverty line. The percentage of persons living below poverty in the study area was 21.4%, substantially higher than the poverty rates in Georgia (13.0%) and the United States (12.4%) (Table C-30) (USCEN 2000b).

In 2007, the estimated median household income for the study area was $42,311, below the estimated median household incomes for Georgia ($55,102) and the United States ($53,154). Clarke County was estimated to have a per capita income of $22,403, slightly lower than in Georgia ($28,047) and the United States ($27,916) (ESRI BIS 2007).

3.10.3.1.2 Population and Housing

3.10.3.1.2.1 Population

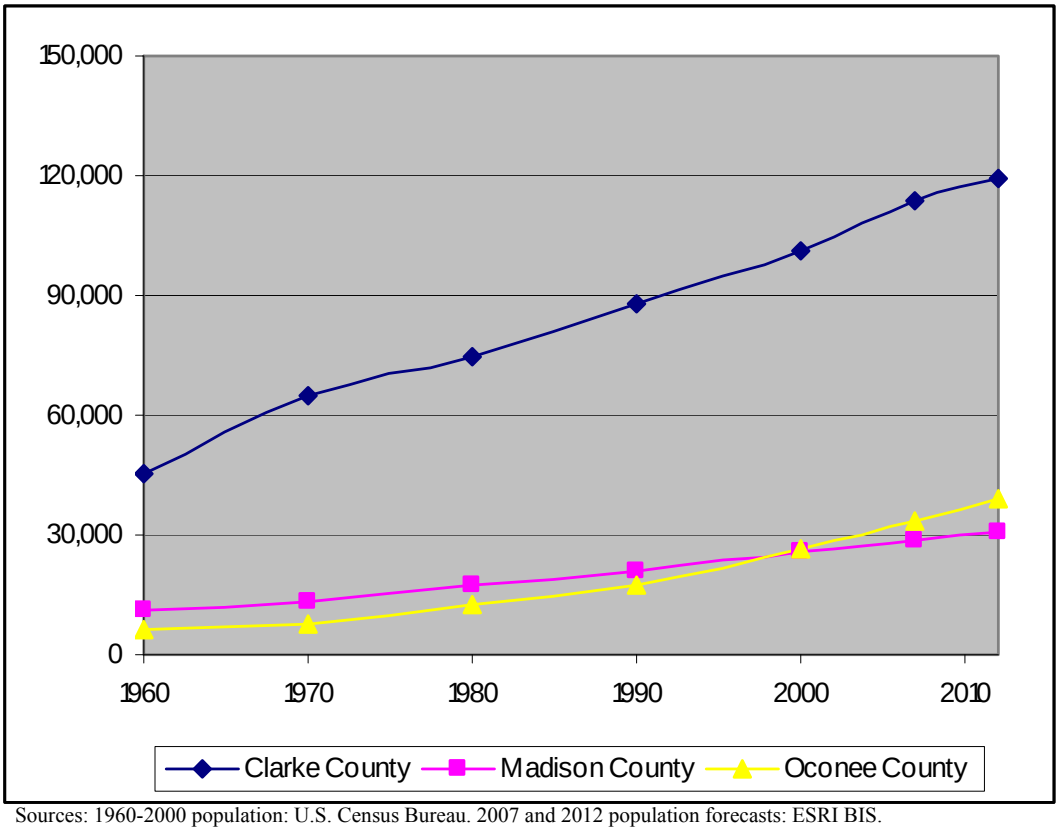
According to population growth trends in the South Milledge Avenue Site study area counties (Clarke, Madison, and Oconee Counties), the total population of the study area has increased by 90,531 persons between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, show an additional 36,029 residents are estimated to be added to the study area between 2000 and 2012 (Figure 3.10.3.1.2.1-1) (USCEN 2000b; ESRI BIS 2007).

While the population of Clarke County, where the City of Athens is located, has increased every decade since 1960, the most rapid growth occurred in the last two decades. As a result of this growth, the population of Oconee County surpassed that of Madison County in the year 2000 (USCEN 2000b).

Between 2007 and 2012, the population of the study area is estimated to grow at a slightly slower rate than Georgia but faster than the United States (Table C-31). In 2000, Clarke County made up 66.1% of the study area population; however, its share is estimated to decline relative to the fast growing Oconee County. By 2012, 20.8% of the study area population is estimated to live in Oconee County, up from 14.0% in 1990.

3.10.3.1.2.1.1 Ethnicity and Race

In 2000, African Americans comprised the largest minority group in the study area (20.5%), which was smaller than the proportion of African Americans in Georgia (28.7%) and greater than the proportion in the United States (12.2%). Clarke County had a substantially greater proportion of minority residents than Madison or Oconee Counties (Table C-32) (USCEN 2000b). The proportion of persons of Hispanic origin in the study area (5.1%) was similar to Georgia (5.3%) but substantially smaller than the United States (12.5%). The proportion of minorities in the study area (29.2%) was smaller than in Georgia (37.4%) and the United States (30.1%).



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.3.1.2.1-1 — Population, Athens-Clarke County, Madison County, and Oconee County, Georgia, 1960-2012

3.10.3.1.2.1.2 Age

In the study area as a whole, approximately 27.7% of the population was 18 years of age and under, and 8.7% was 65 years of age and older, which were similar to the respective proportions in Georgia (28.0% and 9.6%) and the United States (27.1% and 12.4%). In the study area, Clarke County, the largest county in the study area, had substantially smaller proportions of its population aged 18 years and under and 65 years and older (Table C-33) (USCEN 2000).

In 2007, 19.6% of the Clarke County population was estimated to be 18 years of age and under, again smaller than in Georgia (26.7%) and the United States (25.8%). The proportion of the population of Clarke County aged 65 years and older (8.7%) was also estimated to be smaller than in Georgia (9.9%) and the United States (12.5%) (ESRI BIS 2007).

3.10.3.1.2.1.3 Educational Attainment

In 2000, in the study area as a whole, 19.9% of the population 25 years of age and older did not graduate from high school, 42.1% of the population graduated from high school or had some college education, 4.0% had an associate's degree, and 34.1% had a bachelor's degree or a higher level of education (Table C-34). Within the study area, Madison County exhibited the highest proportion of residents without a high school diploma and the lowest proportion of residents with a bachelor's degree or higher (USCEN 2000a). Due to the presence of UGA and related research industries, the proportion of residents with a graduate or professional degree in the study area (15.6%) was substantially higher than in Georgia (8.3%) or the United States (8.9%).

3.10.3.1.2.2 Housing

In 2007, 93.8% of the housing inventory in the study area was estimated to be occupied, and 6.2% was estimated to be vacant (Table C-35). The proportion of vacant units in the study area was estimated to be smaller than in Georgia (9.8%) and the United States (9.9%).

In 2007, Clarke County was estimated to have the highest proportion of renter-occupied housing units in the study area. Overall, the proportion of owner-occupied housing units in the study area (52.3%) was estimated to be smaller than in Georgia (62.3%) and the United States (61.3%) (Table C-35) (ESRI BIS 2007).

In 2000, the single-family detached house was the predominant form of housing in the study area, comprising 32,971 units (53.0%). The majority of housing units in buildings with over 10 units were located in Clarke County, and the largest proportion of mobile homes were located in Madison County (Table C-36) (USCEN 2000b).

In Clarke County, 35.9% of housing units were built before 1970, compared to 27.5% in Madison County and 18.8% in Oconee County. Oconee County has a greater proportion of housing units built in the 1990 to 2000 time period than the other study area counties, reflecting the higher rate of population and household growth in Oconee County compared to the other counties. In the study area as a whole, 16,410 housing units (26.4%) have been built since 1990 (Figure 3.10.3.1.2.2-1) (USCEN 2000b).

Between 2000 and 2007, housing values in the study area were estimated to grow the fastest in Oconee and Clarke Counties. In 2007, Oconee County was estimated to have the highest median housing value ($216,428), and Madison County was estimated to have the lowest median housing value ($109,279). In 2007, the median housing value for Athens-Clarke County was estimated to reach $143,234, below the estimated values for Georgia ($148,827) and the United States ($192,285) (Table C-37) (USCEN 2000b; ESRI BIS 2007).

Overall, 41.5% housing units in the study area were estimated to be valued between $50,000 and $150,000 in 2007. The largest proportion of housing units with estimated values less than $50,000 was in Madison County (17.5%). Oconee County had the largest estimated proportion of housing units valued at over $150,000 (69.3%). Overall, the estimated proportion of housing units valued at over $150,000 in the study area (46.9%) was smaller than in Georgia (49.4%) and the United States (61.7%) (Table C-38) (ESRI BIS 2007).

Between 1990 and 2000 (the most recent data available), median monthly rent in the study area grew the fastest in Madison County to $341; however, this remained the lowest rent in the area. In 2000, Oconee County had the highest median rent in the study area ($485). The 2000 median rents in all study area counties were lower than the median rents for Georgia ($505) and the United States ($519) (Table C-39) (USCEN 2000b).

Overall, in 2000, 83.0% of housing units in the study area paid monthly rents between $200 and $749. The largest proportion of housing units with a rent less than $200 was in Madison County, and Oconee County had the largest proportion of housing units with rents over $1,000. Overall, the proportion of housing units with rents over $1,000 in the study area (3.3%) was lower than in Georgia (4.9%) and the United States (8.4%) (Table C-40) (USCEN 2000b).

In 2005, the majority of new housing units in the study area were permitted in Clarke County relative to Oconee and Madison Counties. The least expensive housing units in the study area are being constructed in Madison County, and the most expensive housing units in the study area are being constructed in Oconee County (Table C-41) (USCEN 2006).

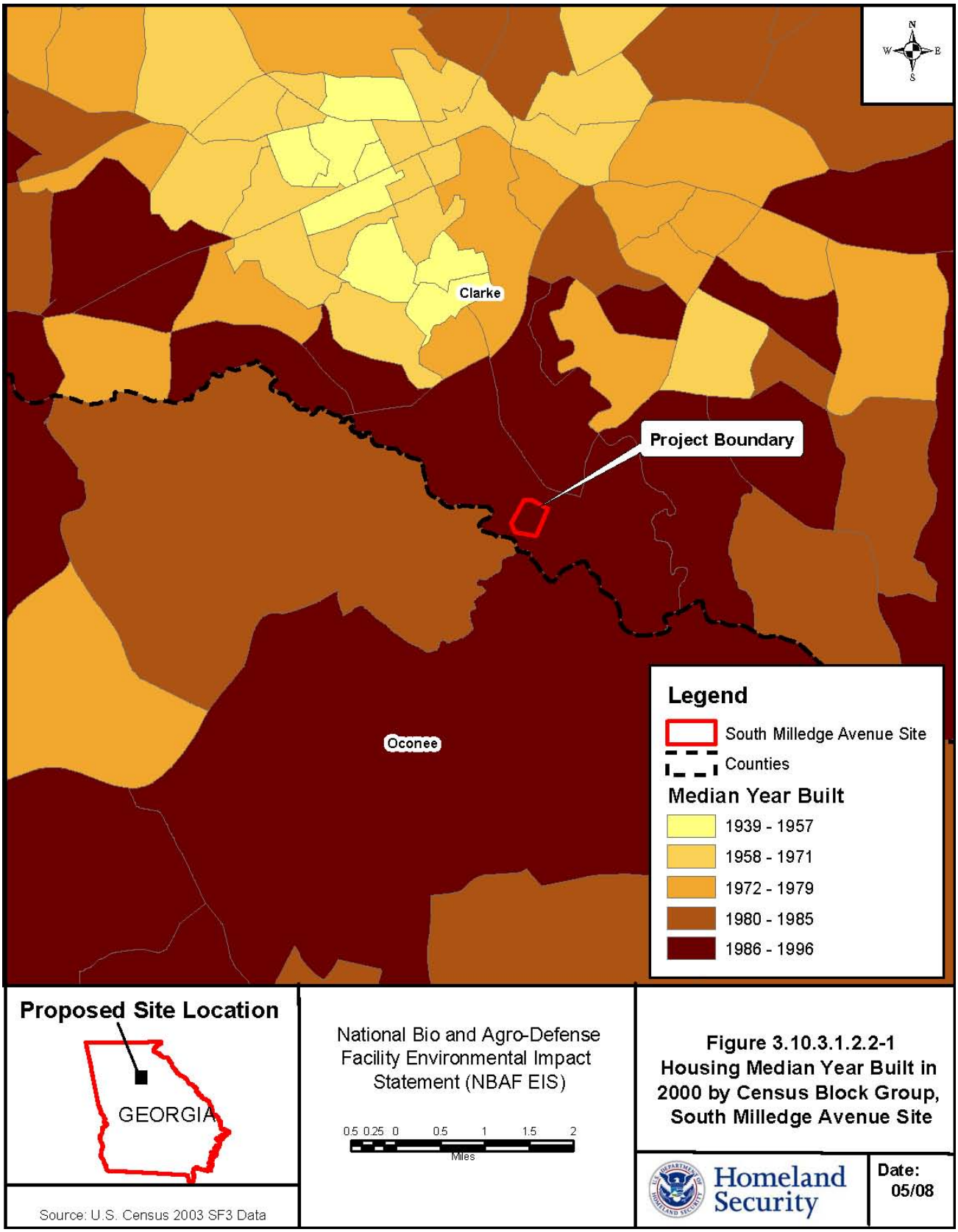


Figure 3.10.3.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group, Clark County, Madison County, and Oconee County, Georgia

3.10.3.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. NEPA quality-of-life analyses typically address issues relating to potential impacts of the NBAF and alternatives on the availability of public services that contribute to quality of life. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.3.1.3.1 Public Schools

The proposed South Milledge Avenue Site area is located in the Athens-Clarke County School District. The Athens-Clarke County School District has 13 elementary schools, 4 middle schools, 3 high schools, and 2 special programs that serve approximately 12,108 students. The student-to-teacher ratio for this district is 13 to 1 (ACC 2007a).

In addition, in the study area, Oconee and Madison Counties serve a total of 10,968 students with 10 elementary schools, 3 middle schools, and 3 high schools. The average student-to-teacher ratio for both counties is 15 to 1 (OCSS 2007; MCSD 2008). Clarke County is also served by UGA, Athens Area Technical College, and the Navy Supply Corps School.

3.10.3.1.3.2 Law Enforcement

The proposed South Milledge Avenue Site area is served by the Athens-Clarke County Police Department located in Athens. The department's authorized personnel consist of 231 sworn positions, 63 civilian positions, and 28 crossing guards. The department is organized into several divisions that include the Uniform Division, the Criminal Investigations Division, and the Information Management Division. The units provide services such as a neighborhood patrol program, follow-up investigations of crimes committed, and data collection and entry.

In addition, the Athens-Clarke County Police Department has two specialized groups: the Communications Division and the Strategic Response Team. The Communications Division provides a link between the citizens and emergency service providers. In 2003, the Athens-Clarke County Central Communications Division processed 214,520 emergency telephone calls. The calls were dispatched to 132,431 police, 2,204 fire, and 5,637 medical emergency personnel. The Strategic Response Team receives advanced training and special equipment to appropriately respond to dangerous situations and ensure the safety of all persons involved (ACC 2008). The study area is also served by the Oconee and Madison County Sheriff's Offices.

3.10.3.1.3.3 Fire Protection

The proposed South Milledge Avenue Site area is served by the Athens-Clarke County Fire and Emergency Services. This department is dedicated to the preservation of life and property through prevention, education, mitigation, preparation, response, and recovery programs. In 2006, the Athens-Clarke County Fire and Emergency Services department employed approximately 170 firefighters. Fire protection services are also provided to the study area by the Oconee and Madison County fire departments.

The Athens-Clarke County Fire and Emergency Services operates the Community Emergency Response Team program. This program trains people to be better prepared to respond to emergency situations in their day-to-day lives as individuals and a community (ACC 2008). Data for department annual emergency response calls are not available.

3.10.3.1.3.4 Medical Facilities

The proposed South Milledge Avenue Site area is served by the Athens Regional Medical Center and St. Mary's Health Care System. The Athens Regional Medical Center is a 315-bed facility that offers specialized medical, surgical, and diagnostic procedures (ARMC 2007). St. Mary's Health Care System is a private, non-profit, acute-care network operated by a 1,400-person staff and a medical staff of approximately 270 physicians. The system's services include a hospital, long-term care facilities, community wellness, and home health care and hospice services (SMHCS 2005).

Clarke County is also served by the Athens Nurses Clinic, Clarke County Health Department, Athens Neighborhood Health Center, and Mercy Health Center. These centers provide a range of services and care for the uninsured, medically underserved, homeless, or lower income populations in Clarke County. Their services include children's health, communicable disease control, nutrition services, pharmacy, and dental care (UGA 2008). These facilities, in addition to the Cobb Health Care Center in Madison County, serve the total study area.

3.10.3.1.3.5 Recreation

The Clarke County Department of Leisure Services manages the local natural resources to provide quality leisure opportunities, experiences, and partnerships to the community with over 46,000 acres of park land. Clarke County recreational resources include numerous parks, both inland and on beaches and islands. Large county parks in eastern Athens-Clarke County include:

- Sandy Creek Park – 780 acres. Features include sports fields, boating, canoeing, hiking, a dog park, fishing and horse, and nature and walking trails (ACC DLS 2008).
- Sandy Creek Nature Center – 225 acres. Features include nature trails, hiking, creeks, rivers and historic ruins.
- North Oconee River Greenway – 3.5 miles. Features include hiking and bicycling. Connects with Cook's Greenway Trail at Sandy Creek Nature Center and follows the North Oconee River south toward downtown Athens and UGA.

In addition to several parks and nature centers, Clarke County is the location of the State Botanical Garden, a horticultural preserve set aside for the study and enjoyment of plants and nature. Several parks and historical sites located throughout Oconee and Madison Counties offer additional recreational activities to the study area (ACC DLS 2008).

Athens-Clarke County provides many opportunities for cultural enhancement, such as a variety of art galleries, dance centers, and theatres. Athens uniquely celebrates AthFest, a musical festival held in June; Twilight Festival, which is held in April; and the annual Marigold Festival, which has earned the city the title of "the marigold capital of Georgia" (CityData 2006).

3.10.3.2Construction Consequences

3.10.3.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the 4-yr construction phase. Economic effects would result from regional purchases generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment.

The economic benefits of construction would be temporary and would diminish as the construction reaches completion. Direct employment (Table 3.10.3.2.1-1) refers to the jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier effect on the initial investment in construction of the facility. The industries that contribute to this other

employment include architectural and engineering services, food services and drink establishments, wholesale trade, and general merchandise stores.

Based on the results of the impact analysis for construction (Table 3.10.3.2.1-1), the construction of the proposed facility would — over the 4-year construction phase — directly support 2,642 person-yrs (661 jobs annually) of employment with an associated total employment level of 3,910 person-yrs (978 jobs annually). The effects of this work would be short term and would only last for the duration of the construction work.

Table 3.10.3.2.1-1 — Short-Term Economic Impacts

Construction	
Total Construction Jobs (person-yrs)	2,642
Impacts:	
Total Employment (person-yrs)	3,910
Total Labor Income Impact ($ millions)	150.0
Federal, State, and Local Tax ($ millions)	44.0
State and Local Tax ($ millions)	14.6

Note: In 2007 dollars.

In terms of income, minor short-term benefits would be expected. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[2]. The estimated labor income generated during the construction phase is $150 million ($37.5 million annually) measured in 2007 dollars. The total labor income of this project would correspond to 1.0% of all estimated 2006 labor income in the three-county region expressed in 2007 dollars, or 1.1% of the total estimated labor income in Clarke County.

The construction phase would generate additional taxes estimated at $44 million (Table 3.10.3.2.1-1), of which $14.6 million is estimated to be col lected through state and local taxes that should flow to the local governments.

3.10.3.2.2 Population and Housing

3.10.3.2.2.1 Population

The majority of the construction workers would be drawn from the study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the NBAF is not estimated to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment.

3.10.3.2.2.2 Housing

As described above, the construction of the NBAF would not be expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.3.2.3 Quality of Life (Community Services)

The construction of the NBAF would not increase the population of the study area. Therefore, construction would have no effect on the availability of public services such as schools, medical services, law enforcement, fire protection, or recreational facilities.

[2] Proprietor income consists of payments received by self-employed individuals as income.

3.10.3.3Operations Consequences

3.10.3.3.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the operations and maintenance phase, which would commence in the year 2014. Economic effects would result from purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the continual operations of the facility (Table 3.10.3.3.1-1).

Table 3.10.3.3.1-1— Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326 [a]
Impacts	
Total Employment (jobs)	483
Total Labor Income Impact ($ Millions)	27.8
Federal, State, and Local Tax ($ Millions)	3.2
State and Local Tax ($ Millions)	1.6

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of this proposed facility would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 483 jobs including the initial 326 direct jobs required for operations and maintenance (see footnote in Table 3.10.3.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operation is $27.8 million annually in 2007 dollars. This corresponds to 0.7% of all estimated 2006 labor income in the three-county region expressed in 2007 dollars or 0.8% of total labor income in Athens-Clarke County. The operations phase would generate additional taxes estimated at $3.2 million (Table 3.10.3.3.1-1), of which $1.6 million is estimated to be collected through state and local taxes that should flow to the local governments.

3.10.3.3.2 Population and Housing

3.10.3.3.2.1 Population

The NBAF would directly employ 326 people. The majority of these employees would be research scientists and other specialized staff, and based on census journey to work data, 257 would be expected to relocate to the study area from elsewhere in the country. Assuming the United States Census Bureau 2006 size of 2.61 persons, this would represent a population increase of 671 (USCEN 2006).

In addition, the economic activity associated with the operation of the NBAF would employ 157 persons. The industries that would contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments, wholesale trade, and general merchandise stores, among others. It is assumed that these employment opportunities would be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs would be negligible.

In total, the population of the study area would increase by 671 as a result of the operation of the NBAF. This population increase is 4.9% of the overall estimated population growth within the study area between 2007 and 2012 (13,663 based on historic trends), which would result in a total study area population of 190,468 in 2012.

3.10.3.3.2.2 Housing

As described above, 671 additional persons would locate to the study area as a result of the NBAF. The average salary including benefits of the 326 employees employed directly at the facility would be $82,622. For comparative purposes, this figure has been adjusted to an average per capita income of $66,924 for employees employed directly at the facility, which is higher than the estimated median 2007 study area per capita income of $22,403. Over 80 NBAF research scientists and managers would earn over $125,000 annually. The estimated 2007 median value of owner-occupied housing units in the study area in 2007 would be $143,234 (Table C-37). Taking into account families with two incomes, the available study area housing stock would be affordable to the majority of the people relocating to the region.

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the estimated growth of the existing population between 2007 and 2012 (13,663). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase due to an increase in demand, and there is no empirical evidence that a facility such as the NBAF would reduce property values in the study area. Therefore, the overall effect of the NBAF on housing market conditions would be negligible.

3.10.3.3.3 Quality of Life (Community Services)

Due to the small percentage of the overall population growth that is attributed to the facility, the NBAF would have a negligible effect on the availability of public services. The study area population growth attributed to the NBAF would be 4.9% of the overall estimated population growth from 2007 to 2012. As the study area population grows, expansion of public services would be necessary, regardless of whether the South Milledge Avenue Site is selected for the location of the NBAF. In comparison to existing trends, the additional population locating to the study area as a result of the NBAF would have a negligible effect on the availability of public services.

3.10.3.3.3.1 Public Schools

The NBAF would add approximately 139 school-aged children to the study area, or a 0.6% increase in the study area's public school district's enrollment of 23,076 students during the 2006/2007 school year (GDE 2007). The 0.6% increase in school-aged children attributed to the NBAF would place minimal additional demand on the schools.

School districts in the study area have invested in educational facilities to meet the needs of the growing population of the region. The Athens-Clarke County School District is using the revenues from a special purpose local option sales tax (SPLOST) to carry out a 10-year strategic plan that would renovate existing schools and add new schools to the district. The district has 11 schools that are currently under construction or in the design stages (ACC School District 2008). In addition to bond selling options, SPLOST is used, or under consideration, by other study area districts as sources of funds for new school constructions in the next decade (OCSS 2008).

3.10.3.3.3.2 Law Enforcement

The population increase associated with the NBAF (671), relative to the estimated growth of the existing population in the study area between 2007 and 2012 (13,663), would result in a negligible increase in the need for additional law enforcement services.

3.10.3.3.3.3 Fire Protection

The population increase associated with the NBAF (671), relative to the estimated growth of the existing population in the study area between 2007 and 2012 (13,663), would result in a negligible increase in the need for additional fire protection services.

3.10.3.3.3.4 Medical Facilities

The additional population associated with the NBAF (671), relative to the estimated growth of the existing population in the study area between 2007 and 2012 (13,663), would result in a negligible increase in the demand for medical services and facilities.

Due to the overall population growth in the region, medical facilities in the study area are responding to growth in the region and expanding to meet the increasing demand. For example, the Athens Regional Medical Center recently constructed a new 122,000 square foot Medical Services Building (ARMC 2007). Also, in 2005, the St. Mary's Health Care System completed a 73,000 square foot facility renovation and expansion (SMHCS 2005).

3.10.3.3.3.5 Recreation

Recreational resources would not experience a significant increase in utilization rates as a result of the population increase associated with the NBAF. The study area has abundant recreation resources available.

3.10.3.3.3.6 Health and Safety

The normal operation of the NBAF would pose no additional health or safety risks to the public because the facility would be closed off to public access at all times. Further analysis with regard to health and safety during abnormal operation of the proposed facility are in Section 3.14 (Health and Safety).

3.10.4 Manhattan Campus Site

3.10.4.1Affected Environment

The City of Manhattan, Kansas, has been proposed as the location site for the facility and the geographic definition of the affected environment for this location was determined primarily based on a journey-to-work analysis of the town. Any county that constituted approximately 5% or more of the worker flows into or out of Manhattan (FIPS Place Code 44250) was considered to comprise the affected environment for the proposed site, and this included Riley, Geary, and Pottawatomie Counties (USCEN 2000a; USCEN 2000c).

The expanded area of study to be used for the agricultural livestock vulnerability analysis added Clay, Marshall, Wabaunsee, and Washington Counties to the original economically described affected area (Figure 3.10.4.1-1).

3.10.4.1.1 Employment and Income

3.10.4.1.1.1 Employment

In general, the civilian labor force for all three counties has grown from 47,299 in 1990 to 57,359 in 2006, an increase of 21.3 %, which is close to the growth rate of the national civilian labor force (20.3%), and higher than Kansas's civilian labor force growth rate of 16% (Table C-42). Of the three counties examined, only Geary County had an unemployment rate higher than the national average for all 3 years observed[3]. Geary County was also the only county that exhibited a decline in its civilian labor force and employment levels between 2000 and 2006.

[3] Based on data from the Bureau of Labor Statistics, the average national unemployment rate for the country in the years 1990, 2000, and 2006 were 5.6, 4.0, and 4.6 respectively.

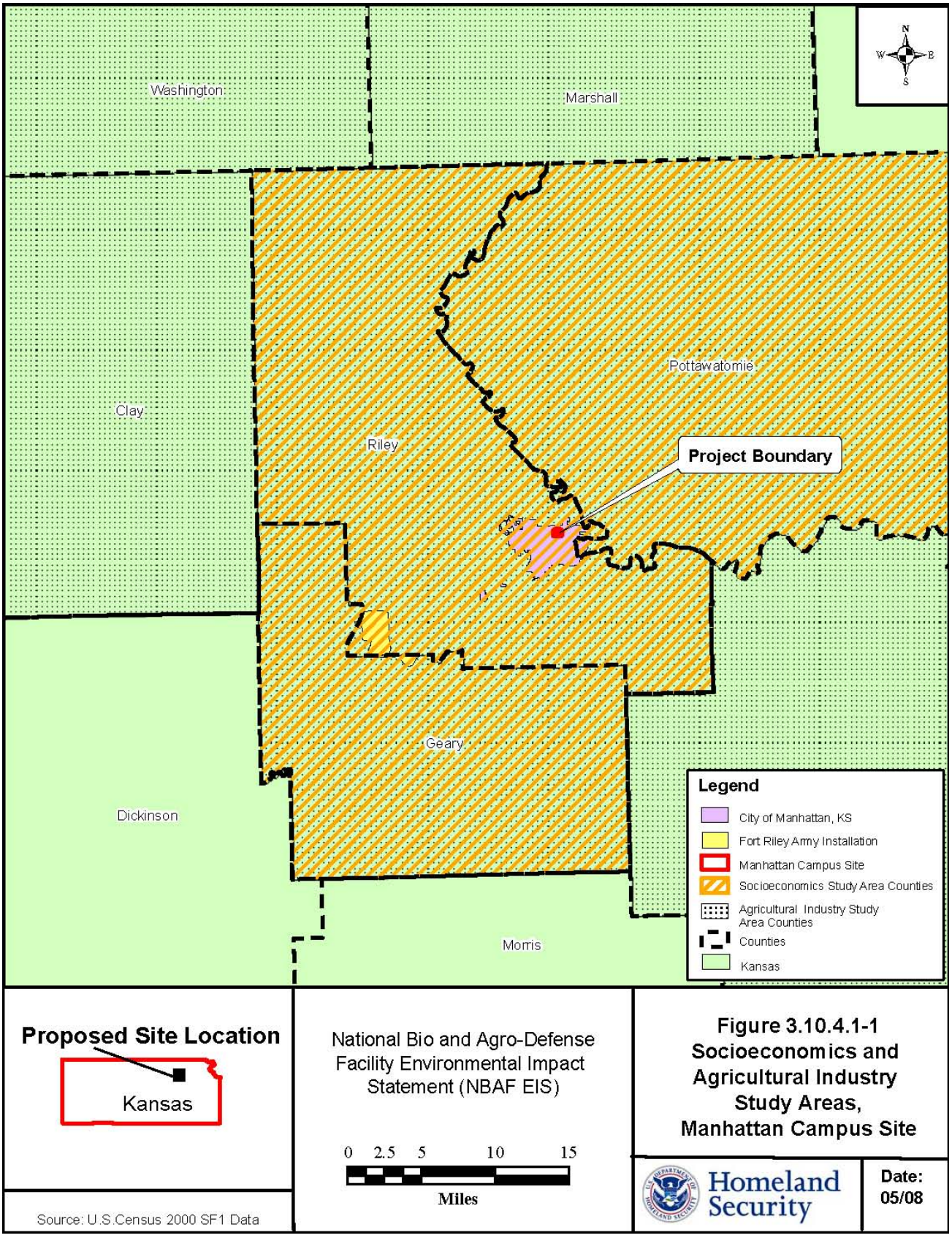


Figure 3.10.4.1-1 — Socioeconomics and Agricultural Industry Study Areas

The unemployment rate in all three counties dropped between 1990 and 2000 but then subsequently rose again between 2000 and 2006. This movement in the unemployment rate was similar to that of the State of Kansas and the national average over the same time period with the combined unemployment rate for the three-county region remaining slightly lower than the state's rate in 2000 and 2006 (Table C-42).

Riley County is the center of employment with approximately 81% of its workers employed within the county, while also attracting about one-third of the labor forces in Geary and Pottawatomie Counties (Table C-43). Riley County's attraction of workers from neighboring areas is mainly due to the local presence of KSU, which supports a large proportion of the employment opportunities in its associated urban center of Manhattan, Kansas.

Although a significant proportion of the work forces in both Geary and Pottawatomie Counties commute to Riley County, the majority of their respective labor forces work within their own county boundaries.

Employment can be measured as either a count of workers or as a count of actual jobs. The data presented in Table C-42 were compiled using the former. The employment base analysis in this section, however, uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the study area.

The data used in this analysis also include military personnel employment. In the case of Riley and Geary Counties, which house the Fort Riley complex, this comprises a large proportion of government and government enterprise employment associated with the respective regions. A total of 10,060 military personnel were assigned to the Fort Riley base in 2006[4]. An additional 9,700 troops are expected to relocate to the Fort Riley installation by 2012. This influx of new military personnel is in turn expected to be supported by the addition of 2,000 civilian workers accompanying the military personnel increase at Fort Riley. The total growth in employment opportunities resulting from the initial relocation of troops is estimated at 18,640 new jobs[5].

Government and government enterprises are the largest sources of employment in terms of number of jobs for the general area of study. At the individual county level, however, government and government enterprise employment is only largest for Geary and Riley Counties — both of which are influenced by the large military presence of Fort Riley. Based on the 2005 Bureau of Economic Analysis Regional Economic Accounts, the vast majority of the military jobs associated with Fort Riley are concentrated in Geary County. Riley County, however, is also home to the City of Manhattan and the campus of KSU, which has 23,000 students. As a result, a large proportion of those employed in the government and government enterprise industry are affiliated with state and local education activities. In Pottawatomie, the largest contributor to employment by number of jobs is the retail trade industry (Tables C-44 and C-45).

As already mentioned, one of the major employers in Geary and Riley Counties is the U.S. Military, which in the case of Geary County housed 9,000 military staff in 2005.[6] A list of other major employers in the region of study is presented in Table C-46.

Government and government enterprises remain ranked as the largest sources of employment, even in terms of total wage compensation paid for the general area of study. At the county level, however, while government and government enterprise employment are still largest for Geary and Riley Counties, in Pottawatomie, the largest industry contributor to employment by earnings is the manufacturing industry (Tables C-47 and C-48).

[4]RKG Associates, Inc. (prepared for the Kansas Department of Commerce), Strategic Action Plan and Growth Impact Assessment for the Flint Hills Region, October 2006, pp. II-14.
[5] Ibid, pp. II-2.
[6] Bureau of Economic Analysis Regional Economic Accounts CA25.

3.10.4.1.1.2 Agricultural Industry

For the purposes of this analysis, an expanded area of study comprising all counties adjacent to the proposed site was defined for the agricultural livestock discussion. The relative importance of the agricultural industry was assessed in the following counties: Geary, Pottawatomie, Riley, Clay, Washington, Wabaunsee, and Marshall.

Agriculture directly supported an estimated 7,481 jobs in the seven counties studied in 2006 (Table C-49), with Washington County (1,275 jobs) and Wabaunsee County (2,947 jobs) contributing 4,222 jobs towards the total. Animal production contributes 4,567 of the 7,481 jobs directly supported by the agricultural industry with Washington County and Wabaunsee County, once again providing the bulk of those jobs in the seven-county region (3,127 jobs combined). The NAICS code classified agriculture and hunting industry makes up approximately 8% of all the jobs in the seven-county region, although that percentage varies quite a bit in each individual county. In Riley — the most urban of the seven — agriculture comprises less than 2% of total industry employment, while in Wabuansee the figure is estimated at more than 60%. Agriculture is a significant contributor to employment in the region (Table C-49).

Industry output from the agriculture and hunting industry in the seven-county region totaled $627 million (Table C-49). Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Animal production generated $402 million towards the total output of the agriculture and hunting industry, with crop production contributing an additional $225 million. Cattle ranching and farming in the seven-county region accounted for approximately $336 million (83%) of total estimated output in the agriculture and hunting industry, making it the most valuable component of the overall industry.

Livestock statistics in the counties surrounding the proposed facility show the total number of livestock found in the seven counties (Table C-50) (DHS 2007). The term livestock includes hoofed animals such as cattle, hogs, sheep, goats, horses, and mules. The total number of livestock found in the seven-county region is 542,507, with Washington County providing 155,747 (29%) of the total amount. The number of poultry in the six-county region is 192,474, and Pottawatomie County provides 151,483 (79%) of the total number (NDP 2007a).

There were approximately 6,400,000 head of cattle and calves at the end of 2006 in Kansas, with an estimated inventory value of $5.38 billion (averaging out to a unit value $840 per head within the state). The seven-county region made up for about 5.4% of that total with 347,300 head of cattle found within those counties (NASS 2006). Based on the state's estimated unit price, the inventory value of cattle within the seven-county region would be approximately $291.7 million.

3.10.4.1.1.3 Hunting

This analysis also uses the expanded study area outlined in the analysis of the agricultural industry (all other subsequent sections related to this site refer to the affected environment outlined in Section 3.10.4.1). Industry output from hunting and trapping supported only 50 jobs for the seven counties with a corresponding industry output of $5.2 million (Table C-49). There is no direct compensation recorded for this industry, although by definition, this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

U.S. Census data from 2001 that are limited to the statewide level show that total expenditures related to recreational hunting activities in the State of Kansas totaled $235 million (USCEN 2001). The data show that of the 291,000 individuals who participated in hunting activities in 2001, 159,000 were involved in big game

hunting (e.g., deer) and spent $81 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

3.10.4.1.1.4 Income and Poverty

In 1999, the median household incomes in the study area ranged from $31,917 in Geary County to $40,176 in Pottawatomie County. Per capita incomes showed less variation and were lowest in Geary County ($16,199). Overall, the median household income in the study area was $33,627 and the per capita income $16,550 (Table C-51) (USCEN 2000b).

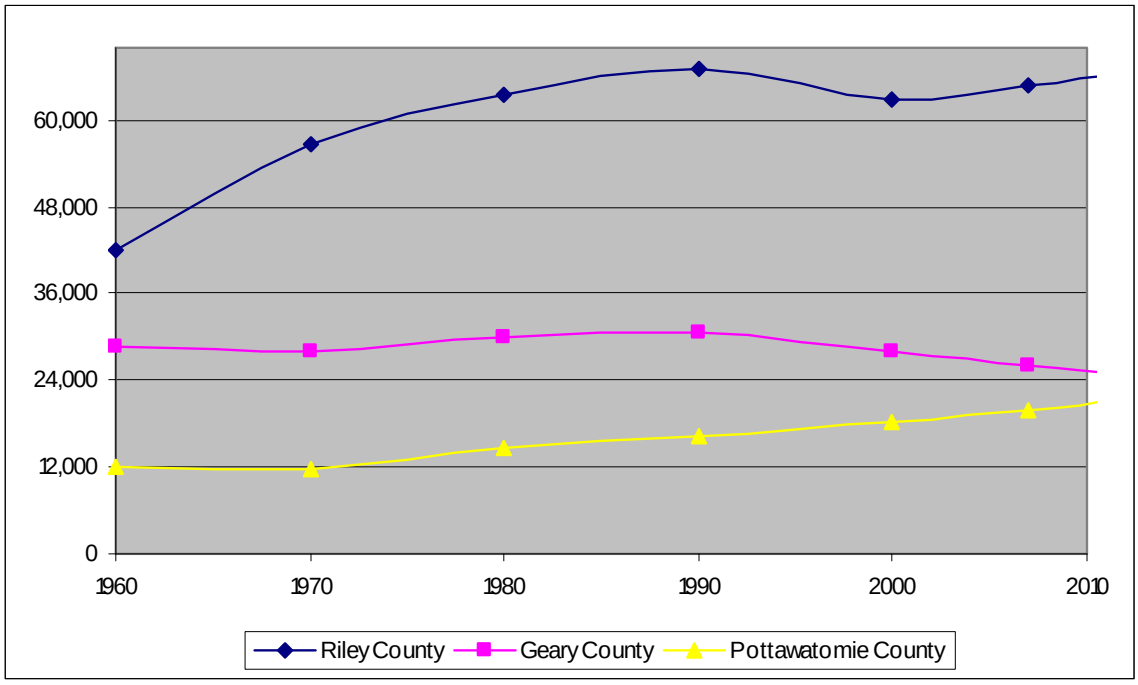
Of the study area counties, Pottawatomie had the lowest proportion of persons living below poverty in the study area, and Riley County had the highest proportion of persons living below the poverty line. The percentage of persons living below poverty in the study area (16.3%) was higher than the poverty rate in Kansas (10.1%) and the United States (12.4%) (Table C-51) (USCEN 2000b).

In 2007, the estimated median household income for the study area was $42,073, less than the estimated median household incomes for Kansas ($51,343) and the United States ($53,154). Riley County was estimated to have a per capita income of $20,899, less than in Kansas ($26,438) and the United States ($27,916) (ESRI BIS 2007).

3.10.4.1.2 Population and Housing

3.10.4.1.2.1 Population

The total population of the study area (Riley, Geary, and Pottawatomie Counties) has increased by 26,349 between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, show an additional 3,555 residents are estimated to be added to the study area between 2000 and 2012. The military personnel population associated with Fort Riley is included in the population figures reported in this section (Figure 3.10.4.1.2.1-1) (USCEN 2000b).



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.4.1.2.1-1 — Population, Riley County, Geary County, and Pottawatomie County, Kansas, 1960- 2012

From 1960 to 1990, the populations of Riley and Pottawatomie Counties have increased, and the population of Gear County has declined (USCEN 2000b). The historic population dynamics of the study area have been influenced by operations at Fort Riley, which is located in Riley and Geary Counties. At the time of the 2000 Census, the total population of Fort Riley was reported as 8,217[7]. As of 2006, there were 10,060 troops stationed at Fort Riley, with an associated military-dependent population of 12,518. Although not reflected in the future population estimates presented in this chapter, three DoD initiatives[8] are estimated to increase the number of military personnel at Fort Riley by 9,700 and the number of civilian employees by 2,000 by 2012. Combined with the dependents of the added military personnel and civilian employees, as well as economic migrants, the total population of the study area is estimated to increase by 26,600 between 2006 and 2012 due to the DoD initiatives at Fort Riley (KDC 2006). The City of Manhattan in Riley County is the specific location of the NBAF site within the study area and is therefore included in this socioeconomic discussion.

Between 2007 and 2012, the population of the study area is estimated to grow slower than Kansas and the United States. Pottawatomie County was the fastest growing county between 1990 and 2000 and is estimated to continue to grow faster than the study area as a whole between 2000 and 2012. The City of Manhattan's share of Riley County's total population (71.3%) estimated to remain relatively constant between 2000 and 2012, adding 993 residents (Table C-52) (ESRI BIS 2007).

3.10.4.1.2.1.1 Ethnicity and Race

In 2000, African Americans comprised the largest percentage minority group in the study area (9.7%), which was greater than in Kansas (5.7%) and smaller than in the United States (12.2%). Person of Hispanic origin comprised 5.2% of the study area, which was smaller than in Kansas (7.0%) and the United States (12.5%). Overall, there was the proportion of minorities in the study area (20.7%) was higher than in Kansas (16.9%) but smaller than in the United States (30.1%) (Table C-53) (USCEN 2000b).

3.10.4.1.2.1.2 Age

In 2000, approximately 25.7% of the study area population was 18 years of age and under, and 9.0% was 65 years of age and older. Geary County had the highest proportion of its population aged 18 years and under, and Pottawatomie County had the highest proportion of its population aged 65 years and older (Table C-54) (USCEN 2000b).

In 2007, the proportion of the Riley County population estimated to be 18 years of age and under (20.6%) was smaller than in Kansas (26.2%) and the United States (25.8%). The proportion of the population of Riley County 65 years of age and older (8.1%) was also estimated to be smaller than in Kansas (12.7%) and the United States (12.5%) (ESRI BIS 2007).

In 2007, the proportion of the Riley County population estimated to be 18 years of age and under was lower than in Kansas and the United States. The proportion of the population of Riley County aged 65 years and older was also estimated to be lower than in Kansas and the United States (ESRI BIS 2007).

3.10.4.1.2.1.3 Educational Attainment

In 2000, 9.3% of the study area population aged 25 years and older did not graduate from high school, 54.2% of the population graduated from high school or had some college education, 6.1% had an associate's degree, and 30.4% had a bachelor's degree or higher level of education. The City of Manhattan and Riley County had a substantially greater proportion of residents with a bachelor's degree or higher level of education and a smaller proportion of residents that did not complete high school when relative to Geary and Pottawatomie

[7] Fort Riley consists of two Census Designated Places (CDPs): the Fort Riley-Camp Whiteside CDP (2000 population of 103) and the Fort Riley North CDP (2000 population of 8,114).
[8] The transformation of units in the Army to Modular Forces (AMF), the implementation of 2005 Base Realignment and Closure (BRAC) decisions, and stationing changes based on the Integrated Global Presence and Basing Strategy (IGPBS).

Counties. The proportion of residents that did not graduate from high school in the study area (9.3%) was less than in Kansas (14.0%) and the United States (19.6%) (Table C-55).

3.10.4.1.2.2 Housing

In 2007, 91.3% of the housing units in the study area were estimated to be occupied, and 8.7% were estimated to be vacant. The proportion of vacant units in the study area was estimated to be smaller than in Kansas (9.8%) and the United States (9.9%) (Table C-56).

In 2007, the City of Manhatttan was estimated to have the highest proportion of renter-occupied housing units in the study area. The percentage of owner-occupied housing units in the study area (50.7%) was estimated to be smaller than in Kansas (63.9%) and the United States (63.3%) (ESRI BIS 2007).

In 2000, the single-family detached house was the predominant form of housing in the study area, comprising 24,011 units (56.3%). The majority of housing units in buildings with over 10 units were located in the City of Manhattan, and the largest proportion of mobile homes were located in Geary County (Table C-57) (USCEN 2000b).

In 2000, approximately one-half of the housing units in all of the study area counties were built before 1970. Pottawatomie County had a greater proportion of housing units built in the 1995 to 2000 time period than the other study area counties, reflecting the higher rate of population and household growth in Pottawatomie compared to Riley and Geary Counties between 1990 and 2000. In the study area as a whole, 6,115 housing units (14.3%) have been built since 1990 (Figure 3.10.4.1.2.2-1).

New housing growth has primarily occurred in the areas on the periphery of the historic population centers of Manhattan and Junction City. The northern portions of the City of Manhattan and the Townships of Manhattan, Wildcat, Smoky, and Lyon had a median housing age of post-1981, indicating that more than one-half of the housing units in these areas were built in the last 25 years.

Between 2000 and 2007, housing values in the study area were estimated to grow the fastest in Riley County and the City of Manhattan. In 2007, the City of Manhattan was estimated to have the highest median housing value ($133,663), and Geary County was estimated to have the lowest median housing value ($91,837). In 2007 the median housing value for Riley County ($126,466) was estimated to exceed the estimated value in Kansas ($112,948) and be less than the estimated value in the United States ($192,285) (Table C-58).

In 2007, over one-half of the housing units in the study area were estimated to be valued between $50,000 and $150,000. Pottawatomie had the largest proportion of housing units with estimated values of less than $50,000, and the City of Manhattan had the largest proportion of housing units with estimated values over $150,000 (39.7%). Overall, the proportion of housing units valued at over $150,000 in the study area (29.1%) was estimated to be smaller than in Kansas (34.1%) and the United States (61.7%) (Table C-59) (ESRI BIS 2007).

Between 1990 and 2000 (the most recent available data), median monthly rent in the study area grew the fastest in Pottawatomie County. In 2000, the City of Manhattan had the highest median rent, and Pottawatomie County had the lowest median rent. The 2000 median rent in Riley County ($413) was higher than the median rent in Kansas ($391) and less than the median rent in the United States ($519) (Table C-60) (USCEN 2000b).

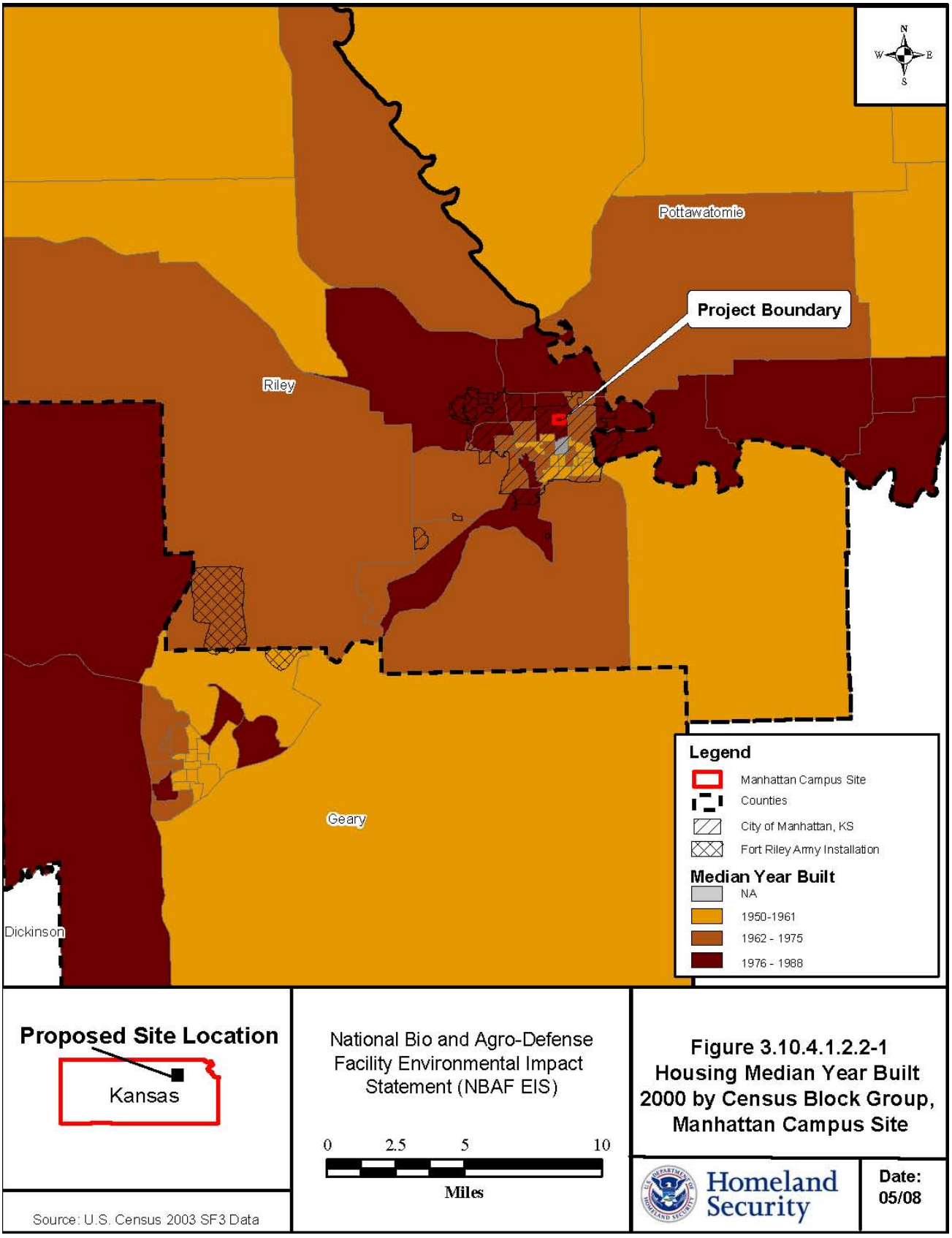


Figure 3.10.4.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas

Overall, 85.41% of the housing units in the study area had rents ranging between $200 and $749. Geary County had the largest proportion of housing units with a rent less than $200, and Riley County had the largest proportion of housing units with rents over $1,000. Overall, the proportion of housing units with rents over $1,000 in the study area (1.8%) was smaller than in Kansas (2.8%) and the United States (8.4%) (Table C-61) (USCEN 2000b).

In 2005, the majority of new building permits in the study area were for single-family homes. The most expensive housing units in the study area are being constructed in Riley County, and the least expensive housing units are being constructed in Geary County (Table C-62) (USCEN 2006).

3.10.4.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. NEPA quality-of-life analyses typically address issues relating to potential impacts of the NBAF and alternatives on the availability of public services that contribute to quality of life. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.4.1.3.1 Public Schools

The Manhattan Campus Site is located in the Manhattan-Ogden Unified School District (USD) 383. Manhattan-Ogden USD 383 serves approximately 5,467 students primarily from the City of Manhattan and adjacent areas of Riley County and small portions of Geary County and Pottawatomie County (KDE 2008). There are eight elementary schools in the City of Manhattan, with a combined enrollment of 2,808 and a student-to-teacher ratio of 23 to 1. There are two junior high/middle schools with a combined enrollment of 710 and a student-to-teacher ratio of 18 to 1. There is one high school in the City of Manhattan (Manhattan High School), with an enrollment 1,722 and a student-to-teacher ratio of 18 to 1 (MACC 2006).

Other public school districts in Riley County include USD 384, Blue Valley, and USD 378 Riley County. In the 2007-2008 school year, USD 384 Blue Valley District had a combined total enrollment of 209 students in one elementary school, one middle school, and one high school. In the 2007-2008 school year, USD 378 Riley County School District had a combined total enrollment of 675 students in one grade school and one high school (USD Home 378 2008; KDE 2008).

Also in the study area, the primary public school district is Geary County Schools (USD 475). In the 2007–2008 school year, Geary County Schools had a combined total enrollment of 7,052 students in 14 elementary schools, 2 middle schools, and 1 high school (KDE 2008).

There are four public school districts in Pottawatomie County: Kaw Valley (USD 321), Onaga-Havensville-Wheaton (USD 322), Rock Creek (USD 323), and Wamego (USD 320). In the 2007-2008 school year, the four-district total enrollment was 3,749 students in eight elementary schools, two middle schools, four high schools, and one charter school (KDE 2008).

3.10.4.1.3.2 Law Enforcement

The Manhattan Campus Site is served by the Riley County Police Department. The Riley County Police Department has approximately 103 officers, and a total of 183 employees organized in four divisions: patrol, investigation, support, and jail. Patrols are organized into three shifts to provide 24-hour coverage. There are nine patrol areas, six in the City of Manhattan (RCPD 2007a).

Properties in the City of Manhattan owned by or adjacent to KSU are also provided law enforcement services through the KSU Police Department. The KSU Police Department assists other law enforcement agencies beyond its jurisdiction when such assistance is requested. The KSU Police Department has approximately

36 employees, including captains, sergeants, officers, communications specialists, and security officers (KSU 2007b). The study area is also served by the Geary and Pottawatomie County Sheriff's Offices.

3.10.4.1.3.3 Fire Protection

The proposed Manhattan Campus Site area is served by the Manhattan Department of Fire Services. There are a total of four stations and two major divisions: emergency services and technical services. The emergency services division is responsible for fire suppression, rescue, and hazardous material operations. The technical services division is responsible for inspections, fire investigations, development plan reviews, and public education to promote fire prevention. There is a fire station located directly across Kimball Avenue from the proposed site (MDFS 2007). Department staffing data are not available. Fire protection services are also provided to the study area by the Geary and Pottawatomie County fire departments.

3.10.4.1.3.4 Medical Facilities

The proposed Manhattan Campus Site area is served by the Mercy Regional Health Center medical facilities. Mercy Regional Health Center is a not-for-profit community medical center that consists of two inpatient campuses in Manhattan, as well as several outpatient facilities throughout the community. Additionally, Mercy manages the emergency medical services in both Riley and Pottawatomie Counties. Mercy also has a majority interest in Wamego City Hospital located in Wamego. The hospital currently has 181 medical staff members, including 102 physicians on the active staff. These physicians currently represent 30 different specialties. The hospital also has a physician development plan, which calls for the recruitment of 41 additional physicians in 22 specialties over the next 3-4 years.

Mercy Regional Health Center is currently a 150-bed facility operating at 70% capacity. The hospital's emergency department includes 2 major trauma rooms and 15 treatment rooms and is staffed 24-hours per day by board-certified emergency physicians. The hospital, working with land and air ambulance, has agreements for the immediate transfer of major neuro-trauma cases (MRHC 2008). The study area is also served by the Geary Community Hospital.

3.10.4.1.3.5 Recreation

Recreation resources in proximity to the proposed Manhattan Campus Site include Cico Park and Fairmont Park. Operated by the Riley County Parks Department, Cico Park is a 97-acre resource located west of the proposed site near the intersection of Kimball Avenue and Wreath Avenue. Large events, such as the Riley County Fair, are held in Cico Park (RCPD 2007b). The recreational facilities provided at Cico Park include a running track, baseball complex, arboretum, fitness trail, swimming pool, sledding hill, meeting facilities, picnic shelters, rodeo arena, fairgrounds, playground, and tennis courts.

Fairmont Park, a 110-acre recreational resource, is located northeast of the intersection of K-177 and the Kansas River. Ownership of the park is divided between three government agencies: the Riley County Department of Parks, the City of Manhattan, and the Kansas Department of Transportation. Key features of the park include forested wildlife habitat and views of the Kansas River.

Outside the City of Manhattan there are several large regional recreational resources, including the 1,200-acre Tuttle Creek State Park and Milford State Park near Junction City (RCDR 2007). Geary County also provides outdoor recreational sites such playgrounds, sports fields, picnic areas, walking trails, historic monuments, and memorials located in parks such as Cleary Park, Heritage Park, Homer's Pond, Buffalo Soldier Park, and the Bluffs Park (GC CVB 2008).

Each community in Pottawatomie County has a city park with features such as public swimming pools, outdoor tennis, softball fields, and basketball courts. There are also approximately 15,000 acres of wildlife refuges, one major federal reservoir, three county lakes, two private lakes, and five state parks in Pottawatomie County. The State of Kansas maintains two lakes and state parks at three locations in

Pottawatomie County. There are over 100 miles of scenic drives and hiking and biking trails that have been mapped throughout the county. Individual state parks offer equestrian, hiking, and biking trails, as well as areas for hunting and RV camping (PEDC 2008; GC CVB 2008).

3.10.4.2Construction Consequences

3.10.4.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the 4-yr construction phase. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment.

The economic benefits of construction impacts would be temporary and would diminish as construction reaches completion. Direct employment (Table 3.10.4.2.1-1) refers to jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier effect on the initial investment in construction of the facility. The industries that contribute to this other employment include architectural and engineering services, food services and drink establishments, non-store retailers, and general merchandise stores.

Based on the results of the impact analysis for the construction phase (Table 3.10.4.2.1-1), the construction of the proposed facility would—over the 4-year construction phase—directly support 2,717 person-yrs of employment (679 jobs annually), with an associated total employment level of 3,848 person-yrs (962 jobs annually). The effects of this work are expected to be short term, and would only last for the duration of the construction work.

Table 3.10.4.2.1-1 — Short-Term Economic Impacts

Construction	
Total Construction Jobs (person-yrs)	2,717
Impacts	
Total Employment (person-yrs)	3,848
Total Labor Income Impact ($ millions)	138.2
Federal, State, and Local Tax ($ millions)	38.1
State and Local Tax ($ millions)	12.5

Note: In 2007 dollars.

In terms of income, minor short-term benefits would be expected. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[9]. The estimated labor income generated during the construction phase is estimated at $138.2 million ($34.5 million annually) measured in 2007 dollars. The total labor income impact of this project would correspond to 1.06% of all estimated 2006 labor income in the three-county region expressed in 2007 dollars or 2.5% of the total estimated labor income in Riley County.

The construction phase would generate additional taxes estimated at $38.1 million (Table 3.10.4.2.1-1), of which approximately $12.5 million is estimated to be collected through state and local taxes that should flow to the local governments.

[9] Proprietor income consists of payments received by self-employed individuals as income.

3.10.4.2.2 Population and Housing

3.10.4.2.2.1 Population

The majority of the construction workers would be drawn from study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the NBAF is not expected to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment. Construction impacts on population and housing would be very similar to those previously described in Section 3.10.3.2.2.

3.10.4.2.2.2 Housing

As described above, the construction of the NBAF is not expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.4.2.3 Quality of Life (Community Services)

Construction impacts on quality of life attributes would be very similar to those described in Section 3.10.3.2.3.

3.10.4.3Operations Consequences

3.10.4.3.1 Employment and Income

The proposed facility would also stimulate the regional economy during the operations and maintenance phase, which is expected to commence in the year 2014. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment (Table 3.10.4.3.1-1).

Table 3.10.4.3.1-1 — Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326 [a]
Impacts:	
Total Employment (jobs)	471
Total Labor Income Impact ($ millions)	26.8
Federal, State, and Local Tax ($ millions)	2.8
State and Local Tax ($ millions)	1.5

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of this proposed facility would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 471 jobs—including the initial 326 direct jobs required for operations and maintenance (see footnote in Table 3.10.4.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operations phase is $26.8 million annually in 2007 dollars. This corresponds to 0.8% of all estimated 2006 labor income in the three-county region expressed in 2007 dollars or 1.9% of total labor income in Riley County.

The operations phase would generate additional taxes estimated at $2.8 million (Table 3.10.4.3.1-1), of which $1.5 million is estimated to be collected through state and local taxes that would flow to the local governments.

3.10.4.3.2 Population and Housing

3.10.4.3.2.1 Population

The NBAF would directly employ 326 people. The majority of these employees are expected to be research scientists and other specialized staff, and based on census journey-to-work data, 300 would be expected to relocate to the study area from elsewhere in the country. Assuming the U.S. 2006 average family size of 2.61 persons, this would represent a population increase of 783 (U.S. Census Bureau).

In addition, the economic activity associated with the operation of the NBAF is expected to employ 145 persons. The industries that would contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments, wholesale trade, and general merchandise stores, among others. It is assumed that these employment opportunities would be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs would be negligible.

In total, the population of the study area is expected to increase by 783 as a result of the operation of the NBAF (U.S. Census Bureau). This population increase is significant when compared to the overall expected population growth, which does not include the Fort Riley expansion, within the study area between 2007 and 2012 (1,617, based on historic trends), which is estimated to result in a total study area population of 113,752 in 2012. However, the population increase associated with the NBAF is not large when compared to the increase in population due to the DoD operations at Fort Riley (23,569 between 2007 and 2012). With both the Fort Riley and NBAF additions, the total population of the study area would be 138,104.

3.10.4.3.2.2 Housing

As described above, 783 additional persons would be expected to move to the study area as a result of the NBAF. The average salary of the 326 employees employed directly at the NBAF would be $82,622, which is higher than the average study area salary. Over 80 NBAF research scientists and managers would earn over $125,000 annually. The estimated median value of owner-occupied housing units in the study area in 2007 was estimated to be $111,924 (Table C-58). Taking into account families with two incomes, the available study area housing stock would be affordable to the majority of the people relocating to the region.

A 2006 Kansas Department of Commerce Study found that 9,900 single-family units and 3,200 multi-family units were under construction or in the planning stages in the study area. With the additional population added by changes at Fort Riley, this study concluded that there would be a 2,400-unit surplus of single-family housing by 2012 (indicating that some planned projects may be canceled). Based on currently planned projects, the supply of multi-family housing would meet demand until 2010, after which additional multi-family housing may be needed. Overall, developers are positioned to meet the growing housing demand (KDC 2006).

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the combined estimated growth of the existing population and the increase in population due to the DoD operations at Fort Riley between 2007 and 2012 (25,186). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase, and there is no empirical evidence that a facility such as NBAF would reduce property values in the study area. Therefore, the overall effect of the NBAF on housing market conditions would be negligible. Developers are positioned to meet the growing housing demand associated with the Fort Riley expansion (KDC 2006).

3.10.4.3.3 Quality of Life (Community Services)

Due to the small percentage of the overall population growth that would be attributed to the facility, the NBAF would create a small increase in the demand for public services. The study area population growth attributed to the NBAF would be 3.1% of the overall combined estimated population growth and the increase in population due to the DoD operations at Fort Riley between 2007 and 2012.

As the study area population grows, expansion of public services would be necessary, regardless of whether the Manhattan Campus Site is selected for the location of the NBAF. In comparison to existing trends (e.g., the expansion of Fort Riley), the additional population locating to the study area as a result of the NBAF would have a small effect on the availability of public services.

3.10.4.3.3.1 Public Schools

The NBAF would add approximately 162 school-aged children to the study area or a 3.2% increase in the Manhattan-Ogden USD 383 total enrollment of 5,149 during the 2005/2006 school year (KDC 2006). By 2012, an additional 2,700 students are expected to attend the school district, and capacity is expected to be exceeded in 2009. A new elementary school would likely be needed. A one-quarter-cent sales tax was instituted in 2005 to fund the expansion of USD 383 to accommodate the expected increase in the school-aged population. School districts affected by the Fort Riley expansion may be eligible for federal funding to cover portions of the cost of providing additional schools and teachers (KDC 2006). The 3.2% increase in school-aged children attributed to the NBAF would add a corresponding increased demand on schools.

3.10.4.3.3.2 Law Enforcement

The population increase associated with the NBAF (1,617), relative to the estimated growth of the existing population and the increase in population due to the DoD operations at Fort Riley between 2007 and 2012 (25,186), would result in a small increase in the need for additional law enforcement services. However, combined with the population increase due to background growth, additional local investment in law enforcement would be required.

3.10.4.3.3.3 Fire Protection

The population increase associated with the NBAF (1,617), relative to the estimated growth of the existing population and the increase in population due to the DoD operations at Fort Riley between 2007 and 2012 (25,186), would result in a small increase in the need for additional fire protection services. However, combined with the population increase due to background growth, additional local investment in fire protection would be required.

3.10.4.3.3.4 Medical Facilities

The additional population associated with the NBAF (783), relative to the estimated growth of the existing population and the increase in population due to the DoD operations at Fort Riley between 2007 and 2012 (25,186), would result in a small increase in the demand for medical services and facilities. However, combined with the population increase due to Fort Riley, additional local investment in medical facilities and services would be required.

3.10.4.3.3.5 Recreation

Recreational resources would experience a small increase in utilization rates as a result of the population increase associated with the NBAF. As detailed in Section 3.10.4.1.3.5, Recreation, the study area has abundant recreation resources available and would be able to absorb the additional usage.

3.10.4.3.3.6 Health and Safety

The normal operation of the proposed facility would pose no additional health or safety risks to the public because the facility would be closed off to public access at all times. Further analysis with regard to abnormal operation of the proposed facility is presented in Section 3.14, Health and Safety.

3.10.5 Flora Industrial Park Site

3.10.5.1Affected Environment

The Flora Industrial Park, Mississippi, has been proposed as the location site for the facility, and the geographic definition of the affected environment for this location was determined primarily based on a journey-to-work analysis of the Town of Flora. Any county that constituted approximately 5% or more of the worker flows into, or out of, Flora (FIPS Place Code 24940) was considered to comprise the affected environment for the proposed site, and this included Madison, Hinds, and Yazoo Counties (USCEN 2000a; USCEN 2000c).

The expanded area of study to be used for the agricultural livestock vulnerability analysis and discussion in Appendix D added Attala, Holmes, Leake, Rankin, and Scott Counties to the original economically described affected area (Figure 3.10.5.1- 1).

3.10.5.1.1 Employment and Income

3.10.5.1.1.1 Employment

In general, the civilian labor force for all three counties in the affected area combined has grown from 163,734 in 1990 to 176,171 in 2006, an increase of 7.6% (Table C-63). Between 2000 and 2006, the employment levels of Hinds and Yazoo Counties have fallen slightly, as they have tracked the trend in Mississippi, which also saw a fall in the number employed over the same period of time. Despite the decline in employment levels witnessed in these two counties, Madison County has seen a 12% increase in its employment level over the same period of time, going from 39,319 to 44,140.

The unemployment rates for Hinds and Madison Counties have consistently remained below that of Mississippi for the 3 years observed (1990, 2000, and 2006), and they have also followed the same trend—falling between the years of 1990 and 2000, and then subsequently rising between the years 2000 and 2006 (Table C-63). The unemployment rate in Yazoo County, however, has steadily risen over the 16-yr period presented. In 2000 and 2006, it was higher than that noted for Mississippi.

Although the average rate of unemployment for the three-county region has consistently been lower than the state's average in the 3 years observed, it has consistently been higher than the national average[10]. The unemployment rate in Yazoo County has been approximately two percentage points higher than the state's average rate in 2000 and 2006 — it has also been close to double the national average rate in those 2 years (Table C-63).

Hinds County, which is home to the city of Jackson, is the center of employment with approximately 79% of its workers employed within the county, while also attracting about one-half of the labor force in Madison County (Table C-64). Jackson is the state capital and largest city in Mississippi. Yazoo County has a much smaller civilian work force relative to the other two counties, and approximately 70% of the employment base remains focused locally, with another 14% working in Hinds County.

[10] Based on data obtained from the Bureau of Labor Statistics, the average national unemployment rate for the country in the years 1990, 2000, and 2006 were 5.6, 4.0, and 4.6 respectively.

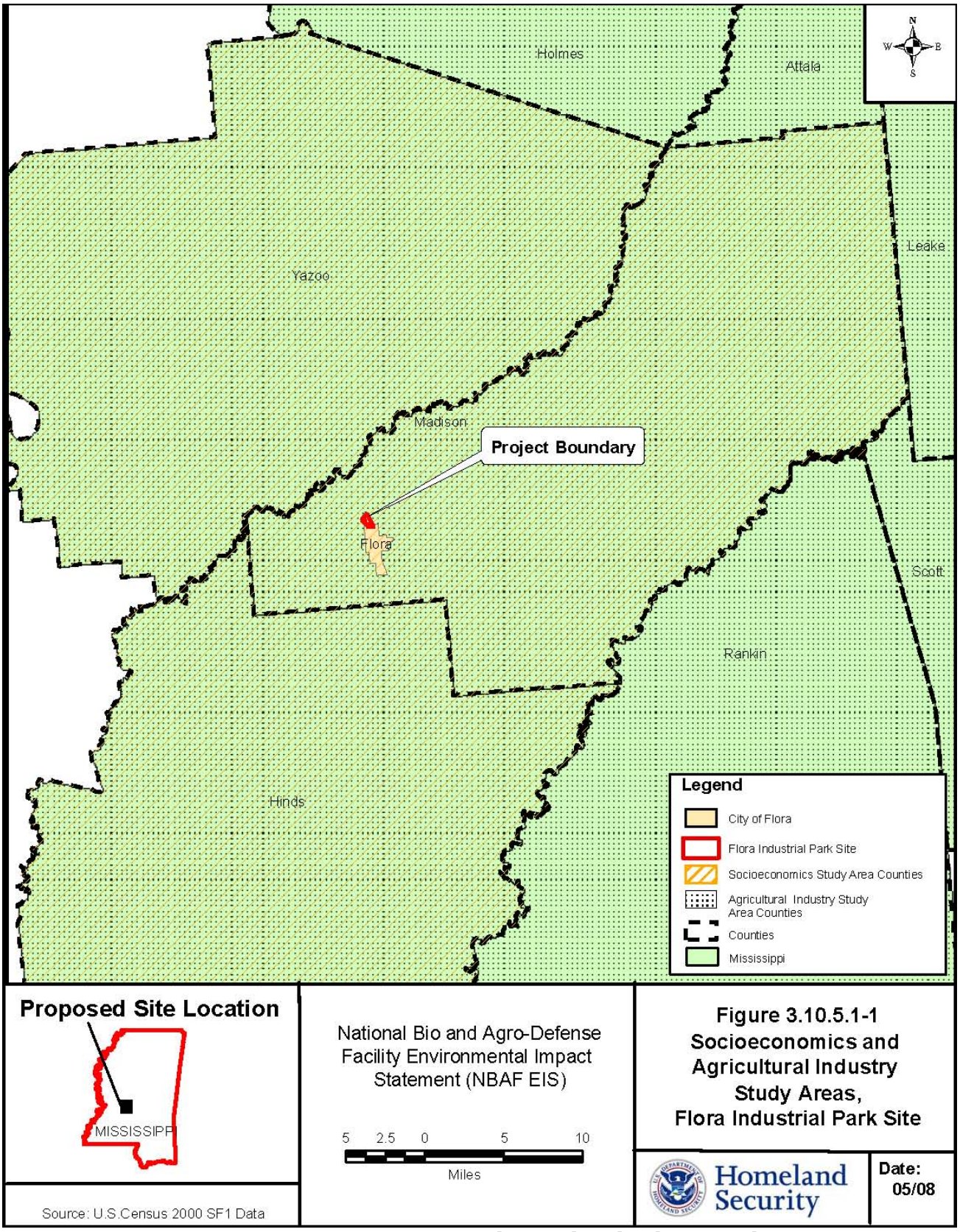


Figure 3.10.5.1-1 — Socioeconomics and Agricultural Industry Study Areas

Employment can be measured as either a count of workers (e.g., see Table C-63) or as a count of actual jobs. The following employment base analysis uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the affected area (Tables C-65 and C-66).

Hinds County is home to 172,206 jobs, while Madison and Yazoo County hold 57,743 and 9,299 jobs, respectively (Table C-65). Hinds County, which includes Jackson, has approximately 40,388 jobs (23.5% of the 172,206 jobs in Hinds County) associated with state and local government. The University of Mississippi's hospitals and clinics also constitute a leading source of employment in the area, with over 5,000 employees.

In all three counties combined, government and retail trade are the largest industry contributors to employment by number of jobs. Hinds County's greater degree of urbanization probably explains its larger proportion of service industry employment, while Yazoo's lower population density probably explains its larger proportion of farm employment. In Madison County, the largest contributors to employment, by number of jobs, are the manufacturing and retail trade industries, with service industries also playing a leading role of lesser impact (Tables C-65 and C-66).

A list of major employers in the region of study is presented in Table C-67. In the case of Hinds County, the employers listed are those that have a workforce of over 1,000 employees, while in Madison and Yazoo Counties, the cutoffs are 250 and 100 employees, respectively.

Government and government enterprises remain ranked as the largest sources of employment, in terms of total wage compensation paid for the three counties combined. At the county level, however, government and government enterprise employment is still largest for Hinds and Yazoo Counties, but in Madison County, the largest industry contributor to employment, by earnings, is the manufacturing industry (Tables C-68 and C-69).

3.10.5.1.1.2 Agricultural Industry

For the purposes of this analysis, an expanded area of study, comprising all counties adjacent to the proposed site, was defined for the agricultural livestock discussion. The relative importance of the agricultural industry was assessed in the following counties: Madison, Yazoo, Attala, Hinds, Ranking, Scott, Leake, and Holmes.

Agriculture directly generated an estimated 6,813 jobs in the eight counties studied in 2006 (Table C-70), with Yazoo County contributing 1,180 jobs towards that total. Animal production made up 2,501 of the 6,813 jobs directly supported by the agricultural industry, with poultry and egg production providing slightly more than half of those jobs. The NAICS code classified that agriculture and hunting industry made up about 2% of all the jobs in the eight-county region, although that percentage varies quite a bit in each individual county. In Hinds, the most urban of the eight, agriculture comprises less than 1% of total industry employment, while in Leake, the figure is almost 10%.

Industry output from the agriculture industry in the eight-county region totaled just over $1 billion (Table C-70). Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Animal production generated $579 million towards the total output of the agriculture and hunting industry, with crop production and other support activities contributing an additional $432 million. Poultry and egg production in the eight-county region accounted for approximately $516 million (51%) of total output in the agriculture and hunting industry, making it the most valuable component of the overall industry.

Livestock statistics in the counties surrounding the proposed facility show the total number of livestock found in the eight-county region is 324,556, with Madison County providing 191,448 (59%) of the total (Table C-71). The term livestock includes hoofed animals such as cattle, hogs, sheep, goats, horses, and mules. The number of poultry in the eight-county region is 48,993,735, and Scott County provides 31,600,000 (64%) of the total (NDP 2007a).

There were approximately 980,000 head of cattle and calves at the end of 2006 within Mississippi, with an estimated inventory value of $755 million (averaging out to a unit value $770 per head within the state). The eight-county region made up for about 19.5% of that total with 190,700 head of cattle found within those counties (NASS 2006). Based on the state's estimated unit price, the inventory value of cattle within the eight-county region would be approximately $146.8 million.

3.10.5.1.1.3 Hunting

This analysis also uses the expanded study area outlined in the analysis of the agricultural industry (all other subsequent sections related to this site refer to the affected environment outlined in Section 3.10.5.1). Industry output from hunting and trapping supported only four jobs for the eight counties, with a corresponding industry output of $420,000 (Table C-70). The direct compensation recorded for this industry is negligible, although by definition, the NAICS code classification of this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers, and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

U.S. Census data from 2001 that are limited to the statewide level show that total expenditures related to recreational hunting activities in Mississippi were $360 million (USCEN 2001). Of the 357,000 individuals who participated in hunting activities in 2001, 295,000 were involved in big game hunting (e.g., deer) and spent $224 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

3.10.5.1.1.4 Income and Poverty

In 1999, median household incomes ranged from $24,795 in Yazoo County to $46,970 in Madison County. Per capita incomes showed less variation and were also lowest in Yazoo County ($12,062). Overall, the median household income in the study area was $35,753, and the per capita income was $18,529 (Table C-72) (USCEN 2000).

Of the three study area counties, Madison County had the smallest proportion of persons living below the poverty level, and Yazoo County had the highest proportion of persons living below the poverty level. The percentage of persons living below poverty in the study area (19.6%) was similar to the poverty rate in Mississippi (19.7%) and higher than in the United States (12.4%) (Table C-72) (USCEN 2000b).

In 2007, the estimated median household income for the study area was $42,527, higher than the estimated median household incomes in Mississippi ($35,903) and lower than in the United States ($53,154) (ESRI BIS 2007). Madison County was estimated to have a per capita income of $29,755, higher than in Mississippi ($18,800) and the United States ($27,916) (ESRI BIS 2007).

3.10.5.1.2 Population and Housing

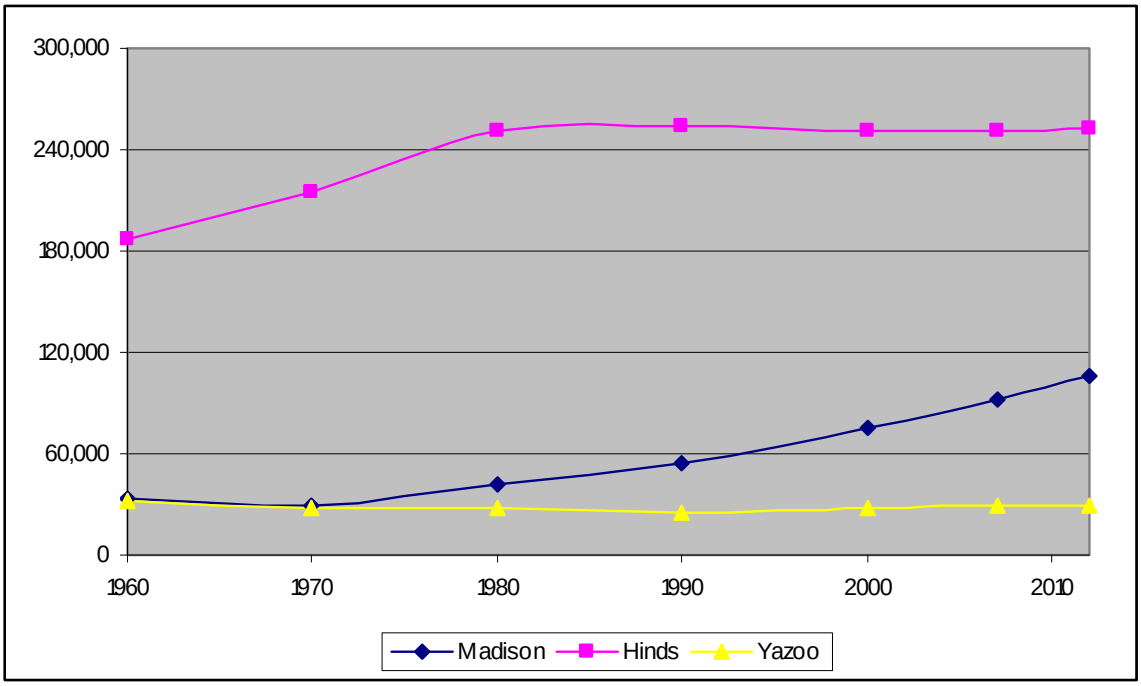
3.10.5.1.2.1 Population

Population growth trends in the affected area counties (Madison, Hinds, and Yazoo Counties) show the total population of the study area has increased by 122,584 between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, shown an additional 34,854 residents are estimated to be added to the study area between 2000 and 2012 (Figure 3.10.5.1.2.1-1) (USCEN 2000b).

Between 1960 and 2000, Yazoo County experienced little population growth, and the population of Madison and Hinds Counties increased substantially. The most populous county in the study area, Hinds County has experienced little change in population size since 1980 (USCEN 2000b). The Town of Flora, in Madison

County, is the specific location of the proposed site within the study area and is therefore included in this socioeconomic discussion.

Between 2007 and 2012, the population of the affected area is expected to grow slightly faster than Mississippi and slower than the United States. The population of the Town of Flora is estimated to increase by 488 persons between 2000 and 2012. Madison County was the fastest growing county in the study area between 1990 and 2000 and is estimated to continue to grow faster than the study area as a whole between 2000 and 2012. Madison County's share of the total study area population (21.1%) is estimated to grow to 27.4% by 2012 (Table C-73) (Figure 3.10.5.1.2.1-1).



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.5.1.2.1-1 — Population, Madison County, Hinds County, and Yazoo County, Mississippi, 1960-2012

3.10.5.1.2.1.1 Ethnicity and Race

In 2000, African Americans comprised the largest minority group in the study area (55.6%), which was greater than the proportion of African Americans in Mississippi (36.3%) and the United States (12.2%). The proportion of persons of Hispanic origin in the study area (1.1%) was substantially smaller than in Mississippi (1.4%) and the United States (12.5%). Overall, the proportion of minorities in the study area (57.9%) was greater than in Mississippi (39.3%) and the United States (30.1%) (Table C-74) (USCEN 2000b).

3.10.5.1.2.1.2 Age

In 2000, approximately 29.8% of the population of the study area was aged 18 years and under, and 10.8% was aged 65 years and over. The Town of Flora had the highest proportion of its population aged 18 years and under, and Yazoo County had the highest proportion of its population aged 65 years and older (Table C-75) (USCEN 2000b).

In 2007, the proportion of the Madison County population estimated to be 18 years of age and under (29.1%) was greater than in Mississippi (26.7%) and the United States (25.8%). The proportion of the population of Madison County estimated to be 65 years of age and older (9.4%) was estimated to be smaller than in Mississippi (12.2%) and the United States (12.5%) (ESRI BIS 2007).

3.10.5.1.2.1.3 Educational Attainment

In 2000, 20.3% of the study area population did not graduate from high school, 45.4% of the population graduated from high school or had some college education, 6.1% had an associate's degree, and 28.3% had a bachelor's degree or higher level of education. Of the three affected area counties, the highest proportion of the population with a bachelor's degree or higher occurred in Madison County, and the lowest proportion was in Yazoo County. The proportion of residents that did not graduate from high school in the study area (20.3%) was less than in Mississippi (27.1%) and slightly higher than in the United States (19.6%) (Table C-76) (USCEN 2000b).

3.10.5.1.2.2 Housing

In 2007, 90.6% of the housing inventory in the study area was estimated to be comprised of occupied housing units and 9.4% vacant housing units. The proportion of vacant units in the study area was estimated to be smaller than in Mississippi (9.8%) and the United States (9.9%) (Table C-77) (ESRI BIS 2007).

In 2007, Hinds County was estimated to have the highest proportion of renter-occupied housing units in the study area. The percentage of owner-occupied housing units in the study area was estimated to be smaller than in Mississippi (63.9%) and the United States (61.3%) (Table C-77) (ESRI BIS 2007).

In 2000, the single-family detached house is the predominant form of housing in the affected area, comprising 95,338 units (68.6%). The majority of apartment building housing units were located in Hinds County, and the largest proportion of mobile homes was located in Yazoo County (Table C-78) (USCEN 2000b).

In 2000, nearly half of the housing units built in Hinds and Yazoo Counties were built before 1970. Madison County had a greater proportion of housing units built in the 1995 to 2000 time period than the other study area counties, reflecting the higher rate of population and household growth in Madison County, relative to Hinds and Yazoo Counties. In the study area as a whole, 25,099 housing units (18.1%) have been built since 1990 (USCEN 2000b).

New housing growth has primarily occurred in the areas on the periphery of the historic population centers of Jackson, Canton, and Yazoo City. Areas of Madison County, north of Jackson and in between Flora and Canton, had a median year built of 1988-1997, indicating that more than one-half of the housing units in these areas were built in the last 10-20 years (Figure 3.10.5.1.2.2-1).

Between 2000 and 2007, housing values in the study area were expected to grow the fastest in the Town of Flora. In 2007, Madison County was estimated to have the highest median housing value ($149,898), and Yazoo County was estimated to have the lowest median housing value ($71,102). In 2007, the Town of Flora was estimated to have a median housing value of $98,021, higher than the estimated value in Mississippi ($92,555) and lower than in the United States ($192,285) (Table C-79) (USCEN 2000b; ESRI BIS 2007).

In 2007, over one-half of the housing units in the study area were estimated to be valued between $50,000 and $51,151. Yazoo County had the largest proportion of housing units with estimated values less than $50,000, and Madison County had the largest estimated number and proportion of housing units valued at over $150,000. Overall, the proportion of housing units valued at over $150,000 in the study area (28.5%) was estimated to be greater than in Mississippi (23.3%) and smaller than in the United States (61.7%) (Table C-80) (ESRI BIS 2007).

Between 1990 and 2000 (the most recent available rent data), median monthly rent grew the fastest in Yazoo County. In 2000, Madison County had the highest median rent, and Yazoo County had the lowest median rent. The 2000 median rent in the Town of Flora ($307) was lower than the median rents in Mississippi ($334) and the United States ($519) (Table C-81) (USCEN 2000b).

Overall, the majority of the housing units in the study area had rents ranging between $200 and $749. Yazoo County had the largest proportion of housing units with a rent less than $200, and Madison County had the largest proportion of housing units with rents over $1,000 (6.4%). Overall, the proportion of housing units with rents over $1,000 in the study area (2.0%) was greater than in Mississippi (0.9%) and smaller than in the United States (8.4%) (Table C-82).

In 2005, the majority of new housing units in the study area were permitted in Madison County. The least expensive housing units being constructed in the study area are located in Yazoo County, and the most expensive housing units are being constructed in Madison County (Table C-83).

3.10.5.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. NEPA quality-of-life analyses typically address issues relating to potential impacts of the NBAF on the availability of public services that contribute to quality of life. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.5.1.3.1 Public Schools

The proposed Flora Industrial Park Site is located in the Town of Flora. Flora maintains one public elementary school, one public middle school, and one private school for students in grades K through 12, with a total of 732 students (MDA 2005). Flora is located within the Madison County Public School District, which has a total of eight public elementary schools, four public middle schools, and three public high schools. The total enrollment within this district was 10,864 for the 2006/2007 school year. In the Madison County School District, there is also one private elementary school and two private high schools, which had a total of 1,216 students (MDE 2007).

In addition to the Madison County School District, Madison County also contains the Canton School District, which has two elementary schools, one middle school, and one high school, with a total enrollment of 3,393 students. The study area is also served by the Hinds County School District and the Yazoo County School District.

3.10.5.1.3.2 Law Enforcement

Police protection for the proposed site area in Flora, Mississippi, is provided by the Flora Police Department. The department employs approximately seven full-time police officers and three part-time officers. The study area is also served by the Madison, Hinds, and Yazoo Counties Sheriff's Departments (City Data 2006).

3.10.5.1.3.3 Fire Protection

The Flora Fire Department provides fire safety support for the citizens of Flora and the proposed site area. The department is comprised of four part-time employees (City Data 2006). Department staffing data are not available. Fire protection services are also provided to the study area by the Hinds and Yazoo Counties fire departments.

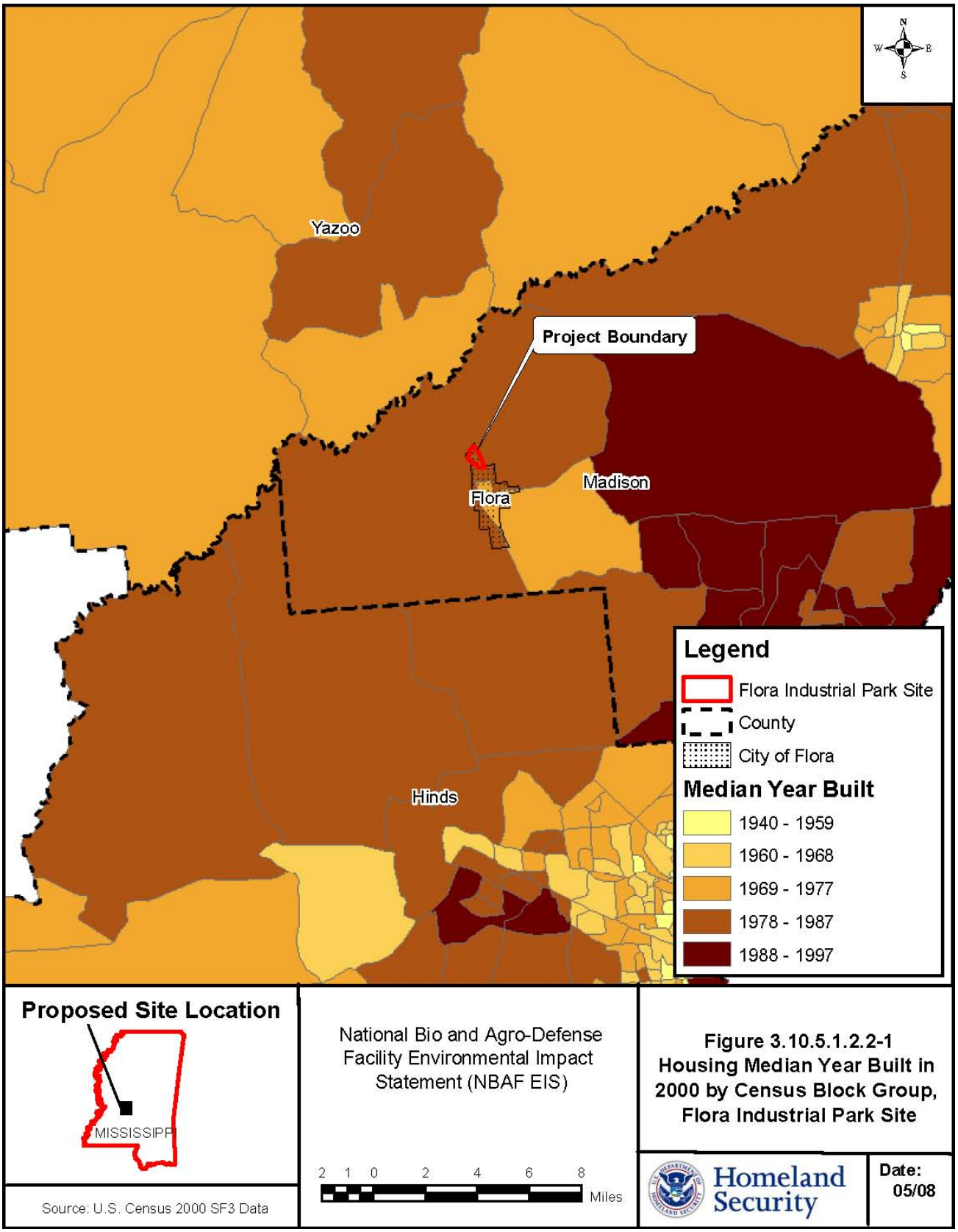


Figure 3.10.5.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi

3.10.5.1.3.4 Medical Facilities

St. Dominic Jackson Memorial Hospital is located approximately 17 miles from Flora, in Jackson, Mississippi. It is a 571-bed, not-for-profit acute-care hospital and employs a staff of 2,000 employees and over 500 physicians. In addition to providing emergency care, inpatient and outpatient surgery, and medical care, St. Dominic Health Services provides primary care to low-income families whose needs are not being met by mainstream health care via its primary health clinic (SDJMH 2007). The University of Mississippi Medical Center, also located in Jackson, maintains a 722-bed diagnostic and treatment referral center for the State of Mississippi. The hospital medical staffs are appointed from the Schools of Medicine and Dentistry. Every year, the hospital treats approximately 27,000 inpatients and over 418,000 outpatient and emergency visits (UMMC 2007).

In addition, Jackson is the home to Mississippi's only comprehensive rehabilitation hospital, the Methodist Rehabilitation Center (MRC 2007). The study area is also served by Central Mississippi Medical Center and the Kings Daughter Hospital.

3.10.5.1.3.5 Recreation

Just outside of Flora town limits is the Mississippi Petrified Forest, and there are several parks and scenic lakes within Madison County. Five museums, three historic sites, and a state park lie within 20 miles of Flora. Also, the nearby universities host a variety of arts and sports recreational activities that are often available to the public (City Data 2006). There are also parks and scenic areas located throughout Hinds and Yazoo Counties that offer additional recreational activities to the study area.

3.10.5.2Construction Consequences

3.10.5.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the 4-yr construction phase. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment. The IMPLAN model estimates the total multiplier effect to the regional economy due to increased expenditures and employment associated with the facility.

The economic benefits of construction would be temporary and would diminish as the construction reaches completion. Direct employment (Table 3.10.5.2.1-1) refers to the jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier effect on the initial investment in construction of the facility. The industries that contribute to this other employment include architectural and engineering services, food services and drink establishments, wholesale trade, and general merchandise stores.

Table 3.10.5.2.1-1 — Short-Term Economic Impacts

Construction	
Total Construction Jobs (person-yrs)	2,744
Impacts:	
Total Employment (person-yrs)	3,997
Total Labor Income Impact ($ millions)	149.6
Federal, State, and Local Tax ($ millions)	41.6
State and Local Tax ($ millions)	14.4

Note: In 2007 dollars.

Based on the results of the impact analysis for the construction phase (Table 3.10.5.2.1-1), the construction of the proposed facility would—over the 4-year construction phase—directly support 2,744 person-yrs (686 jobs

annually) of employment, with an associated total employment level of 3,997 person-yrs (999 jobs annually). The effects of this work are expected to be short term and would only last for the duration of the construction work.

Minor short-term benefits would be expected as a result of construction. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[11]. The estimated labor income generated during construction is $149.6 million ($37.4 million annually), measured in 2007 dollars. The total labor income impact of this project would correspond to 0.38% of all estimated 2006 labor income in the three-county region, expressed in 2007 dollars, or 1.67% of the total estimated labor income in Madison County.

The construction phase would generate additional taxes estimated at $41.6 million (Table 3.10.5.2.1-1), of which $14.4 million is estimated to be collected through state and local taxes that should flow to the local governments.

3.10.5.2.2 Population and Housing

3.10.5.2.2.1 Population

The majority of the construction workers would be drawn from the study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the NBAF would not be expected to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment. Construction impacts on population and housing would be very similar to those previously described in Section 3.10.3.2.2.

3.10.5.2.2.2 Housing

As described above, the construction of the NBAF would not be expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.5.2.3 Quality of Life (Community Services)

Construction impacts on quality-of-life attributes would be very similar to those described in Section 3.10.3.2.3.

3.10.5.3Operations Consequences

3.10.5.3.1 Employment and Income

The proposed facility would also stimulate the regional economy during the operations and maintenance phase, which is expected to commence in the year 2014. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment (Table 3.10.5.3.1-1).

[11] Proprietor income consists of payments received by self-employed individuals as income.

Table 3.10.5.3.1-1 — Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326 [a]
Impacts:	
Total Employment (jobs)	485
Total Labor Income Impact ($ millions)	28.4
Federal, State, and Local Tax ($ millions)	3.6
State and Local Tax ($ millions)	1.9

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of this proposed facility would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 485 jobs including the initial 326 direct jobs required for operations and maintenance (see footnote in Table 3.10.5.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operations phase is $28.4 million annually, in 2007 dollars. This corresponds to 0.3% of all estimated 2006 labor income in the three-county region, expressed in 2007 dollars, or 1.3% of total labor income in Madison County.

The operation phase would generate additional taxes estimated at $3.6 million (Table 3.10.5.3.1-1), of which $1.9 million is estimated to be collected through state and local taxes that should flow to the local governments.

3.10.5.3.2 Population and Housing

3.10.5.3.2.1 Population

The NBAF would directly employ 326 people. The majority of these employees would be expected to be research scientists and other specialized staff, and based on census journey-to-work data, 246 would be expected to relocate to the study area from elsewhere in the country. Assuming the U.S. 2006 average family size of 2.61 persons, this would represent a population increase of 642 (USCEN 2006).

In addition, the economic activity associated with the operation of the NBAF is expected to employ 159 persons. The industries that would contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments and wholesale trade, among others. It is assumed that these employment opportunities would be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs would be negligible.

In total, the population of the study area would be expected to increase by 642 as a result of the operation of the NBAF. This population increase is a small portion of the overall estimated population growth within the study area between 2007 and 2012 (15,512, based on historic trends), which is expected to result in a total study area population of 389,641 in 2012.

3.10.5.3.2.2 Housing

As described above, 642 additional persons would locate to the study area as a result of the NBAF. The average salary of the 326 employees employed directly at the facility would be $82,622. Over 80 NBAF research scientists and managers would earn over $125,000 annually, which is higher than the average study area salary. The estimated median value of owner-occupied housing units in the study area in 2007 was estimated to be $94,645 (Table C-79). Taking into account families with two incomes, the available study area housing stock would be affordable to the majority of the people relocating to the region.

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the expected growth of the existing population between 2007 and 2012 (15,512). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase due to an increase in demand, and there is no empirical evidence that a facility such as the NBAF would reduce property values in the study area. Therefore, the overall effect of the NBAF on housing market conditions would be negligible.

3.10.5.3.3 Quality of Life (Community Services)

Due to the small percentage of the overall population growth that is attributed to the facility, the NBAF would create a slight increase in the demand for public services. The study area population growth attributed to the facility is 4.1% of the overall estimated population growth from 2007 to 2012. As the study area population grows, expansion of public services would be necessary, regardless of whether the Flora Industrial Park Site is selected for the location of the NBAF.

3.10.5.3.3.1 Public Schools

The NBAF would add approximately 133 school-aged children to the study area, or a 1.2% increase in the 2006/2007 10,864 enrollment of the Madison County School District (MDE 2007). The 1.2% increase in school age children attributed to the facility would place minimal demand on the schools. School districts in the study area have invested in educational facilities to meet the needs of the growing population of the region.

3.10.5.3.3.2 Law Enforcement

The population increase associated with the NBAF (642), relative to the expected growth of the existing population between 2007 and 2012 (15,512), would result in a slight increase in the need for additional law enforcement services.

3.10.5.3.3.3 Fire Protection

The population increase associated with the NBAF (642), relative to the expected growth of the existing population between 2007 and 2012 (15,512), would result in a slight increase in the need for additional fire protection services.

3.10.5.3.3.4 Medical Facilities

The additional population associated with the NBAF (642), relative to the expected growth of the existing population between 2007 and 2012 (15,512), would result in a slight increase in the demand for medical services and facilities. Due to the overall population growth in the region, medical facilities in the study area are responding to growth in the region and are expanding to meet the increasing demand. For example, the Madison County Medical Center in Canton is planning to construct a new replacement medical facility, the Madison County Regional Medical Center, near the Nissan plant in Canton (MCMC 2007).

3.10.5.3.3.5 Recreation

Recreational resources would not experience a significant increase in utilization rates as a result of the population increase associated with the NBAF. The study area has abundant recreation resources available.

3.10.5.3.3.6 Health and Safety

The normal operation of the proposed facility would pose no additional health or safety risks to the public because the facility would be closed off to public access at all times. Further analysis with regard to abnormal operation of the proposed facility is presented in Section 3.14, Health and Safety.

3.10.6 Plum Island Site

3.10.6.1Affected Environment

The description of the socioeconomic environment associated with the Plum Island Site's affected area is the same as that outlined under the No Action Alternative (Refer to Section 3.10.2.1).

3.10.6.2Construction Consequences

3.10.6.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the construction phase. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment.

Table 3.10.6.2.1-1 — Short-Term Economic Impacts

Construction	
Total Construction Jobs (person-yrs)	2,113
Impacts	
Total Employment (person-yrs)	3,374
Total Labor Income Impact ($ millions)	183.9
Federal, State, and Local Tax ($ millions)	71.5
State and Local Tax ($ millions)	24.7

Note: In 2007 dollars.

The economic benefits of construction impacts would be temporary and would diminish as the construction reaches completion. Direct employment (Table 3.10.6.2.1-1) refers to the jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier effect on the initial investment in construction of the facility. The industries that contribute to this other employment include architectural and engineering services, food services and drink establishments, wholesale trade, and offices of physicians and other health care services.

As indicated in Table 3.10.6.2.1-1, the construction of the proposed facility would—during the 4-year construction phase — directly support 2,113 person-yrs of employment (528 jobs annually) with an associated total employment level of 3,374 person-yrs (844 jobs annually). The effects of this work are expected to be short term and would only last for the duration of the construction work.

In terms of income, minor short-term benefits would be expected. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[12]. The estimated labor income generated during the construction phase is $183.9 million ($46 million annually), measured in 2007 dollars. The total labor income impact of this project would correspond to 0.1% of all estimated 2006 labor income in the three-county region, expressed in 2007 dollars, and also approximately 0.1% of the total estimated labor income in Suffolk County.

The construction phase would generate additional taxes estimated at $71.5 million (Table 3.10.6.2.1-1), of which approximately $24.7 million is estimated to be collected through state and local taxes that would flow to the local governments.

[12] Proprietor income consists of payments received by self-employed individuals as income.

3.10.6.2.2 Population and Housing

3.10.6.2.2.1 Population

The majority of the construction workers would be drawn from the study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the Plum Island alternative is not expected to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment. Construction impacts on population and housing would be very similar to those previously described in Section 3.10.3.2.2.

3.10.6.2.2.2 Housing

As described above, the construction of the NBAF is not expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.6.2.3 Quality of Life (Community Services)

Construction impacts on quality-of-life attributes would be very similar to those described in Section 3.10.3.2.3.

3.10.6.3Operations Consequences

3.10.6.3.1 Employment and Income

The operation of NBAF would also stimulate the regional economy during the operations and maintenance phase, which is expected to commence in the year 2014. Economic impacts would result from purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the continual operations of the facility. Table 3.10.6.3.1-1 displays a summary of the direct impact and multiplier effects to the local economy.

Table 3.10.6.3.1-1 — Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326[a]
Impacts	
Total Employment (jobs)	491
Total Labor Income Impact ($ millions)	30.8
Federal, State, and Local Tax ($ millions)	5.4
State and Local Tax ($ millions)	2.7

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of the NBAF would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 491 jobs including the initial 326 direct jobs required for operations and maintenance (see footnote in Table 3.10.6.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operations phase is $30.8 million annually, in 2007 dollars. This corresponds to 0.1% of all estimated 2006 labor income in the three-county region, expressed in 2007 dollars, which also corresponds to approximately 0.1% of total labor income in Suffolk County.

The operations phase of a new facility would generate additional taxes estimated at $5.4 million (Table 3.10.6.3.1-1), of which $2.7 million is estimated to be collected through state and local taxes that would flow to the local governments.

3.10.6.3.2 Population and Housing

3.10.6.3.2.1 Population

The NBAF would directly employ 326 people. The majorities of these employees are research scientists, and because no decisions have yet been made regarding the future operation of PIADC, for the purpose of this study, based on census journey-to-work data, 276 employees are assumed to relocate to the study area from elsewhere in the country. Assuming the U.S. Census Bureau 2006 average household size of 2.61 persons, this represents a population of 720.

The economic activity associated with the operation of the NBAF includes the employment of 165 persons. The industries that would contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments and wholesale trade, among others. It is assumed that these employment opportunities would be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs would be negligible.

In total, the population of the study area associated with the Plum Island Site is 720. This population is 1.0% of the overall expected population growth within the study area between 2007 and 2012 (70,562, based on historic trends). The estimated total study area population for 2012 is 2,013,919.

3.10.6.3.2.2 Housing

As described above, 720 persons living in the study area would be associated with the NBAF. The average salary, including benefits, of the approximately 326 employees employed directly at the NBAF would be $82,622. For comparative purposes, this figure has been adjusted to an average per capita income of $66,924 for employees employed directly at the NBAF, which is higher than the estimated median 2007 study area per capita income ($36,351). Over 80 NBAF research scientists and managers would earn more than $125,000 annually. The estimated median value of owner-occupied housing units in the study area in 2007 was estimated to be $294,580 (Table C-16). In the study area, 18.9% of occupied housing units were estimated to be renter occupied. The 2000 yearly median rents of renter-occupied housing units were $10,332 in Suffolk County and $6,744 in New London County (U.S. Census Bureau American Community Survey). Taking into account families with two incomes, the available study area housing stock is affordable to the majority of employees associated with the proposed facility.

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the estimated growth of the existing population between 2007 and 2012 (70,562). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase due to an increase in demand, and there is no empirical evidence that a facility such as NBAF would reduce property values in the study area.

3.10.6.3.3 Quality of Life (Community Services)

The NBAF would have a negligible effect on the availability of public services. The study area population associated with Plum Island Site, which mainly already resides within the study area, is 1.0 % of the overall estimated population growth from 2007 to 2012.

3.10.6.3.3.1 Public Schools

The number of school-aged children associated with employees of Plum Island Site is 149 or 4.6% of the combined 3,281 student 2005-2006 enrollment in the Oysterponds Union Free School District and 2003–2004 enrollment in the New London School District (NYSDE 2007; CSDE 2005).

School districts in the study area have invested in educational facilities to meet the needs of the growing population of the region. For example, the New London School District is currently constructing a new elementary school that is scheduled to open in 2008 (NLPS 2008).

3.10.6.3.3.2 Law Enforcement

The population increase associated with the Plum Island Site (720), relative to the expected growth of the existing population between 2007 and 2012 (70,562), would result in a negligible increase in the need for additional law enforcement services.

3.10.6.3.3.3 Fire Protection

The population increase associated with the NBAF (720), relative to the expected growth of the existing population between 2007 and 2012 (70,562), would result in a negligible increase in the need for additional fire protection services.

3.10.6.3.3.4 Medical Facilities

The additional population associated with the NBAF (720), relative to the expected growth of the existing population between 2007 and 2012 (70,562), would result in a negligible increase in the demand for medical services and facilities.

Due to the overall population growth in the region, medical facilities in the study area are responding to growth in the region and expanding to meet the increasing demand. For example, in 2005, the Eastern Long Island Hospital expanded its Emergency Center, and this past year has allocated $600,000 to increase surgical unit capacity (ELIH 2007).

3.10.6.3.3.5 Recreation

Recreational resources would not experience a significant increase in utilization rates as a result of the population increase associated the NBAF. The study area has abundant recreation resources available.

3.10.7 Umstead Research Farm Site

3.10.7.1Affected Environment

The Town of Butner, North Carolina, has been proposed as the location site for the facility, and the geographic definition of the affected environment for this location was determined primarily based on a journey-to-work analysis. Any county that constituted approximately 5% or more of the worker flows into or out of Butner (FIPS Place Code 09360) was considered to comprise the affected environment for the proposed site, and this included Granville, Durham, Vance, and Wake Counties. (USCEN 2000a; USCEN 2000c).

The expanded area of study to be used for the agricultural livestock vulnerability analysis and discussion in Appendix D added Person, Franklin, Mecklenburg (VA), and Halifax (VA) Counties to the original economically described affected area (Figure 3.10.7.1-1).

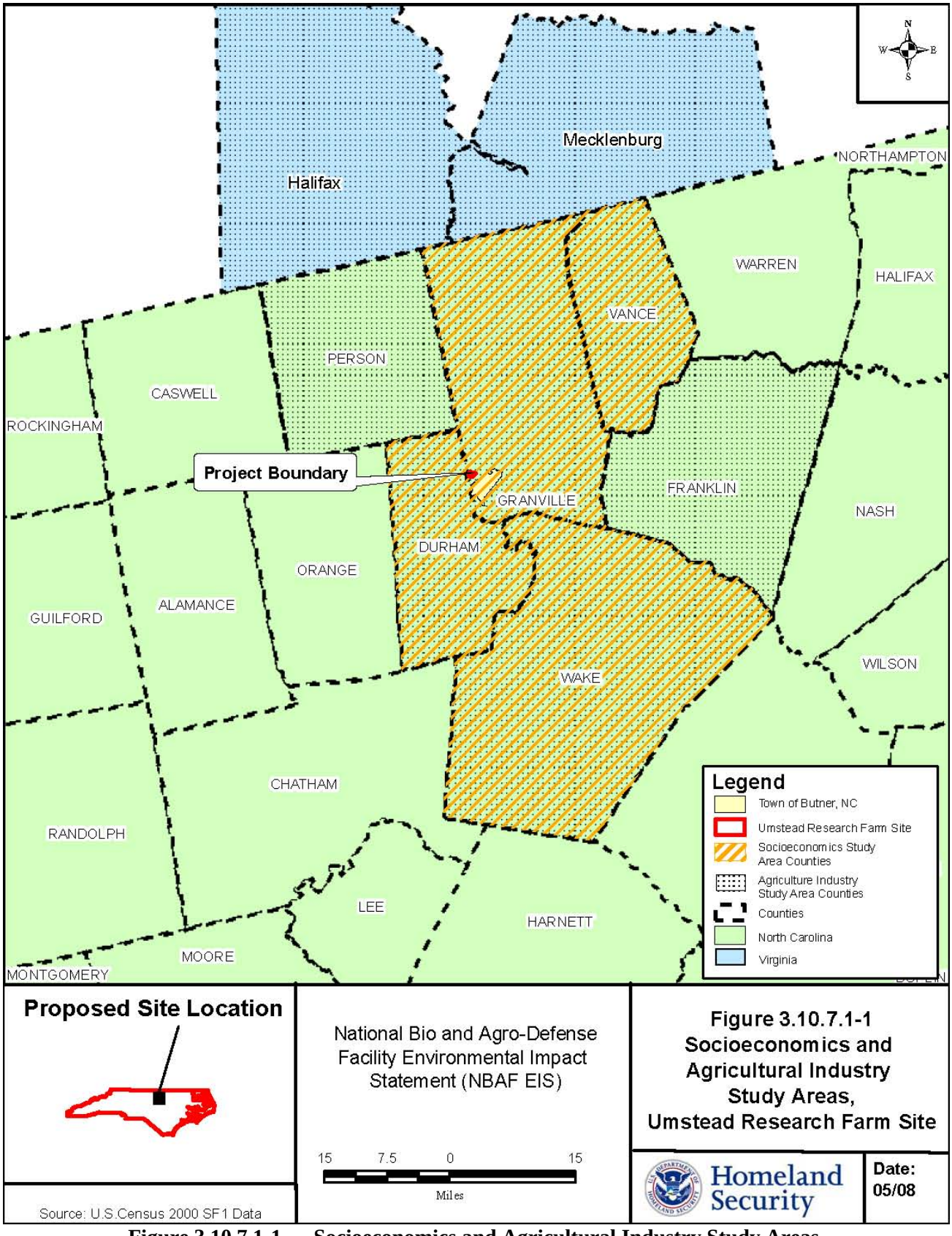


Figure 3.10.7.1-1 — Socioeconomics and Agricultural Industry Study Areas, Umstead Research Farm Site

3.10.7.1.1 Employment and Income

3.10.7.1.1.1 Employment

In general, the civilian labor force for all four counties combined has grown from 398,860 in 1990 to 605,207 in 2006, an increase of 51.7% compared to a 27.7% increase in the state's civilian labor force (Table C-84). The biggest contributor to this increase in the four-county was Wake County, which also happens to house the state's capital and is adjacent to and partly contains the Research Triangle Park, the largest research park in the world. Wake County's labor force has grown by 66% over the 16-yr period observed without an increase in the unemployment rate, demonstrating that the county offers a favorable environment for employment regionally.

The unemployment rates in all the counties studied, with the exception of Durham County, followed the state trend: falling between 1990 and 2000 and then subsequently rising between 2000 and 2006. The unemployment rates in Granville and Vance Counties have consistently been higher than the state's average rate in all 3 years observed. Vance County in particular has had a relatively higher rate than the state—almost double the state average in 1990 and surpassing the state average by more than one and a half times in 2006. This high unemployment rate may explain why Vance is the only study area county that has experienced a decline in its labor force and number employed between the years 2000 and 2006.

The combined four-county average rate consistently remains below the state's average. This is largely due to the low unemployment rate in Wake County, which weighs heavily in terms of employment in the four counties. The unemployment rate in Wake County is generally one percentage point lower than the state's average rate, and at times it has been almost 2% lower than the national average over the 3 years observed.[13]

Despite its large contribution to the overall employment numbers within the four-county region, Wake County does not attract extraordinarily large proportions of the commuters in the other three counties. Twelve to 13% of commuters in Durham and Granville work in Wake County, and an even smaller proportion of commuters from Vance County work in Wake County (Table C-85). Due to the universities and the portion of Research Triangle Park located in Durham County, many Granville residents (23%) commute to Durham County.

Employment can be measured as either a count of workers (e.g., see Table C-84) or as a count of actual jobs. The following employment base analysis uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the study area (Tables C-86 and C-87).

Wake County was home to 508,662 of the 764,206 jobs held in the four-county region in 2006. Durham contributed 211,588 jobs while Granville and Vance contributed a much smaller number: 24,423 and 19,533, jobs respectively, towards the four-county total (Table C-87). Wake County's concentration of employment and its diverse economy is mostly attributed to the county being home to the state capital, numerous universities, a portion of the Research Triangle Park, and an international airport.

Government and government enterprise are the leading employers for the four-county region as a whole, as well as three of four individual counties. The exception is Durham where manufacturing is the leading industry. Even though each county contains a diverse mixture of leading industry employers, government enterprise and retail trade are common leaders in all four counties (BEA 2006) (Tables C-86 and C-87).

Government and government enterprises remain ranked as the largest sources of employment even in terms of total wage compensation paid for the general area of study (Table C-88). At the county level, however, Durham County's largest industry contributor to employment measured by earnings is the manufacturing industry (Tables C-89 and C-90).

[13] Based on data from the Bureau of Labor Statistics, the average national unemployment rate for the country in the years 1990, 2000, and 2006 were 5.6, 4.0, and 4.6, respectively.

3.10.7.1.1.2 Agricultural Industry

For the purposes of this analysis, an expanded area of study comprising all counties adjacent to the proposed site was defined for the agricultural livestock discussion. The relative importance of the agricultural industry was assessed in the following counties: Granville,NC; Durham, NC; Vance, NC; Wake, NC; Franklin, NC; Person, NC; Halifax, VA; and Mecklenburg, VA.

Agriculture directly generated an estimated 6,634 jobs in the eight counties studied in 2006 (Table C-91), with Wake County contributing 2,086 jobs towards that total and Franklin, Halifax (VA); and Mecklenburg (VA) supporting approximately another 1,000 agriculturally related jobs each. Of the 6,634 jobs directly supported by the agricultural industry, only 1,550 jobs are attributed to animal production enterprises, with the bulk of agricultural employment maintained and provided by crop production. Agriculture makes up less than 1% of the jobs in the eight-county region, although that percentage varies quite a bit among each individual county. Within the four-county region of Granville, Durham, Vance, and Wake, proportional employment in agriculture is highest in Granville (2.5%) followed by Vance (2.0%). In the wider eight-county region, employment in agriculture makes up 5.2% in Franklin, 6.2% in Halifax, and 6.3% in Mecklenburg.

Industry output from the NAICS code classified, agriculture and hunting industry in the eight-county region totaled $489 million (Table C-91). Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Crop production generated $391 million towards the total output of the agriculture and hunting industry, with animal production contributing an additional $69 million.

Livestock statistics in the counties surrounding the proposed facility show the total number of livestock found in the eight-county region is 156,059, with Franklin County providing 40,263 (26%) of the total sum (Table C-92). The term livestock includes all hoofed animals; cattle, hogs, sheep, goats, horses, and mules. The number of poultry in the eight-county region is 1,900,459, and Vance County provides 926,000 (49%) of the total (NDP 2007a).

There were approximately 850,000 head of cattle and calves at the end of 2006 within North Carolina with an estimated inventory value of $663 million (averaging out to a unit value $780 per head within the state). The eight-county region made up for about 10% of that total with 89,100 head of cattle found within those counties (NASS 2006). Based on the state's estimated unit price, the inventory value of cattle within the eight-county region would be approximately $69.5 million.

3.10.7.1.1.3 Hunting

This analysis also uses the expanded study area outlined in the analysis of the agricultural industry (all other subsequent sections related to this site refer to the affected environment outlined in Section 3.10.7.1). Industry output from hunting and trapping supported 248 total jobs in the eight counties with a corresponding industry output of $29.2 million (Table C-91). There is very little direct compensation recorded for this industry ($28,000 or $113 per job), although by definition, the NAICS code classification of this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

2001 U.S. Census data that is limited to the statewide level shows that total expenditures related to recreational hunting activities in the State of North Carolina totaled $438 million (USCEN 2001). The data show that of the 295,000 individuals who participated in hunting activities in 2001, 224,000 were involved in big game hunting (e.g., deer) and spent $305 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

The same census data shows, that total expenditures related to recreational hunting activities in the State of Virginia totaled $321 million (USCEN 2001). The data show that of the 355,000 individuals who participated in hunting activities in 2001, 322,000 were involved in big game hunting (e.g., deer) and spent $161 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

3.10.7.1.1.4 Income and Poverty

In 1999, the median household incomes in the study area ranged from $31,301 in Vance County to $54,988 in Wake County. Per capita incomes ranged from $15,897 in Vance County to $27,004 in Wake County. Overall, the median household income in the study area was $50,396 and the per capita income was $25,115 (Table C-93).

Of the study area counties, Wake County had the lowest proportion of persons living below poverty in the study area, and Vance County had the highest percentage of persons living below the poverty line. The percentage of persons living below poverty in the study area was 9.9%, lower than the poverty rate in North Carolina (12.3%) and the United States (12.4%).

In 2007, the estimated median household income for the study area was $66,558, above the estimated median household incomes for North Carolina ($49,687) and the United States ($53,154). Granville County was estimated to have a per capita income of $22,353, slightly lower than in North Carolina ($26,409) and the United States ($27,916) (ESRI BIS 2007).

The Census Bureau classifies all people not living in households as living in group quarters. There are two types of group quarters: institutional (e.g., correctional facilities, nursing homes, and mental hospitals) and non-institutional (e.g., college dormitories, military barracks, group homes, missions, and shelters). Study area federal and state group quarters population data were included in the per capita income estimates; however, it was not used to determine household income estimates (USCEN 2008).

3.10.7.1.2 Population and Housing

3.10.7.1.2.1 Population

According to population growth trends in the South Milledge Avenue Site study area (Granville, Durham, Vance, and Wake Counties), the total population of the study area (all four counties) has increased by 596,423 between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, show an additional 411,821 residents are expected to be added to the study area between 2000 and 2012 (Figure 3.10.7.1.2.1-1).

The Granville County population has increased every decade since 1960, and the population trends in Durham, Vance, and Wake Counties also experienced positive population growth between 1960 and 2000. Granville and Vance Counties have small populations relative to the Durham and Wake study area counties (U.S. Census Bureau 1960-2000).

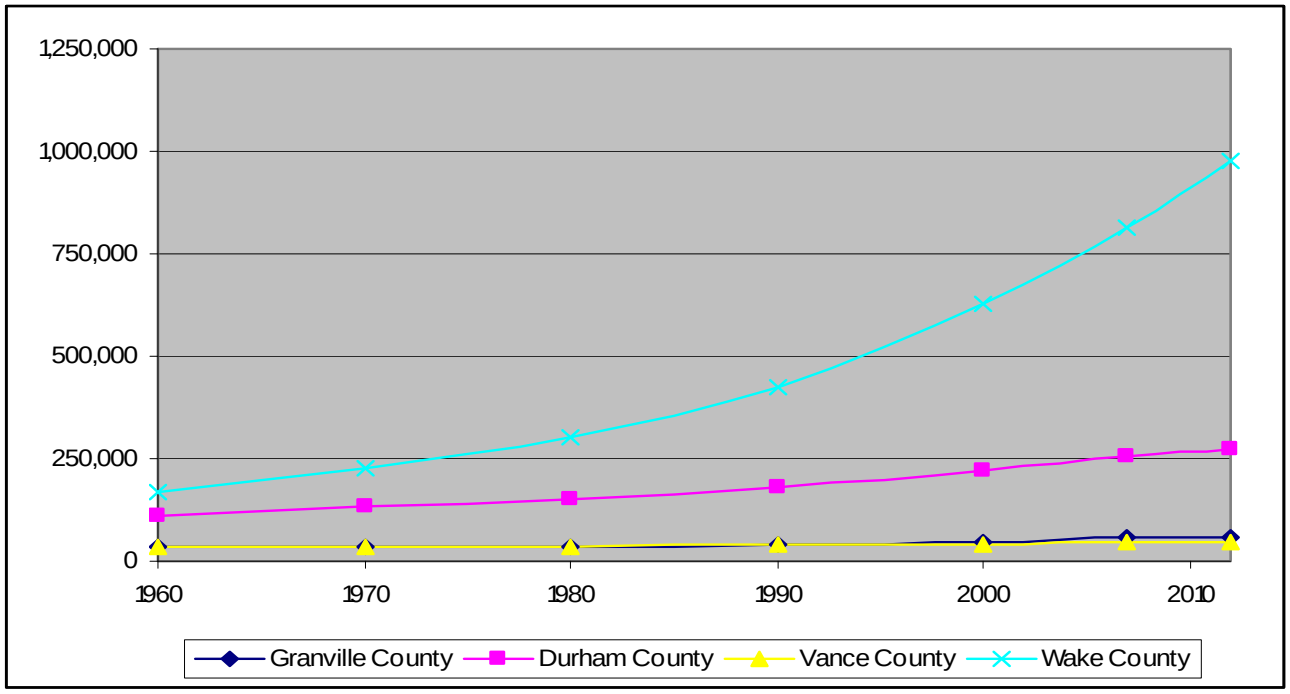
The Town of Butner in Granville County contains the proposed site and is therefore highlighted in this socioeconomic discussion. The C.A. Dillon Youth Development Center, the Butner Federal Correctional Complex, and the John Umstead Hospital are located in the Town of Butner and are located in close proximity to the proposed site. The study area demographic profile presented in this section reflects all residential populations, including those in group quarters (e.g., correctional facilities and psychiatric hospitals) (Table C-94) (USCEN 2008).

The C.A. Dillon Youth Development Center, a state juvenile correctional facility for males 10 to 21 years of age, has 125 beds in four campus residential units located on 80 acres of land (NCDJJDR 2007). The Butner

Federal Correctional Complex is comprised of three low to medium security facilities with a total population of 4,572 inmates (FBOP 2008).

The John Umstead Hospital, a state psychiatric hospital, is an inpatient facility that operates 68 beds and treats persons with psychiatric disorders. In 2008, the John Umstead Hospital will merge with local mental care centers to form the Central Regional Hospital. This new state-operated psychiatric facility will be located within approximately 1 mile of driving distance from the existing hospital, in an area located within the study area. The facility is estimated to operate 432 beds and treat the acute mental health needs of residents within the central region of the state (NCDMH 2007). The Murdoch Center, a residential care facility for persons with developmental disabilities, is located approximately 4.5 miles from the proposed site (Murdoch Center 2008).

Between 2007 and 2012, the population of the study area is expected to grow nearly two times as fast as North Carolina and the United States. Wake County, the largest and fastest growing portion of the study area, is expected to continue to grow faster than the study area as a whole between 2000 and 2012. By 2012, more than 72% of the study area population is expected to live in Wake County, up from about 63% in 1990 (ESRI BIS 2007).



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.7.1.2.1-1 — Population, Granville County, Durham County, Vance County, and Wake County, North Carolina, 1960-2012

3.10.7.1.2.1.1 Ethnicity and Race

In 2000, African Americans comprised the largest percentage minority group in the study area (26.5%), which was greater than in the United States (12.2%) and North Carolina (21.6%) (Table C-94). Persons of Hispanic origin comprised 5.8% of the study area population, which was less in Durham County (7.6%) and smaller in Granville County (4.0%). Overall, the proportion of minorities in the study area (36.9%) was greater than in the United States (30.1%) and North Carolina (29.8%) (Table C-95) (USCEN 2000b).

3.10.7.1.2.1.2 Age

In 2000, approximately 26.0% of the population was 18 years of age and under, and 8.4% was 65 years of age and older. Vance County had the highest proportions of its population aged 18 years and under, and Wake County had the lowest proportion of its population 65 years of age and over (Table C-96) (USCEN 2000b).

In 2007, the proportion of the Granville County population was estimated to be 18 years of age and under (24.0%), smaller than in North Carolina (24.7%) and the United States (25.8%). The proportion of the population of Granville County aged 65 years and older (11.6%) was also expected to be smaller than in North Carolina (12.2%) and the United States (12.5%) (ESRI BIS 2007).

3.10.7.1.2.1.3 Educational Attainment

In 2000, 19.75% of the population 25 years of age and older graduated from high school, 19.3% of the population graduated from high school or had some college education, 7.1% had an associate's degree, and 25.8% had a bachelor's degree or a higher level of education. Within the study area, the Town of Butner exhibited the highest proportion of residents without a high school diploma and the lowest proportion of residents with a bachelor's degree or higher. The proportion of residents without a high school diploma in the study area (14.1%) was smaller than in North Carolina (21.4%) and the United States (19.6%) (Table C-97) (USCEN 2000b).

3.10.7.1.2.2 Housing

In 2007, 92.2% of the housing inventory in the study area was estimated to be occupied, and and 7.8% were estimated to be vacant (Table C-98). The proportion of vacant units in the study area was estimated to be smaller than in North Carolina (12.1%) and the United States (9.9%).

In 2007, the Durham County was estimated to have the highest proportion of renter-occupied housing units. The percentage of owner-occupied housing units in the study area (60.0%) was estimated to be smaller than in North Carolina (62.1%) and the United States (61.3%) (Table C-98) (ESRI BIS 2007).

In 2000, the single-family detached house was the predominant form of housing in the study area, comprising 234,791 units (60.1%) in 2000 (Table C-99). The second largest structure category was apartment buildings with five to nine units. The highest proportions of mobile homes were located in Granville and Vance Counties (Table C-99) (USCEN 2000b).

Approximately one-third of the study area housing units were built before 1970. Wake County has a larger proportion of housing units that were built in 1980 to 2000 (62.7%) than the three other counties in the study area. In the study area as a whole, 130,459 housing units (33.4%) have been built since 1990 (USCEN 2000b).

New housing growth has primarily occurred in the areas on the periphery of the historic population centers of Raleigh in Wake County and the City of Durham in Durham County (Figure 3.10.7.1.2.2-1). A majority of census block groups (subdivisions of counties) in these areas have a median housing age of 1979 to 1999, indicating that more than one-half of the housing units in these areas were built in the last 20 to 30 years. In 2000, many areas to the north of Wake and Durham Counties, including Granville County, had a median housing age of 1979 to 1988.

Between 2000 and 2007, housing values in the study area were estimated to grow the fastest in Vance and Granville Counties. In 2007, Wake County was estimated to have the highest median housing value ($215,260), and Vance County was estimated to have the lowest median housing value ($106,552). In 2007, the median housing value for Granville County was estimated to reach $132,152, below the estimated values for North Carolina ($139,312) and the United States ($192,285) (Table C-100) (USCEN 2000b; ESRI BIS 2007).

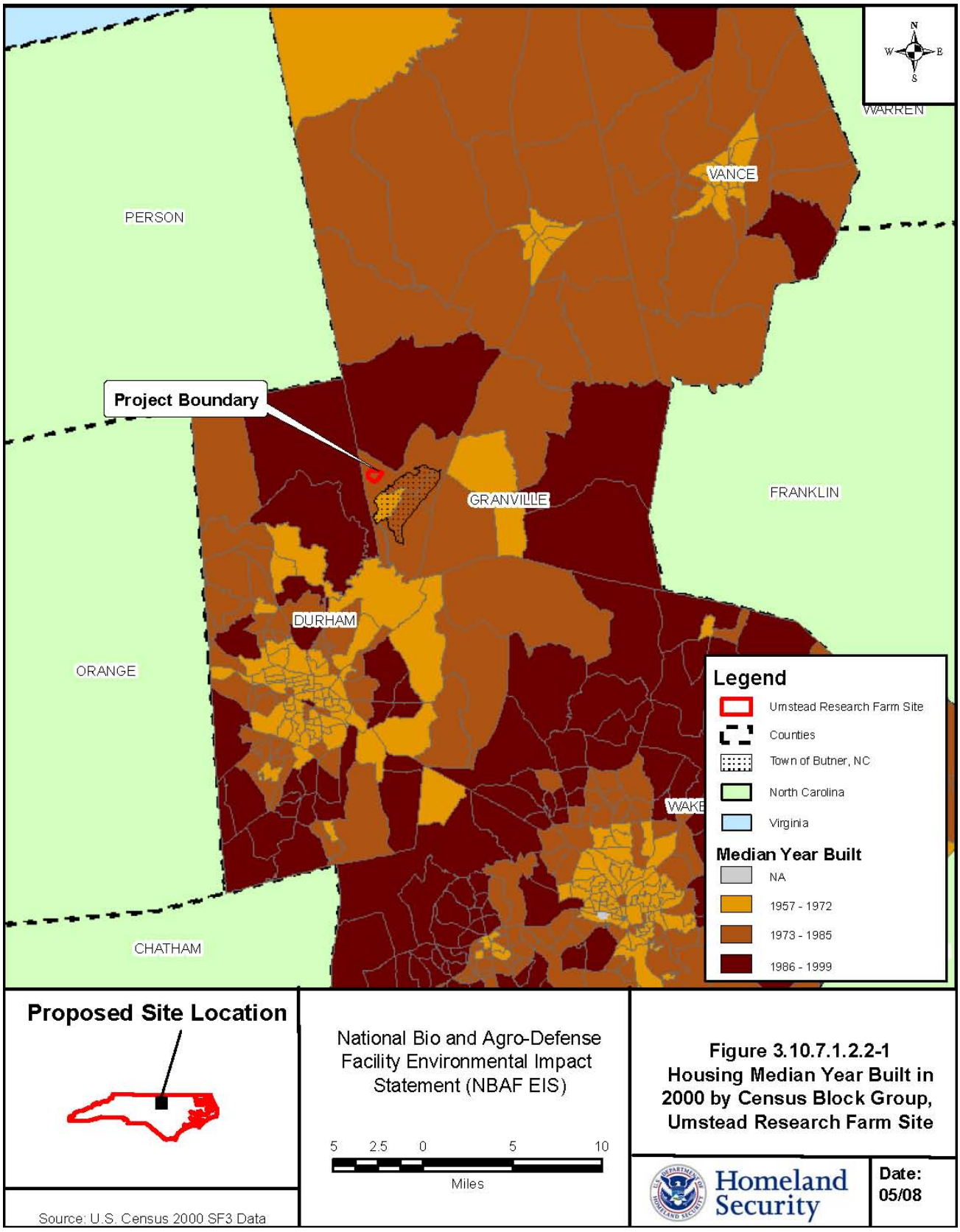


Figure 3.10.7.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group, Durham County, Granville County, Vance County, and Wake County, North Carolina

In 2007, the largest proportion of housing units with estimated values less than $50,000 was in Vance County with 2,162 units. Wake County was estimated to have the largest proportion of housing units valued over $150,000. Overall, the proportion of housing units with estimated values over $150,000 in the study area (68.7%) was larger than in North Carolina (44.8%) and the United States (61.7%) (Table C-101) (ESRI BIS 2007).

Between 1990 and 2000, median monthly rent in the study area grew the fastest in the Town of Butner and Granville County. In 2000, Wake County had the highest median rent, and Vance County had the lowest median rent. The 2000 median rent in Granville County ($352) was lower than the median rents for North Carolina ($431) and the United States ($519) (Table C-102) (USCEN 2000b).

In 2000, Vance County had the largest proportion of housing units with a rent less than $200, and Wake County had the largest proportion of housing units with rents over $1,000. Overall, the majority of the housing units in the study area had rents ranging between $200 and $749 (71.3%). The proportion of housing units with rents over $1,000 in the study area (5.7%) was greater than in North Carolina (2.9%) and smaller than in the United States (8.4%) (Table C-103) (USCEN 2000b).

In 2005, the majority of housing units permitted were located in Durham County. The least expensive housing units in the study area are being constructed in Vance County, and the most expensive housing units are being constructed in Wake County (Table C-104) (USCEN 2006).

3.10.7.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. NEPA quality-of-life analyses typically address issues relating to potential impacts of the NBAF on the availability of public services that contribute to quality of life. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.7.1.3.1 Public Schools

The Umstead Research Farm Site in the Town of Butner is served by the Granville County School District. Granville County School District has eight elementary schools, three middle schools, one intermediate school, and six high schools that serve approximately 8,500 students. The student-to-teacher ratio for this district is 16.8 to 1 (GCSD 2007).

In addition, in the study area, Durham County Public School System serves over 32,000 students with 28 elementary schools, 9 middle schools, 10 high schools, and 2 alternative schools. The average student-to-teacher ratio in Durham County is 24.5 to 1 within public schools (DCPSS 2007). Seven charter schools serve approximately 2,000 Durham County students of varying ages. Vance and Wake Counties have a combined total of 106 elementary schools, 32 middle schools, and 26 high schools with an approximate total student enrollment of 142,000 (NCSBE 2007).

The study area is home to several public and private universities of higher education, including North Carolina State University in Wake County, Duke University, and North Carolina Central University in Durham County.

3.10.7.1.3.2 Law Enforcement

Butner Public Safety is the police authority in the proposed site area, the Town of Butner. Butner Public Safety has 43 sworn officers. They serve all citizens within the territorial jurisdiction including those living in group quarters (e.g., correctional facilities and psychiatric hospitals). Butner Public Safety's director reports to the chief deputy secretary of the Department of Crime Control and Public Safety. All officers must be

certified in Basic Law Enforcement. They must also have extensive knowledge of the policies, procedures, jurisdictional authority, and special populations of the 25 different federal, state, and local agencies that have facilities in Butner. Butner Public Safety has 25 police vehicles. Surrounding cities and counties provide mutual aide, if necessary (BPSD 2006). The study area is also served by the Granville County Sheriff's Department, the Durham County Police Department and Sheriff's Office, the Wake County Sheriff's Office, and the Vance County Sheriff's Office.

3.10.7.1.3.3 Fire Protection

Granville County Fire Services provides fire protection to the study area with 14 incorporated fire departments, such as Butner Public Safety, which provides fire fighting, fire training, and fire-prevention programs to the proposed site area in Butner (Granville County Fire Services 2007). All law enforcement officers must also be trained as Level I Firefighters. To maintain safety, Butner Public Safety has two class-A pumpers, one 95-foot ladder truck, one 2,000-gallon tanker, and one skid unit brush truck (Butner Public Safety Division 2004). Butner Public Safety officers regularly conduct drills and inspections in Butner's institutions, industries, and local businesses. Fire fighters also teach local children about fire safety through school presentations and community safety days. Butner Public Safety is responsible for providing secure transport of patients from N.C. Memorial Hospital to institutions in Butner. Approximately 400 transports are conducted annually (NCDCCPS 2007).

Fire protection services are also provided to the study area by approximately 25 departments located throughout Durham, Wake, and Vance Counties.

3.10.7.1.3.4 Medical Facilities

The proposed Umstead Research Farm Site is served by the Granville Medical Center. The center provides inpatient acute care, long-term residential care, obstetrical services, 24-hour emergency care, and outpatient, surgical, mental health, and diagnostic services to the Granville County community. The center operates five facilities: the 62-bed Granville Medical Center, 80-bed Brantwood Nursing Center, Harold Sherman Adult Day Center, Granville Surgical Associates, and South Granville Medical Center, which includes the Community Immediate Care Center, South Granville Specialty Clinic, and Best Care Pharmacy (Granville Medical Center 2007). In addition, Butner is served by the John Umstead Hospital in Butner. The John Umstead Hospital's primary purpose is to provide an inpatient facility to diagnose and treat persons with psychiatric disorders, to restore them to an optimal level of functioning, and to return them to the community. The facility operates with 68 beds, 34 physicians, and 61 nurses (NCDMH 2007).

The proposed site is also served by the University of North Carolina Health Care System (UNC Health Care), the Duke University Medical Center, and the Durham Regional Hospital. UNC Health Care is comprised of the North Carolina Children's Hospital, the North Carolina Memorial Hospital, the North Carolina Neurosciences Hospital, and the North Carolina Women's Hospital (UNC HC 2007). The 708-bed facility treats over 31,000 patients each year. The Duke Medical Center occupies 90 buildings on 210 acres with 924 beds (DUSM 2008), and the Durham Regional Hospital operates with 369 beds and an over 500 physician medical staff (DRH 2008).

Also in the study area, Vance and Wake Counties are served by the Maria Parham Hospital, Southern Wake Hospital, Central Prison Hospital, Dorothea Dix Hospital, Duke Health Raleigh Hospital, Holly Hill Hospital, Rex Hospital, Wake Medical Center, and the Murdoch Center. The Murdoch Center provides comprehensive 24-hour care for residential persons with severe to moderate mental retardation or a related developmental disability. The center currently serves approximately 550 citizens from 18 counties in the state's Central Region with a staff of 1,720 employees (Murdoch Center 2008).

3.10.7.1.3.5 Recreation

Granville County has nine museums, four historic sites, and several areas for shopping and fine dining. The RBC Center and the Alltel Pavilion feature sporting events and concerts by leading musicians throughout the year. Granville Athletic Park offers baseball and softball facilities and a safe space for walking, playing, and picnicking. Granville County also has many lakes, rivers, and parks, such as Kerr Lake and Tar River, which offer recreational activities that span the study area and include fishing, camping, boating, skiing, sailing, wind surfing, nature walking, bird watching, golfing, and canoeing (GCCC 2008).

The study area has numerous colleges and universities that offer educational and recreational activities, such as collegiate sporting events. The Atlantic Coast Conference basketball program is top ranked in the country, and the Carolina Hurricanes hockey team and the Durham Bulls baseball team provide entertainment throughout the study area. Additionally, study area cities such as Raleigh, Chapel Hill, and Durham offer a wide range of cultural and entertainment activities (GCCC 2008).

3.10.7.2Construction Consequences

3.10.7.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the 4-yr construction phase. Economic impacts would result from regional material purchases generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment.

The economic benefits of construction impacts would be temporary and would diminish as the construction reaches completion. Direct employment (jobs at the facility in Table 3.10.7.2.1-1) refers to the jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier effect on the initial investment in construction of the facility. The industries that contribute to this other employment include architectural and engineering services, food services and drink establishments, food and beverage stores, and general merchandise stores.

Based on the results of the impact analysis for the 4-year construction phase (Table 3.10.7.2.1-1), the construction of the proposed facility would directly support 2,447 person-yrs (612 jobs annually) of employment with an associated total employment level of 3,693 person-yrs (923 jobs annually). The effects of this work are expected to be short term and would only last for the duration of the construction work.

Table 3.10.7.2.1-1 — Short-Term Economic Impacts

Construction	
Jobs at the Facility (jobs)	2,447
Impacts	
Total Employment (jobs)	3,693
Total Labor Income Impact ($ millions)	162.1
Federal, State, and Local Tax ($ millions)	51.5
State and Local Tax ($ millions)	16.2

Note: In 2007 dollars.

In terms of income, minor short-term benefits would be expected. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[14]. The estimated labor income generated during the construction phase is estimated at $162.1 million ($40.5 million annually) measured in 2007 dollars. The total labor income effect of this project would

[14] Proprietor income consists of payments received by self-employed individuals as income.

correspond to 0.1% of all estimated 2006 labor income in the four-county region expressed in 2007 dollars or 3.7% of the total estimated labor income in Granville County.

The construction phase would generate additional taxes estimated at $51.5 billion (Table 3.10.7.2.1-1), of which $16.2 million is estimated to be collected through state and local taxes that should flow to the local governments.

3.10.7.2.2 Population and Housing

3.10.7.2.2.1 Population

The majority of the construction workers would be drawn from the study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the NBAF would not be expected to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment. Construction impacts on population and housing would be very similar to those previously described in Section 3.10.3.2.2.

3.10.7.2.2.2 Housing

As described above, the construction of the NBAF is not expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.7.2.3 Quality of Life (Community Services)

Construction impacts on quality-of-life attributes would be very similar to those described in Section 3.10.3.2.3. The construction project would pose no additional health or safety risks to the public because the construction site would be closed off to public access at all times.

3.10.7.3Operations Consequences

3.10.7.3.1 Employment and Income

The proposed facility would also stimulate the regional economy during the operations and maintenance phase, which is expected to commence in the year 2014. Economic impacts would result from purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the continual operations of the facility (Table 3.10.7.3.1-1).

Table 3.10.7.3.1-1 — Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326[a]
Impacts	
Total Employment (jobs)	493
Total Labor Income Impact ($ millions)	29.4
Federal, State, and Local Tax ($ millions)	4.0
State and Local Tax ($ millions)	1.9

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of this proposed facility would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 493 jobs including the initial 326 direct jobs required for

operations and maintenance (see footnote in Table 3.10.7.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operations phase is estimated at $29.4 million annually in 2007 dollars. This corresponds to 0.1% of all estimated 2006 labor income in the four-county region expressed in 2007 dollars or 2.7% of total labor income in Granville County.

3.10.7.3.2 Population and Housing

3.10.7.3.2.1 Population

The NBAF would directly employ 326 people. The majority of these employees would be research scientists and other specialized staff, and based on census journey-to-work data, 263 are expected to relocate to the study area from elsewhere in the country. Assuming the U.S. Census Bureau 2006 average household size of 2.61 persons, this would represent a population increase of 686.

In addition, the economic activity associated with the operation of the NBAF would be expected to employ 167 persons. The industries that would contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments and wholesale, trade among others. It is assumed that these employment opportunities would be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs will be negligible.

In total, the population of the study area is expected to increase by 686 as a result of the operation of the NBAF. This population increase would be a very small portion of the overall expected population growth within the study area between 2007 and 2012 (188,278 based on historic trends), which is expected to result in a total study area population of 1,355,470 in 2012.

3.10.7.3.2.2 Housing

As described above, 686 additional persons would locate to the study area as a result of the NBAF. The average salary including benefits of the 326 employees employed directly at the NBAF would be $82,622. For comparative purposes, this figure has been adjusted to an average per capita income of $66,924 for employees employed directly at the NBAF, which would be higher than the estimated median 2007 study area per capita income ($26,299). Over 80 NBAF research scientists and managers would earn over $125,000 annually. The estimated median value of owner-occupied housing units in the study area is $157,715 (Table C-100). Taking into account families with two incomes, the available study area housing stock would be affordable to the majority of the people relocating to the region.

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the expected growth of the existing population between 2007 and 2012 (188,278). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase due to an increase in demand, and there is no empirical evidence that a facility such as the NBAF would reduce property values in the study area. Therefore, the overall effect of the NBAF on housing market conditions would be negligible.

3.10.7.3.3 Quality of Life (Community Services)

Due to the small percentage of the overall population growth that would be attributed to the facility, the NBAF would have a negligible effect on the availability of public services. The study area population growth attributed to the NBAF would be 0.4% of the overall expected population growth from 2007 to 2012.

3.10.7.3.3.1 Public Schools

The NBAF would add approximately 142 school-aged children to the study area or a 0.1% increase in the 2006/2007 182,500 public school enrollment in the study area public school districts (North Carolina State Board of Education 2007). The 0.1% increase in school-aged children attributed to the NBAF would place minimal demand on the schools.

School districts in the study area have invested in educational facilities to meet the needs of the growing population of the region. For example, the Durham County Public School System plans to invest over $550 million in school capacity needs over the next decade, and the Wake County Public School System will add 33 new schools to their district between 2007 and 2012 (DCPSS 2007; WCPS 2007).

3.10.7.3.3.2 Law Enforcement

The population increase associated with the NBAF (686), relative to the expected growth of the existing population between 2007 and 2012 (188,278), would result in a negligible increase in the need for additional law enforcement services.

3.10.7.3.3.3 Fire Protection

The population increase associated with the NBAF (686), relative to the expected growth of the existing population between 2007 and 2012 (188,278), would result in a negligible increase in the need for additional fire protection services.

3.10.7.3.3.4 Medical Facilities

The additional population associated with the NBAF (686), relative to the expected growth of the existing population between 2007 and 2012 (188,278), would result in a negligible increase in the demand for medical services and facilities.

Due to the overall population growth in the region, medical facilities in the study area are responding to meet the increasing demand. For example, the Duke University Medical Hospital is adding a 56,000 square feet to its facility for 11 operating rooms, family waiting rooms, and patient intake and preparatory areas (DUSM 2008). Durham Regional Hospital is renovating its Intensive Care and Coronary Care Units and adding a 22-bed state-of-the-art intensive care unit in 2008 (DRH 2008). Also, in early 2008, the John Umstead Hospital will merge with the Dorothea Dix Hospital to form the Central Regional Hospital with 432 beds and 1,100 employees to the serve acute mental health needs for more than 3 million people in the central region of the state (DDH 2008).

3.10.7.3.3.5 Recreation

Recreational resources would not experience a significant increase in utilization rates as a result of the population increase associated with the NBAF. As detailed in above, the study area has abundant recreation resources available.

3.10.7.3.3.6 Health and Safety

The normal operation of the proposed facility would pose no additional health or safety risks to the public because the facility would be closed off to public access at all times. Further analysis with regard to abnormal operation of the proposed facility is presented in Section 3.14, Health and Safety.

3.10.8 Texas Research Park Site

3.10.8.1Affected Environment

The Texas Research Park in the western portion of Bexar County, Texas, has been proposed as the location site for the facility, and the geographic definition of the affected environment for this location was determined primarily based on a journey-to-work analysis. Any county that constituted approximately 5% or more of the worker flows into or out of the two census tracts most closely associated with the proposed site on Omicron Drive (U.S. Census tracts 1720.01 and 1720.02 in Bexar, TX) was considered to comprise the affected environment for the proposed site, and this included Bexar and Medina Counties (USCEN 2000a; USCEN 2000c).

The expanded area of study to be used for the agricultural livestock vulnerability analysis discussion in Appendix D added Atascosa, Bandera, Comal, Guadalupe, Kendall, and Wilson Counties to the original economically described affected area (Figure 3.10.8.1-1).

3.10.8.1.1 Employment and Income

3.10.8.1.1.1 Employment

In general, the civilian labor force for both Bexar and Medina counties has grown from 573,746 in 1990 to 761,326 in 2006, an increase of 32.7%, tracking the trend in Texas that has seen its civilian labor force grow at a rate of 33.7% over the same time period.

The unemployment rate in both counties dropped between 1990 and 2000, but then subsequently rose again between 2000 and 2006 (Table C-105). This movement in the unemployment rate was similar to that of Texas over the same time period, with the combined unemployment rate for the two counties remaining slightly lower than the state's rate in 2000 and 2006.

Bexar County is the center of the San Antonio MSA, and according to Census Bureau's County-to-County Worker Flow data, it attracts at least 30% of the workers from each of the other seven counties that constitute the San Antonio MSA[15]. Of the two counties studied in detail, approximately 96% of Bexar County workers are employed within the county, while 42% of Medina County's labor force commutes to Bexar County for work (Table C-106).

Employment can be measured as either a count of workers (e.g., see Table C-105) or as a count of actual jobs. The following employment-based-analysis in this section uses the count of actual jobs in ascertaining the relative importance and proportion of various industrial sectors present in the study area (Tables C-107 and C-108).

Bexar County is home to 915,500 jobs while Medina County holds 14,944 jobs (Table C-108). Bexar County appears to be a center of employment for the region, and this is due to the influence that the City of San Antonio has on the surrounding regions and the fact that it is located in Bexar County (Table C-106).

Government and government enterprises are the largest sources of employment in terms of number of jobs for both Bexar and Medina Counties; they comprise approximately 17% of the total jobs in both counties combined. Although government is the primary employer in both counties, the other leading industries in each county differ quite a bit with the exception of the retail trade industry. Bexar County's greater degree of urbanization explains its larger proportion of service industry employment, while Medina's lower population density explains its larger proportion of farm employment (Tables C-107 and C-108).

[15] San Antonio MSA comprises the following counties: Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina, and Wilson.

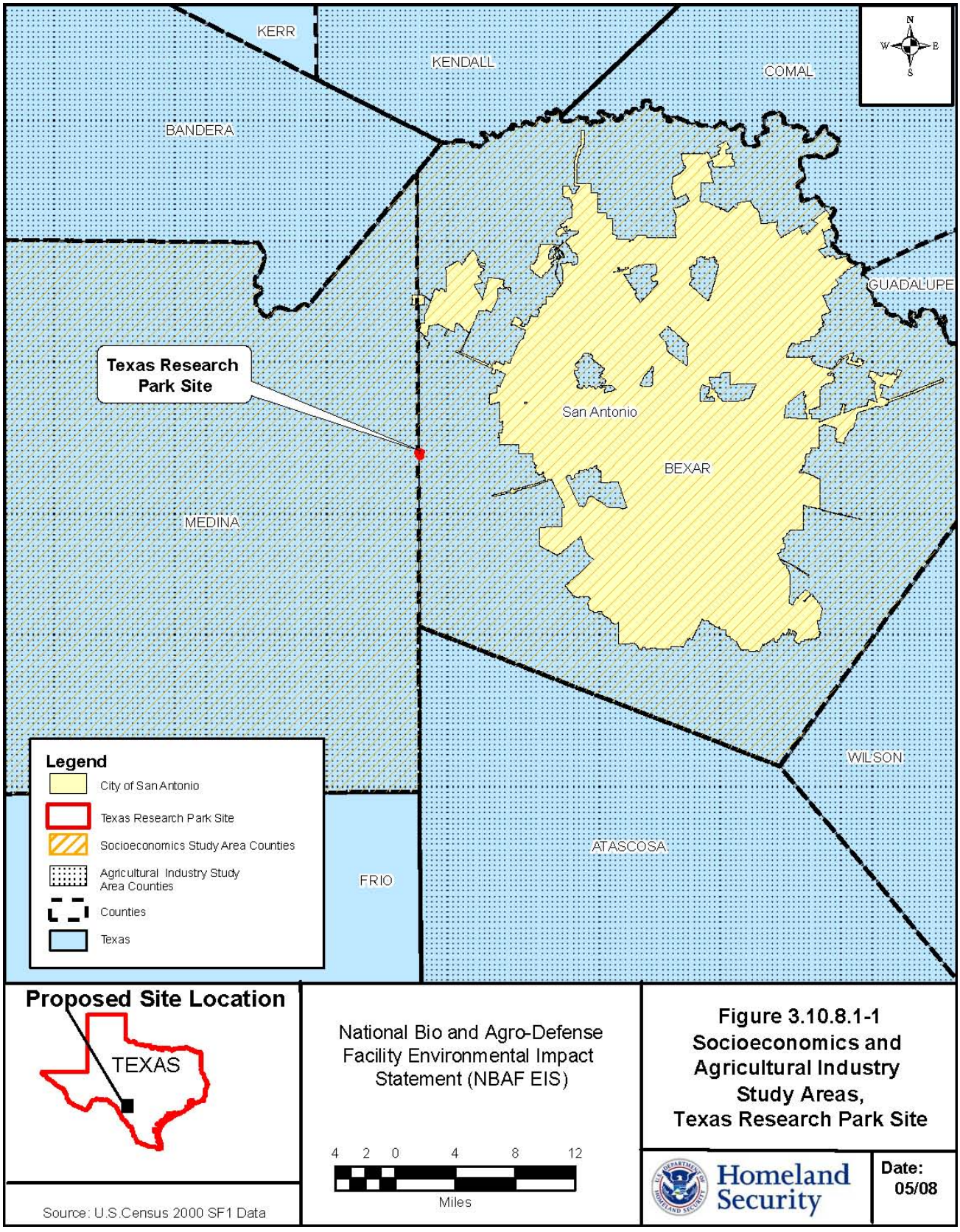


Figure 3.10.8.1-1 — Socioeconomics and Agricultural Industry Study Areas, Texas Research Park Site

The City of San Antonio acts as a center of employment in the region, and some of the major employers located in the Greater San Antonio Area are presented in Table C-109. The top three employers—H.E.B. Food Stores (14,588 workers), United Service Automobile Association (14,258), and AT&T (6,500)—are all major corporations headquartered in San Antonio, while Wachovia (3,200) and Citibank (3,000) both maintain regional/divisional offices in the city. Three of the top manufacturing firms include Cardell Kitchen and Bath Cabinetry (2,493 workers), Toyota Motors Manufacturing (2,000), and Kinetic Concepts, Inc. (1,800).

Government and government enterprises are the largest sources of employment in terms of total wages paid for both Bexar and Medina Counties; it comprises approximately 27% of the total wages in both counties combined, paying out approximately $9.5 billion in wages. In Medina County, government and government enterprises are even more prominent as a percentage of total wages where it makes up over 40% of total wages paid in the county. Bexar County's greater degree of urbanization explains its apparent larger proportion of service industry employment (Tables C-110 and C-111).

3.10.8.1.1.2 Agricultural Industry

For the purposes of this analysis, an expanded area of study comprising all counties adjacent to the proposed site was defined for the agricultural livestock discussion. The relative importance of the agricultural industry was assessed in the following counties: Bexar, Medina, Atascosa, Bandera, Comal, Guadalupe, Kendall, and Wilson.

Agriculture directly generated an estimated 14,094 jobs in the eight counties studied in 2006 (Table C-112), with Wilson County contributing 2,339 jobs towards that total. Animal production makes up 7,482 of the 14,094 jobs directly supported by the agricultural industry, with cattle ranching and farming providing approximately three-quarters of those jobs in the eight-county region (5,441 jobs). The NAICS code classified agriculture and hunting industries make up 1.4% of all the jobs in the eight-county region, although that percentage varies quite a bit in each individual county. In Bexar, the most urban of the eight, agriculture comprises less than 1% of total industry employment, while in Wilson the figure is 22%.

Industry output from the agriculture and hunting industry in the eight-county region is estimated at just over $600 million (Table C-112). Industry output can be measured by the total value of purchases made by intermediate and final consumers of that industry's production. Animal production generated $284 million towards the total output of the agriculture and hunting industry with crop production and other agricultural support activities contributing an additional $292 million. Cattle ranching and farming in the eight-county region accounted for approximately $245 million (41%) of total output in the agriculture and hunting industry, making it the most valuable component of the overall industry.

Livestock statistics in the counties surrounding the proposed facility show the total number of livestock found in the six-county region is 459,889 with Wilson County providing 94,654 (21%) of the total (Table C-113). The term livestock includes cattle, hogs, sheep, goats, horses, and mules. The number of poultry in the six-county region is 6,411,379, and Guadalupe County provides 3,626,597 (57%) of the total (NDP 2007a).

There were approximately 14,000,000 head of cattle and calves at the end of 2006 within Texas, with an estimated inventory value of $11.1 billion (averaging out to a unit value $790 per head within the state). The eight-county region made up only 2.8% of that total with 397,000 head of cattle found within those counties (NASS 2006). Based on the state's estimated unit price, the inventory value of cattle within the eight-county region would be approximately $313.6 million.

3.10.8.1.1.3 Hunting

This analysis also uses the expanded study area outlined in the analysis of the agricultural industry (all other subsequent sections related to this site refer to the affected environment outlined in Section 3.10.8.1). Industry output from hunting and trapping supported only 128 jobs for the eight counties with a corresponding industry

output of $24.5 million (Table C-112). The direct compensation associated with the 128 estimated jobs in this industry paid out an estimated $3.7 million in compensation, although by definition, the NAICS code classification of this activity is limited to commercial hunting and trapping, the operation of commercial game preserves such as game retreats, or the operating of hunting preserves. The non-commercial aspects of hunting and trapping, which may be significant, are not reflected in these numbers, and based on U.S. Census data on hunting, it is very likely that certain occupations in state wildlife and conservation services, and the sporting goods retail industry supplying hunting gear, are supported by this activity.

U.S. Census data from 2001 that are limited to the statewide level shows that total expenditures related to recreational hunting activities in Texas totaled $1.5 billion (USCEN 2001). The data shows that of the 1.2 million individuals who participated in hunting activities in 2001, approximately 890,000 were involved in big game hunting (e.g., deer) and spent $776 million on guns, ammunition, special clothing, transportation, food and lodging, licenses, and other expenditures related to recreational hunting activity.

3.10.8.1.1.4 Income and Poverty

In 1999, median household incomes ranged from $36,063 in Medina County to $38,358 in Bexar County. The per capita incomes were also similar throughout the study area and were lowest in Medina County ($15,210). The median household income in the study area was $38,277 and the per capita income $18,276.

Of the study area counties, Medina County had the lowest proportion of persons living below the poverty level. Overall, the percentage of persons living below poverty in the study area was 15.9%, which was higher than the poverty rate in Texas (14.0%) and the United States (12.4%) (Table C-114) (USCEN 2000a).

In 2007, the estimated median household income for the study area was $46,993, lower than the estimated median household incomes for Texas ($51,090) and the United States ($53,154). Bexar County was estimated to have a per capita income of $23,134, lower than in Texas ($25,413) and the United States ($27,916) (ESRI BIS 2007).

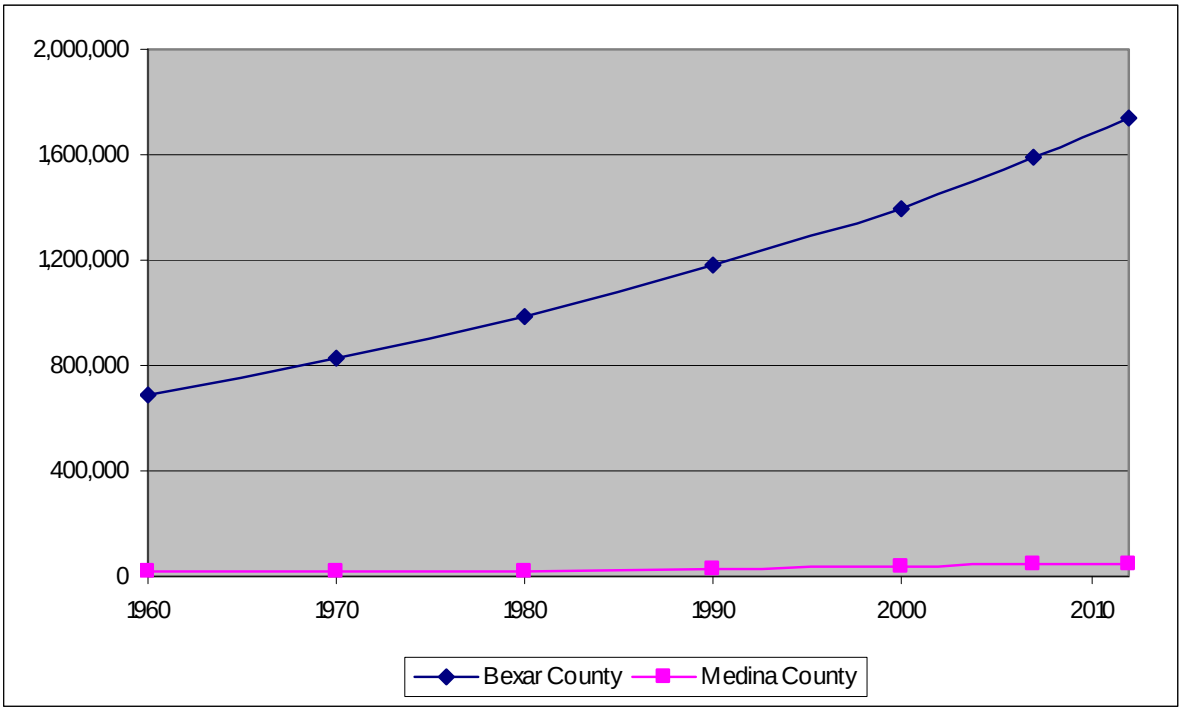
3.10.8.1.2 Population and Housing

3.10.8.1.2.1 Population

According to population growth trends for the San Antonio site study area counties (Bexar and Medina Counties), the total population of the study area has increased by 726,180 between 1960 and 2000. Population estimates for 2007 and 2012, the most recent forecasts available, show an additional 351,463 residents are expected to be added to the study area between 2000 and 2012 (Figure 3.10.8.1.2.1-1) (Table C-115) (USCEN 2000; ESRI BIS 2007).

From 1960 to 2000, the population of Bexar and Medina Counties increased every decade. Between 1990 and 2000, Medina County grew substantially faster than the historical trend reaching a total population of 39,304 in 2000 (USCEN 2000b). San Antonio (in Bexar County) is the specific location of the project, and therefore it is included in this socioeconomic discussion.

Between 2007 and 2012, the population of the study area is expected to grow at a slightly slower rate than Texas and faster than the United States. San Antonio's share of Bexar County's total population is expected to decrease from 82.2% in 2000 to 78.3% in 2012. Over 97% of the population of the study area lives in Bexar County, and this percentage is not expected to noticeably change through 2012.



Sources: 1960-2000 population: U.S. Census Bureau. 2007 and 2012 population forecasts: ESRI BIS.

Figure 3.10.8.1.2.1-1 — Population, Bexar County and Medina County, Texas, 1960-2012

3.10.8.1.2.1.1 Ethnicity and Race

In 2000, persons of Hispanic origin comprised over 50% of the population of the City of San Antonio, Bexar County, and the study area as whole, which was higher than in Texas (32.0%) and the United States (12.5%). The proportion of African Americans in the study area (7.0%) was smaller than in Texas (11.7%) and the United States (12.2%), and approximately 21.3% of the population of the study area identified themselves as "some other race alone" or "two or more races." There was a 64.0% minority population in the study area, which was substantially larger than in Texas (47.6%) and the United States (30.1%) (Table C-116) (USCEN 2000b).

3.10.8.1.2.1.2 Age

In 2000, approximately 30.1% of the study area population was 18 years of age and under, and 10.4% was aged 65 years and over. The proportions of the study area's county and city populations aged 18 years and under did not show significant variation, and the proportion of the population aged 65 years and older was slightly greater in Medina County (Table C-117).

In 2007, 28.7% of the San Antonio population was estimated to be 18 years of age and under, slightly greater than in Texas (28.4%) and the United States (25.8%). The proportion of the population of San Antonio aged 65 years and older (10.2%) was estimated to be slightly greater than in Texas (9.9%) and smaller than in the United States (12.5%) (ESRI BIS 2007).

3.10.8.1.2.1.3 Educational Attainment

In 2000, 24.0% of the study area population did not graduate from high school, 48.1% of the population graduated from high school or had some college education, 5.9% had an associate's degree, and 22.1% had a bachelor's degree or higher level of education (Table C-118). Bexar County had a greater proportion of residents with bachelor's degree or higher level of education and a smaller proportion of residents that did not complete high school compared to Medina County. The proportion of residents that did not graduate from

high school in the study area (24.0%) was smaller than in Texas (24.4%) and greater than in the United States (19.6%) (USCEN 2000).

3.10.8.1.2.2 Housing

In 2007, 92.6% of the housing inventory in the study area was estimated to be occupied, and 7.4% were estimated to be vacant (Table C-119). The proportion of vacant units in the study area was estimated to be smaller than in Texas (10.2%) and the United States (9.9%).

In 2007, San Antonio and Bexar County were estimated to have the highest proportions of renter-occupied housing units in the study area. The percentage of owner-occupied housing units estimated in the study area (58.9%) was smaller than in Texas (59.1%) and the United States (61.3%) (ESRI BIS 2007).

In 2000, the single-family detached house was the predominant form of housing in the study area, comprising 352,325 units (65.7%). The majority of housing units in buildings with over 10 units were located in San Antonio, and the largest proportion of mobile homes occurred in Medina County (Table C-120) (USCEN 2000b).

In 2000, over one-third of the study area housing units were built before 1970. Medina County had a greater proportion of housing units built in the 1990 to 2000 time period than Bexar County, reflecting the higher rate of population and household growth in Medina County compared to Bexar County between the 1990 and 2000 censuses. In the study area as a whole, 100,284 housing units (18.7%) have been built since 1990 (Figure 3.10.8.1.2.2-1) (USCEN 2000b).

New housing growth has primarily occurred in the areas on the periphery of the historic population center of San Antonio. Many areas to the north of San Antonio surrounding Camp Bullis and Camp Stanley have a median housing age of 1988 to 1998, indicating that more than one-half of the housing units in these areas were built in the last 10 to 20 years.

Between 2000 and 2007, housing values in the study area were estimated to grow the fastest in Medina County. In 2007, Bexar County was estimated to have had the highest median housing value ($105,637), and Medina County was estimated to have the lowest median housing value ($97,372). In 2007, the median housing value for the City of San Antonio was estimated to reach $97,712, lower than the estimated values for Texas ($110,551) and the United States ($192,285) (Table C-121) (USCEN 2000b; ESRI BIS 2007).

In 2007, over one-half of the housing units in the study area were estimated to be valued between $50,000 and $150,000. Medina County had the largest proportion of housing units with estimated values less than $50,000, and Bexar County had the largest estimated proportion of housing units valued at over $150,000. Overall, the proportion of housing units valued at over $150,000 in the study area (28.8%) was estimated to be smaller than in Texas (32.7%) and the United States (61.7%) (Table C-122) (ESRI BIS 2007).

Between 1990 and 2000, median monthly rent in the study area grew the fastest in Medina County. In 2000, Bexar County had the highest median rent, and Medina County had the lowest median rent. The 2000 median rent in Bexar County ($479) was lower than the median rents in Texas ($490) and the United States ($519) (Table C-123) (USCEN 2000).

Overall, 79.6% of the housing units in the study area paid monthly rents between $200 and $749. Medina County had the largest proportion of housing units with a rent less than $200, and Bexar County had the largest proportion of housing units with rents over $1,000. Overall, the proportion of housing units with rents over $1,000 in the study area (3.9%) was lower than in Texas (4.6%) and the United States (8.4%) (Table C-124) (USCEN 2000b).

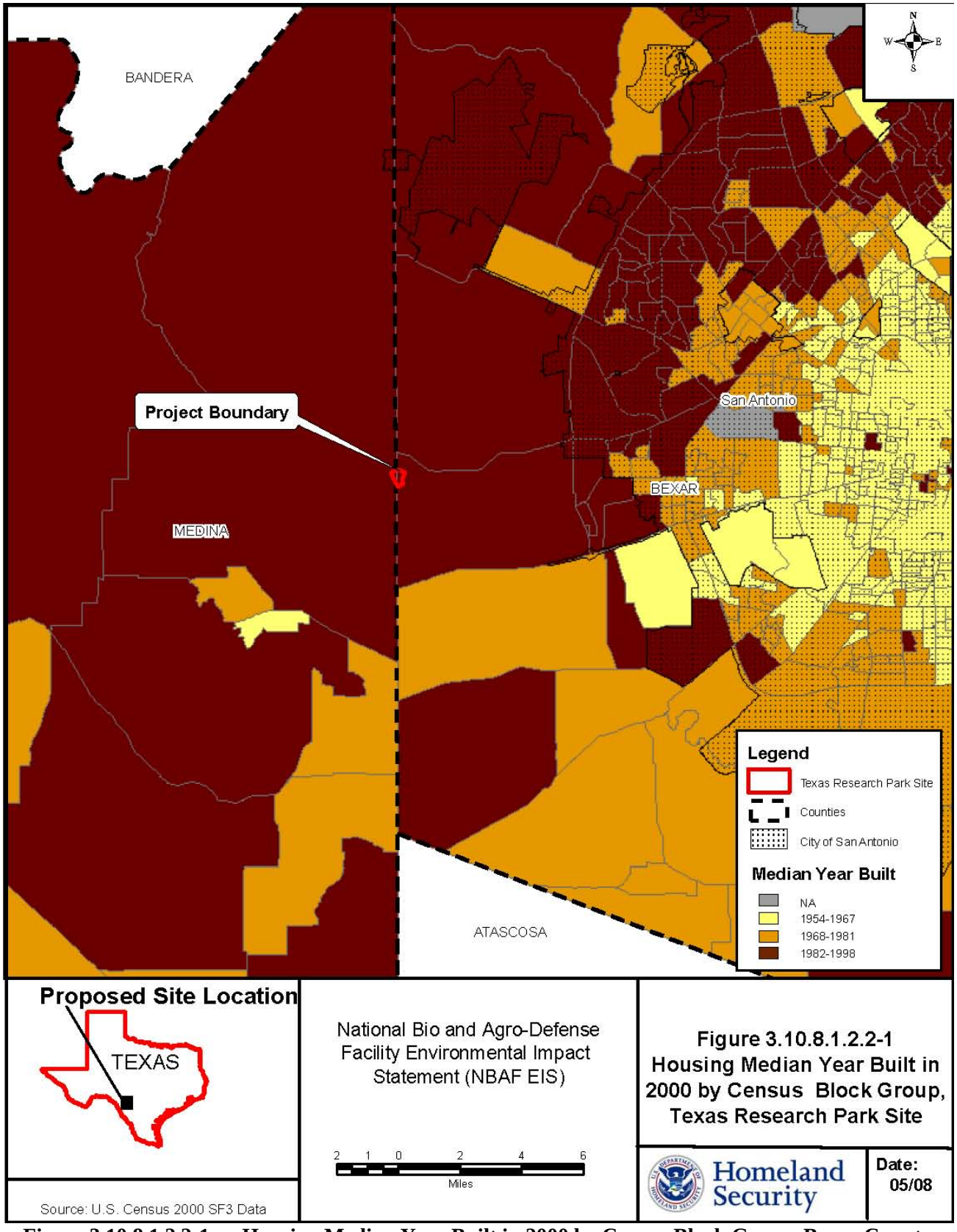


Figure 3.10.8.1.2.2-1 — Housing Median Year Built in 2000 by Census Block Group, Bexar County and Medina County, Texas

The majority of housing units permitted, as reported by the Census Bureau for 2005, were located in Bexar County. The least expensive housing units in the study area are being constructed in Medina County, and the most expensive housing units are being constructed in Bexar County (Table C-125) (USCEN 2000b).

3.10.8.1.3 Quality of Life (Community Services)

Quality of life encompasses those attributes of resources (man-made or natural occurring) of a region that contribute to the well-being of its residents. The relative importance of these attributes to a person's well-being is subjective. NEPA quality-of-life analyses typically address issues relating to potential impacts of the NBAF on the availability of public services that contribute to quality of life. For the purposes of this study, the quality of life of the affected environment includes public schools, law enforcement, fire protection services, medical facilities, and recreation facilities.

3.10.8.1.3.1 Public Schools

The proposed Texas Research Park Site is located in the San Antonio Independent School District. The district has 69 elementary schools, 29 middle schools, and 15 high schools that serve approximately 55,406 students. The student-to-teacher ratio for this district is 16 to 1 (SAISD 2007).

In addition, San Antonio has 39 other school districts. In total, 281,924 students attend 700 primary and secondary schools in which 420 are public and 109 are private. The average student body population is 460 students in elementary schools, 520 students in middle schools, and 649 students in high schools. The average student-to-teacher ratio in San Antonio is 13 to 1 within public schools and 10 to 1 within private schools. Also in the study area, Bexar and Medina Counties have a combined total of 45 school districts with a total student enrollment of 296,318 (TEA 2007).

3.10.8.1.3.2 Law Enforcement

The proposed Texas Research Park Site is served by the San Antonio Police Department (SAPD). The SAPD has approximately 2,085 actual personnel comprised primarily of lieutenants, sergeants, detectives, and patrol officers that are organized across six divisions: the Office of the Chief, the Administration Bureau, the Operations Bureau, the Patrol Division, the Investigations Division, and Internal Affairs. The SAPD serves the city through six substations and areas throughout San Antonio. In the period between 2004 and 2006, the SAPD responded to 996,515 calls, had an average emergency response time of 5.34 min, and a non-emergency response time of 17.3 min. The department provides a range of services that include community policing, traffic control, crime prevention, and family services (SAPD 2007).

Law enforcement services are also provided by the University of Texas at San Antonio (UTSA) Police Department. The jurisdiction of campus police officers who work for state institutions of higher learning includes Bexar County in which the property is owned, leased, rented, or otherwise under the control of the institution of higher education. The UTSA Police Department is divided into a Patrol Division and a Support Services Division, which includes criminal investigation and communications (UTSA 2007). The SAPD and UTSA Police Department maintain close working relationships with each other, as well as the Bexar County Sheriff's Office and federal, state, and other law enforcement agencies and routinely share investigative information. The study area is also served by the Medina County Sheriff's Office.

3.10.8.1.3.3 Fire Protection

The proposed Texas Research Park Site is served by the San Antonio Fire Department (SAFD). The SAFD mission is to prevent and minimize the loss of life and property of citizens and fire service personnel, provide Emergency Medical Services, mitigate the consequences of natural and man-made disasters, provide non-emergency support services, and safeguard the environment and economic base of our community. The SAFD operates 49 fire stations throughout the city, which maintains 49 engines in addition

to approximately 60 specialized fire safety vehicles, and a staff of 1,470 career firefighters and 45 non-firefighting personnel (SAFD 2007).

The SAFD's Emergency Medical Services utilizes 29 full-time units and 8 Peak Period Units (SAFD 2007). In addition to active fire response and emergency medical services, the department provides public outreach and educational services. Fire protection services are also provided to the study area by the Bexar and Medina County fire departments.

3.10.8.1.3.4 Medical Facilities

The proposed Texas Research Park Site is served by Christus Santa Rosa Health Care, a health care organization with facilities; the Christus Santa Rosa Hospital and the Christus Santa Rosa Medical Center, located on two campuses in two different areas of San Antonio. The Christus Santa Rosa Hospital is a 400 plus bed, adult acute-care facility providing several medical specialty services, including a comprehensive cancer program, transplant and orthopedic services, a Level 3 trauma center, and a 24-hour emergency room. The 178 plus bed Christus Santa Rosa Medical Center is also an acute-care adult facility that provides highly specialized services in addition to 24-hour emergency care. Additionally, CSRHC maintains a comprehensive care Children's Hospital. The hospital has over 200 beds and treats approximately 150,000 children each year in its more than 34 primary and specialty clinics. Christus Santa Rosa Health Care is also due to open a 150-bed full-service medical complex in San Antonio in 2008 (CSRMC 2007). The study area is also served by the University Health System/University Hospital, Bexar County Hospital, and Medina Community Hospital.

3.10.8.1.3.5 Recreation

As the seventh largest city in the United States, San Antonio offers a wide range of cultural, entertainment, and sporting activities. The city is famous for four historic sites, such as the Alamo, which are part of the historic walk called Missions Trail. Also, the River Walk is a strip full of shops, restaurants, clubs, and hotels along the San Antonio River. In addition to traditional holidays, San Antonio celebrates its Mexican heritage during Fiesta, a 10-day festival throughout the city that includes music, food, and a variety of art and street parades. San Antonio has many art galleries, museums, theatres, opera houses and playhouses, and the nationally recognized San Antonio Symphony (SARW 2008; SATC 2007).

San Antonio celebrates the success of several professional sports teams, such as the San Antonio Spurs basketball team. Minor league baseball and women's pro basketball are also popular sporting events. There are over 50 golf courses in the area and 26 year-round community centers. There are well over 100 parks, which include sports fields and courts, skate parks, community pools, designated natural areas, gardens, picnic areas, hiking trails, and a dog park. Also, a short distance from San Antonio is The Hill Country, a spot where families often enjoy remote getaways complete with small-town shopping, dining, outdoor activities, river tubing, water parks, and camping (SATC 2007; SAPR 2007). There are also parks and entertainment venues located throughout Medina County that offer additional recreational activities to the study area.

3.10.8.2Construction Consequences

3.10.8.2.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the construction phase. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment.

The economic benefits of construction would be temporary and would diminish as the construction reaches completion. Direct employment (Table 3.10.8.2.1-1) refers to the jobs associated with actual construction of the facility, while total employment refers to all other employment generated as a result of the multiplier

effect on the initial investment in construction of the facility. The industries that contribute to this other employment include architectural and engineering services, food services and drink establishments, wholesale trade, and employment services.

Based on the results of the impact analysis for the construction phase (Table 3.10.8.2.1-7), the construction of the proposed facility would — over the 4-year construction phase — directly support 2,429 person-yrs of employment (607 jobs annually) with an associated total employment level of 4,026 person-yrs (1,007 jobs annually) during the 4-year construction phase. The effects of this work are expected to be short term and would only last for the duration of the construction work.

Table 3.10.8.2.1-1 — Short-Term Economic Impacts

Construction	
Total Construction Jobs (person-yrs)	2,429
Impacts:	
Total Employment (person-yrs)	4,026
Total Labor Income Impact ($ millions)	180.5
Federal, State, and Local Tax ($ millions)	52.4
State and Local Tax ($ millions)	13.6

Note: In 2007 dollars.

In terms of income, minor short-term benefits would be expected. Labor income for any given region is defined as the sum of labor compensation and proprietor income generated within the regional boundaries[16]. The estimated labor income generated during the construction phase is $180.5 million ($45.1 million annually) measured in 2007 dollars. The total labor income impact of this project would correspond to 0.1% of all estimated 2006 labor income in the two-county region expressed in 2007 dollars or 0.1% of the total estimated labor income in Bexar County.

The construction phase would generate additional taxes estimated at $52 million (Table 3.10.8.2.1-1), of which approximately $13.6 million is estimated to be collected through state and local taxes that would flow to the local governments.

3.10.8.2.2 Population and Housing

3.10.8.2.2.1 Population

The majority of the construction workers would be drawn from the study area or would commute from the surrounding counties. Therefore, construction-related employment generated by the NBAF is not expected to result in an increase in the study area population. Any population change during construction would be temporary and would involve a small percentage of the total construction-period employment. Construction impacts on population and housing would be very similar to those described in Section 3.10.3.2.2.

3.10.8.2.2.2 Housing

As described above, the construction of the NBAF is not expected to increase the population of the study area. Therefore, no effects on housing availability or prices would occur.

3.10.8.2.3 Quality of Life (Community Services)

Construction impacts on quality-of-life attributes would be very similar to those described in Section 3.10.3.2.3.

[16] Proprietor income consists of payments received by self-employed individuals as income.

3.10.8.3Operations Consequences

3.10.8.3.1 Employment and Income

The proposed facility would have a small incremental benefit on the local economy during the operations and maintenance phase, which is expected to commence in the year 2014. Economic impacts would result from material purchases in the region generating local sales, payroll expenditures for labor on- and offsite, and related spending by supplying firms and laborers to satisfy the initial demand created by the project investment (Table 3.10.8.3.1-1).

Table 3.10.8.3.1-1 — Long-Term Annual Economic Impacts

Operations	
Jobs at the Facility (jobs)	326 [a]
Impacts:	
Total Employment (jobs)	507
Total Labor Income Impact ($ millions)	30.4
Federal, State, and Local Tax ($ millions)	4.0
State and Local Tax ($ millions)	1.7

Note: In 2007 dollars.
[a] Actual jobs would range from 250 to 350; 326 was used for cost estimating purposes and the basis for the economic analysis.

Operation of this proposed facility would commence in 2014 and would require 145 operations, maintenance, and security staff and an additional 181 scientific and support staff. The operations and maintenance of the proposed facility would generate a total of 507 jobs including the initial 326 direct jobs required for operations and maintenance (see footnote in Table 3.10.8.3.1-1 regarding actual NBAF employment figures) (NDP 2007a).

The estimated income generated during the operations phase is $30.4 million annually in 2007 dollars. This corresponds to less than 0.1% of all estimated 2006 labor income in the two-county region, expressed in 2007 dollars, and also less than 0.1% of total labor income in Bexar County.

The operations phase would generate additional taxes estimated at $4 million (Table 3.10.8.3.1-1), of which $1.7 million is estimated to be collected through state and local taxes that would flow to the local governments.

3.10.8.3.2 Population and Housing

3.10.8.3.2.1 Population

The NBAF would directly employ 326 people. The majority of these employees are expected to be research scientists and other specialized staff, and based on census journey-to-work data, 296 are expected to relocate to the study area from elsewhere in the country. Assuming the U.S. 2006 average family size of 2.6 persons, this would represent a population increase of 772.

In addition, the economic activity associated with the operation of the NBAF is expected to employ 181 persons. The industries that will contribute to this indirect employment include those in non-specialized areas such as food services and drink establishments and wholesale trade, among others. It is assumed that these employment opportunities will be filled by the local labor force and that the relocation of workers to the study area due to the generation of these jobs will be negligible.

In total, the population of the study area is expected to increase by 772 as a result of the operation of the NBAF. This population increase is a very small portion of the overall expected population growth within the

study area between 2007 and 2012 (150,919, based on historic trends), which is expected to result in a total study area population of 1,784,898 in 2012.

3.10.8.3.2.2 Housing

As described above, 772 additional persons would locate to the study area as a result of the NBAF. The average salary including benefits of the 326 employees employed directly at the NBAF would be $82,622. For comparative purposes, this figure has been adjusted to an average per capita income of $66,924 for employees employed directly at the NBAF, which is higher than the estimated median 2007 study area per capita income ($20,816). Over 80 NBAF research scientists and managers would earn over $125,000 annually. The estimated median value of owner-occupied housing units in the study area in 2007 was estimated to be $101,505 (Table C-121). Taking into account families with two incomes, the available study area housing stock would be affordable to the majority of the people relocating to the region.

The housing market would be able to meet the increase in housing demand (326 employees in total), relative to the estimated growth of the existing population between 2007 and 2012 (150,919). It is possible that with the relocation of highly skilled workers to the immediate area, property values could increase due to an increase in demand, and there is no empirical evidence that a facility such as the NBAF would reduce property values in the study area. Therefore, the overall effect of the NBAF on housing market conditions would be negligible.

3.10.8.3.3 Quality of Life (Community Services)

Due to small percentage of the overall population growth that is attributed to the facility, the NBAF would have a negligible effect on the availability of public services. The study area population growth attributed to the NBAF is 0.5% of the overall estimated population growth from 2007 to 2012.

3.10.8.3.3.1 Public Schools

The NBAF would add approximately 160 school-aged children to the study area or an 0.3% increase in the 2006/2007 school year 55,406 enrollment of the San Antonio Independent School District (TEA 2007). The 0.3% increase in school-aged children attributed to the NBAF would place minimal demand on the schools.

To meet the needs of the overall population growth, school districts in the study area have invested in educational facilities. For example, the San Antonio Independent School District has had two bond issues in the last 10 years to support new facilities: a $483.5 million bond issue in 1997 and a $126.5 million bond issue in 2001 (SAISD 2007).

3.10.8.3.3.2 Law Enforcement

The population increase associated with the NBAF (772), relative to the estimated growth of the existing population between 2007 and 2012 (150,919), would result in a negligible increase in the need for additional law enforcement services.

3.10.8.3.3.3 Fire Protection

The population increase associated with the NBAF (772), relative to the estimated growth of the existing population between 2007 and 2012 (150,919), would result in a negligible increase in the need for additional fire protection services.

3.10.8.3.3.4 Medical Facilities

The additional population associated with the NBAF (772), relative to the expected growth of the existing population between 2007 and 2012 (150,919), would result in a negligible increase in the demand for medical services and facilities.

Due to the overall population growth in the region, medical facilities in the study area are responding to growth in the region and expanding to meet the increasing demand. For example, Christus Santa Rosa Health Care is planning to open a new 150-bed full-service medical complex in San Antonio in 2008 (CSRMC 2007).

3.10.8.3.3.5 Recreation

Recreational resources would not experience a significant increase in utilization rates as a result of the population increase associated with the NBAF. The study area has abundant recreation resources available.

3.10.8.3.3.6 Health and Safety

The normal operation of the proposed facility would pose no additional health or safety risks to the public because the facility would be closed off to public access at all times. Further analysis with regard to abnormal operation of the proposed facility is presented in Section 3.14, Health and Safety.

3.10.9 Accidental Release Scenario

FMDV, RVF, and Nipah virus were selected as the pathogens to be analyzed for economic consequences. The diseases caused by these three viruses sufficiently cover the spectrum of outcomes that would likely occur if any of the pathogens to be studied at the NBAF were to escape to the surrounding areas and infect animal and human populations. Appendix D provides a more detailed assessment of potential economic damage to the U.S. economy resulting from a pathogen release from the NBAF. To the extent possible, this assessment used conditions at each site to differentiate the levels of economic risk posed at each site.

FMD is the most well-known and documented of the three diseases. An FMD outbreak has the capacity to wreak havoc on the livestock economy. The RVF and Nipah viruses pose potential threats to both livestock and human populations. A release of pathogens could potentially affect wildlife populations. Information is limited on the possible role of wildlife in the maintenance and amplification of these pathogens. However, it is likely that the release would negatively impact regional hunting-related industries (see Section 3.10.3.1.1.3 for a description of the study area's hunting industry).

Due to the combination of Nipah's epidemiology and the prevailing practices of livestock and human health management in the United States, the anticipated negative economic consequences resulting from a loss of containment scenario involving the Nipah virus are likely to be much lower than those involving FMD or RVF viruses. As a result, the focus of a worst-case scenario centers on the possible effects of FMD and RVF on local human and animal populations.

FMD is a highly contagious viral disease that affects all cloven-hoofed animals including cattle, pigs, sheep, goats, deer, and bison. The virus can also be carried by a variety of animals that are not susceptible to the disease such as birds, dogs, cats, and rodents, as well as feed trucks, fomites, etc. Because pigs shed the virus much more heavily than other hosts and because cattle are the most susceptible to infection, outbreaks of the disease are most likely to occur in environments where there is a dense livestock population that includes large numbers of both cattle and pigs and also where significant movements of livestock occur, usually in areas with a relatively high concentration of commercial agriculture.

Several studies have been carried out to estimate the potential economic impacts that would arise from an FMD outbreak in the United States and various states with due consideration given to the effects of export

bans on U.S. livestock products (Ekboir 1999; Pendell et al. 2007). Projected impacts to the U.S. livestock industry of an FMD outbreak similar in scale to the 2001 United Kingdom episode have been estimated to range from $10 to $30+ billion, with individual states facing losses to farm income in smaller ranges depending on each state's economic reliance on this industry. More information on the 2001 United Kingdom episode is provided in Appendix D.

A recent modeling study found that a major FMD outbreak in a 14-county southwestern Kansas region could cost the sizeable livestock industry (2 million cattle) nearly $1 billion based on 2005 data (Pendell et al. 2007). Kansas produces about 1.5 million calves, markets 5.5 million head of fed cattle, and slaughters 7.5 million head of cattle annually. The large commercial cattle feedlot and beef packing industries together bring more than 100,000 head of cattle per week on average into the state for feeding or processing. The modeling study found that depending on the release scenario (the introduction of the disease to a single cow or the infection of feedlots of different sizes), an outbreak is estimated to result in regional economic losses ranging from $36 to $945 million within the 14-county region. The modeling study also estimated that in the event of a large-scale outbreak, activities in meat processing, trade, and animal movement would significantly slow down and that the anticipated export bans would further exacerbate the economic decline.

The magnitude of anticipated economic impacts obtained from the Kansas 14-county region analysis, comport well to a very limited preliminary study conducted by the Lawrence Livermore National Laboratory (LLNL) that evaluated the potential impact of an FMD release at the six candidate sites. In this study, the estimated costs resulting from industry disruptions to each study area ranged from $31 Million at the Plum Island site, to approximately $1 Billion at the Manhattan site. In addition to the regional economic impacts, each site was also evaluated for larger economic costs arising from foreign trade bans and these costs were significantly higher for each site, ranging from $2.7 Billion at the Plum Island site to $4.1 Billion at the Manhattan site. The losses resulting from local industry disruptions tend to account for most of the differences in the total economic costs (industry disruption costs plus trade ban costs) associated with each candidate site. Because the industry disruption costs are generally related to the size of livestock operations, the size of the local livestock industry serves as the leading discriminator among the candidate sites. More information on some the details of this analysis are provided in Appendix D.

RVF can affect many species of animals including domestic livestock such as cattle, sheep, goats, buffalo, camels, and non-domestic animals such as monkeys, gray squirrels, mice and other rodents. In humans, RVF manifests itself as an acute onset of fever in the majority of individuals that become infected. Severe illness occurs in about 1% to 3% of cases, and overall mortality rate is approximately 1%. Establishment of RVF would primarily rely on the amenability of the geographical location to a competent disease carrier's (e.g., *Aedes* and *Culex* mosquito species) presence and the availability of susceptible hosts (animals and humans) to maintain a sufficiently large virus reservoir for retransmission to biting mosquitoes.

Because it is carried by mosquitoes, RVF virus would be expected to spread in a manner similar to the West Nile Virus (WNV). Estimates of the economic cost of a WNV outbreak in Louisiana in 2002 exceeded $20.1 million, and these costs reflect the economic impacts of the outbreak on human health only. Although there are similarities in the way RVF and WNV are spread, the per capita costs of responding to a RVF virus outbreak are expected to be higher than those associated with responding to WNV. The Rift Valley Fever Working Group developed a bioterrorist RVF release scenario that estimated 114 human deaths and the economic impact on the United States to exceed $50 billion due to losses in livestock and related industries (Pendell et al. 2007). Most nations would almost certainly ban the export of U.S. meat products, which in 2006 totaled more than $4 billion, while damage to the domestic industry could also be significant given that the value of the major livestock (cattle, calves, hogs, and sheep) in the U.S. meat industry alone was estimated at $95.9 billion in 2006[17].

The accidental release of the virus from the proposed research center would not likely lead to such dire consequences in the short term; although, if the virus were to become established in the environment

surrounding the facility, it would likely spread over time to other areas, eventually causing the magnitude of losses projected for the bioterrorism scenario described above. Appendix D provides a more details on potential economic impacts to the U.S. economy resulting from a pathogen release from the NBAF (USDA 2008).

3.10.9.1 South Milledge Avenue Site

3.10.9.1.1 FMD

In comparison to the Kansas FMD modeling scenario, the cattle and pork industries in Georgia and in the counties adjacent to the proposed South Milledge Avenue Site in particular are relatively small. In 2008, animal production activity in the six-county region generated $559 million of industry output (Table C-28). The majority was from poultry and egg production ($512 million), which is not expected to be at risk from the accidental release of pathogens from the facility. The LLNL study estimates total economic costs of $3.35 Billion at this site, with approximately $154 Million attributed to industry disruption losses, and $94 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006; Pendell et al. 2007).

3.10.9.1.2 RVF

The warm climate and typical absence of freezing temperatures and the presence of aquatic habitats in the area surrounding the South Milledge Avenue Site, would increase the likelihood that the RVF virus would establish a sustainable reservoir. Multiple species of mosquitoes capable of transmitting the virus are present, making this site more prone to epidemic and endemic spread of the RVF virus than other alternative site locations. The facility would also be located near Athens with a population estimated at 102,498 in 2003 (estimated population density of 867 persons per square mile). In addition, despite the moderate to relatively low density of livestock populations surrounding the proposed South Milledge Avenue Site (see Section 3.10.3.1.1.2 for detailed agricultural characteristics), other animals (e.g., squirrels and field mice) would become viremic and spread the virus (USCEN 2008; NDP 2007a).

3.10.9.2 Manhattan Campus Site

3.10.9.2.1 FMD

In comparison to the scenario in southwestern Kansas, the cattle industry in the seven-county study area where the proposed Manhattan Campus Site is located is also relatively small. Cattle ranching activity in the 14-county southwestern Kansas region is estimated to have directly generated $1.8 billion in 2006 dollars, whereas the corresponding amount for the seven-county study area around the proposed Manhattan Campus Site is estimated to generate approximately $336 million[18]. The LLNL study estimates total economic costs of $4.2 Billion at this site, with approximately $1 Billion attributed to industry disruption losses, and $97 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006; Pendell et al. 2007).

3.10.9.2.2 RVF

The climate conditions during the winter months in the area surrounding Manhattan do not provide the most suitable environment for mosquito species to breed and, therefore, the ability for the RVF virus to establish a sustainable reservoir is hindered during these times as compared to other alternative site locations. However, the facility's proposed location is in an urbanized area that although only supported a local population estimated at 44,733 in 2003, had an estimated population density at the time of approximately 2,982 persons per square mile (see Section 3.10.4.1.2.1, Population, for detailed population statistics). The proposed site is also surrounded by high-density livestock populations in Riley and other adjacent counties (see

[18] Refer to Appendix C for more detailed breakout of literature review.

Section 3.10.4.1.1.2, Agricultural Industry, for detailed agricultural characteristics) (DHS 2007). Appendix D provides a more details on potential economic impacts to the U.S. economy resulting from a pathogen release from the NBAF.

3.10.9.3Flora Industrial Park Site

3.10.9.3.1 FMD

In comparison to the scenario in Kansas, the cattle and pork industries in Mississippi and in the counties adjacent to the proposed site, in particular, are relatively small. Animal production activity in the eight-county region generated $579 million of industry output in 2006, the majority of that was from poultry and egg production ($516 million), which is not expected to be at risk from the accidental release of pathogens from the facility. The LLNL study estimates total economic costs of $3.4 Billion at this site, with approximately $216 Million attributed to industry disruption losses, and $94 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006; Pendell, et al. 2007).

3.10.9.3.2 RVF

The warm climate and typical absence of freezing temperatures and the presence of aquatic habitats in the area surrounding the Town of Flora should increase the likelihood that the RVF virus can establish a sustainable reservoir. Multiple species of mosquitoes capable of transmitting the virus are present, making this site more prone to epidemic and endemic spread of the RVF virus than other alternative site locations.

Flora is characterized by a small population estimated at 1,546 in 2000 (estimated population density of 455) and a low density of livestock populations in the surrounding area and adjacent counties (see Section 3.10.5.1.2 for detailed population statistics and Section 3.10.5.1.1.2 for detailed agricultural characteristics). However, the City of Jackson—with a population of 179,599 in 2003 (population density 1,710.5 persons per square mile)—is approximately 12 miles away from the proposed site location for this facility (USCEN 2008 ; NDP 2007a). In addition, despite the low number of nearby livestock, other animals (e.g., squirrels and field mice) could become viremic and spread the virus.

3.10.9.4Plum Island Site

3.10.9.4.1 FMD

In comparison to the scenario in Kansas, the cattle, ranching, and pork industries are not only relatively small in the counties adjacent to the proposed site, but also the immediate vicinity of the Plum Island location is virtually free of livestock population, and the island's geographic isolation from the mainland significantly mitigates the risk of containment failures affecting any livestock population in the three counties studied. The LLNL study estimates total economic costs of $2.8 Billion at this site, with approximately $31 Million attributed to industry disruption losses, and $93 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006; Pendell, et al. 2007).

3.10.9.4.2 RVF

The climate conditions during the winter months on Plum Island do not provide a suitable environment for mosquito species to breed, and therefore, the ability for the RVF virus to establish a sustainable reservoir is hindered during these times, as compared to other alternative site locations. Moreoever, the island is separated from the nearest land by 2 miles of open water, and mosquitos' range of flight are typically limited to 200 yards. In addition, prevailing winds blow seaward from the island. It is unclear to what extent humans could serve as infectious sources for feeding mosquitoes, but Plum Island itself does not have a residential population. The only human population associated with the location would be the 326 employees of the proposed facility. The overall combination of these factors significantly diminishes the likelihood of RVF virus becoming established in the local environment, as compared to the other site locations.

3.10.9.5Umstead Research Farm Site

3.10.9.5.1 FMD

In comparison to the scenario in Kansas, the cattle and pork industries in North Carolina and in the counties adjacent to the proposed site in particular are relatively small. In 2006, animal production activity in the eight-county region generated only $69 million of industry output compared to a total industry output of $119 billion (Table C-91). The LLNL study estimates total economic costs of $3 Billion at this site, with approximately $430 Million attributed to industry disruption losses, and $94 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006, Pendell, et al. 2007).

3.10.9.5.2 RVF

The climate conditions during the winter months in the area surrounding Butner do not provide the most suitable environment for mosquito species to breed and, therefore, the ability for the RVF virus to establish a sustainable reservoir is hindered during these times as compared to other alternative site locations. However, during most months, temperatures would be favorable for breeding, and the presence of multiple species of mosquitoes capable of transmitting the virus could make this site more prone to epidemic and endemic spread of RVF than the other site locations.

The Town of Butner is characterized by a small, local population estimated at 5,792 in 2000 (estimated population density of 876) and a low density of livestock populations in the surrounding area and adjacent counties (see Sections 3.10.7.1.2 and 3.10.7.1.1.2 for detailed population statistics and detailed agricultural characteristics). However, the City of Durham, with a population of 198,376 in 2003 (population density 2,088 persons per square mile), is approximately 9 miles away from the proposed site location for this facility (USCEN 2008; DHS 2007). In addition, despite the low number of nearby livestock, other animals (e.g., squirrels and field mice) could become viremic and spread the virus.

3.10.9.6Texas Research Park Site

3.10.9.6.1 FMD

In comparison to the scenario in Kansas, the cattle and pork industries in the counties adjacent to the proposed site are relatively small. Animal production activity in the eight-county region generated only $284 million of industry output compared to a total industry output of $129 billion (Table C-112). The LLNL study estimates total economic costs of $3.1 Billion at this site, with approximately $940 Million attributed to industry disruption losses, and $93 Million attributed to government costs incurred during containment activities (refer to Appendix D). (MIG 2006; Pendell, et al. 2007).

3.10.9.6.2 RVF

The warm climate and absence of freezing temperatures and the presence of aquatic habitats in the area surrounding San Antonio should increase the likelihood that the RVF virus can establish a sustainable reservoir. Multiple species of mosquitoes capable of transmitting the virus are present, making this site more prone to epidemic and endemic spread of the RVF virus as compared to other alternative site locations. The proposed facility is also located right on the outskirts of San Antonio with an estimated population of 1,214,725 in 2003 (population density 2,977.3 persons per square mile) in addition to a moderately dense level of livestock population in the surrounding area and adjacent counties (see Sections 3.10.8.1.2 and 3.10.8.1.1.2 for detailed population statistics and agricultural characteristics). This factor, in combination with climatic conditions, favors the virus' spread at this proposed site location compared to other alternative site locations (USCEN 2008; DHS 2007).

3.11 TRAFFIC AND TRANSPORTATION

3.11.1 Methodology

The general methodology for the inclusion of traffic and transportation data for each site involved the collection and verification of current/planned site and regional traffic and transportation data, the identification of NBAF design-based traffic and transportation conditions, and finally the identification and evaluation of site-specific and/or regional impacts resulting from construction and facility operation. The results of this methodology are presented in the following subsections.

3.11.2 No Action Alternative

This section presents an overview of the transportation modes and corridors that are currently used to transport biological or other hazardous materials and supplies to and from the PIADC.

3.11.2.1Affected Environment

3.11.2.1.1 Highways, Roads, and Marine Transportation

The PIADC is located on the southeastern coast of Plum Island, New York. Plum Island is 840 acres in size and is situated approximately 1.5 miles northeast of Long Island and about 12 miles southwest of New London, Connecticut (Figure 3.11.2.1.1-1). A strait known as Plum Gut separates Plum Island from Orient Point, the easternmost tip of Long Island's North Fork. Other bodies of water surrounding the island include Long Island Sound to the north, Block Island Sound to the east, and Gardiners Bay to the south. Primary access points to Plum Island include Long Island, New York and Old Saybrook, Connecticut. Restricted access ferry service to Plum Island is available from Orient Point, New York, and Old Saybrook, Connecticut.

From Long Island, New York, the Long Island Expressway (Interstate 495) provides a high-volume east-west artery from New York City and between communities on Long Island (Nassau and Suffolk Counties). East of the terminus of I-495 at the Town of Riverhead, traffic destined for the North Fork of Long Island from the west is serviced by NYS Route 25 and CR 48, two-lane highways that represent the primary collector road systems for the area. Routes 25 and 48 traverse the Town of Southold west to east, eventually merging into Route 25 and reaching Orient Point where restricted ferry service is available to Plum Island from the Plum Island ferry terminal. According to traffic studies conducted by the Town of Southold, traffic has increased steadily in the North Fork area, averaging 38% from 1993 to 2006 for an annual increase of 2.9% per year based on New York State Department of Transportation (NYSDOT) data. Although the increase in traffic results in decreasing mobility and increasing congestion at times and may result in significant congestion in the future, the study concluded that there are currently no major congestion issues.

The Long Island public ferry facilities within the town of Southold are located in Orient Point and Greenport. The North Ferry Company operates year-round ferry service from Shelter Island to Greenport for cars, trucks, and passengers. The Cross Sound Ferry Services operates ferry service form Orient Point to New London, Connecticut, for cars, trucks, and passengers. In addition, Sea Jet Service is available for passengers only. The Plum Island Ferry is a restricted ferry service operating from Orient Point to Plum Island and transports employees, contractors, and visitors of PIDAC only. The Plum Island ferry terminal is located adjacent to the public ferry terminal of Cross Sound Ferry Services. Orient Point is the closest land mass to Plum Island and affords the best and most expedient means for transporting people and heavy and/or bulk materials to/from Plum Island. Transit times between the terminals at Orient Point and Plum Island’s Plum Gut Harbor are approximately 20 to 30 min depending on sea conditions.

Figure 3.11.2.1.1-1 — Plum Island Site Roads

From Connecticut, Interstate 95 is the major high-volume highway serving through traffic and the communities of the Connecticut coast, including Middlesex and New London counties. From I-95, access to Plum Island is from the Old Saybrook Dock in the Town of Old Saybrook, Connecticut. The Old Saybrook Dock is located approximately 2 miles south of the intersection of Highway 95 and SR 9. Several transportation routes including U.S. Highway 1 and State Highway 154 are available from I-95 to the PIADC's docking facilities. These routes are largely limited to two-way, multi-lane light commercial streets.

Cross Sound Ferry Services operates ferry service form Orient Point, on Long Island to New London, Connecticut, for cars, trucks, and passengers. In addition, Sea Jet Service is available for passengers only. The Plum Island Ferry at Old Saybrook is a restricted ferry service operating from the Old Saybrook dock to Plum Island for the transport of PDIAC employees only. Plum Island ferry transportation services from the Old Saybrook dock do not include the transportation of heavy and/or bulk materials. For transportation of these items from Connecticut, ferries must depart from New London (or other ports) on commercial ferries, as PIADC has no freight loading or transport capabilities at its docking facility at Old Saybrook. Transportation from these alternate ports require more than 1 hour each way to complete the passage of heavy/bulk loads.

Ferry access to Plum Island is restricted and limited to employees, contractors, and visitors of PIADC. Transportation on the island is essentially restricted to government-owned vehicles; however, contractor- and privately owned vehicles are occasionally allowed on the island by special permission. All employees and visitors to PIADC use the government-owned and contractor-operated marine transportation to and from Plum Island. The government ferries depart daily from Orient Point, New York, and Old Saybrook, Connecticut. Docking or landing of private marine vessels is prohibited unless specifically authorized by PIADC's security department. Non-governmental marine access is exclusively restricted to landings of cargo and equipment (e.g., construction materials and heavy construction vehicles, fuel oil tankers) that PIADC's marine fleet cannot safely or effectively transport.

3.11.2.2Construction Consequences

There would be no construction consequences to existing highways, roads, or marine transportation infrastructure or traffic patterns from the No Action Alternative.

3.11.2.3Operation Consequences

There would be no operation consequences to existing highways, roads, or marine transportation infrastructure or traffic patterns from the No Action Alternative.

3.11.3 South Milledge Avenue Site

3.11.3.1Affected Environment

3.11.3.1.1 Highways and Roads

The South Milledge Avenue NBAF site is located in the southern part of Clarke County, near Athens, Georgia. Athens Perimeter Highway, a freeway encircling the city of Athens, is approximately 1 mile north of the South Milledge Avenue NBAF site. Athens Perimeter Highway (Georgia 10 Loop) connects with many highways, including U.S. 29 and State Highway 316, which run west from Athens towards Atlanta. U.S. 441 and U.S. 129 provide access to Interstates 85 and 20, which are both less than 30 miles from the South Milledge Avenue NBAF site. The South Milledge Avenue NBAF site is accessed from the eastbound lane of Athens Perimeter Highway by exiting South Whitehall Road and proceeding south for 1 mile. Figure 3.11.3.1.1- 1 shows the significant roads near the South Milledge Avenue NBAF site.

3.11.3.2Construction Consequences

3.11.3.2.1 Highways and Roads

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during construction of the South Milledge Avenue NBAF. Construction vehicles would operate primarily during the daylight hours and be parked onsite over night. Parking for site or construction workers during hours of construction activities would be on or adjacent to the South Milledge Avenue NBAF construction site. During construction activities, some vehicular and pedestrian traffic may be rerouted to avoid the construction areas. Any roadway or pedestrian walkway closures and associated rerouting would be limited to the immediate area of construction and would not include general area traffic within the immediate vicinity or effect regional traffic patterns. The construction phase would be temporary and in some cases may be intermittent, occurring only during certain construction stages or times of day.

Mobilization and demobilization would result in trips of heavy equipment and light- and medium-weight vehicles for the entire 4-yr construction period. Deliveries of soil, backfill, and building materials are expected to occur an average of twice daily for a 6-month window of time (NDP 2007a).

3.11.3.3Operation Consequences

3.11.3.3.1 Highways and Roads

According to traffic analysis performed by the Georgia Department of Transportation and Public Works, critical traffic flow would occur at the intersection of Whitehall Road and South Milledge Avenue, as well as at Milledge Avenue and the South Milledge Avenue NBAF entrance (ACC 2007a).

At Whitehall Road and South Milledge Avenue, critical movement would occur at the northbound left turn from Whitehall Road onto South Milledge Avenue and the eastbound left turn onto Whitehall Road from South Milledge Avenue. The northbound critical movement that currently operates at Level of Service (LOS) "C" during the morning peak hours would lessen to LOS "D" in 2014. [Note: LOS ratings range from "A" (best rating; lowest delay) to "F" (worst rating; highest delay)].

The northbound critical movement currently operates at LOS "F" during the nighttime peak hour. The eastbound critical movement currently operates at LOS "F" during both the morning and nighttime peak hours. After the construction of the South Milledge Avenue NBAF, the northbound movement would operate at LOS "E" in 2014. The eastbound movement would remain at LOS "F."

The critical movements at South Milledge Avenue and the South Milledge Avenue NBAF entrance occur in the westbound left turn from South Milledge Avenue into the South Milledge Avenue NBAF and the northbound left turn from the South Milledge Avenue NBAF onto South Milledge Avenue. The northbound movement would operate at LOS "F" for both the morning and nighttime peaks hours in 2009 and 2014. The westbound movement would operate at LOS "B" for the morning peak in 2009 and 2014 and the westbound movement would operate at LOS "B" in the nighttime peak for 2009 and LOS "C" in the nighttime peak for 2014.

The Department of Transportation and Public Works recommends that the intersection at Whitehall Road and South Milledge Avenue be redesigned as a standard intersection with signals and separate left and right turn lanes on South Milledge Avenue, as well as left and right turn lanes on Whitehall Road.

The LOS for the South Milledge Avenue NBAF drive access at South Milledge Avenue is "F." The Department of Transportation and Public Works recommends that there be two points of access to the South Milledge Avenue NBAF, with a minimum 300 feet separation. The Department of Transportation and Public Works also recommends a dedicated left turn lane on westbound South Milledge Avenue into the facility (ACCG 2007).

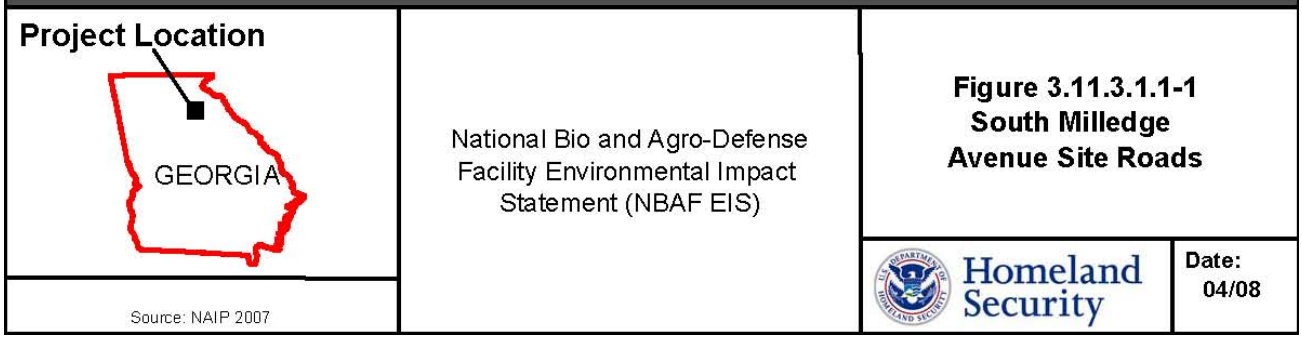


Figure 3.11.3.1.1-1 — South Milledge Avenue Site Roads

The additional vehicles from approximately 350 new employees represent a small fraction of the total vehicles in the City of Athens. South Milledge Avenue has an average daily traffic volume of 10,860 vehicles (ACC 2007a). The Department of Transportation and Public Works estimated that the 350 employees could make a total of 1,000 trips per day. This would increase daily traffic volume on South Milledge Avenue by approximately 9%.

The Athens-Clarke County Fire and Emergency Services would provide fire and emergency services to the South Milledge Avenue NBAF. Response time is currently estimated at slightly more than 5 min. South Milledge Avenue NBAF security measures on-property would also be incorporated.

Cumulative Impacts

According to the University of Georgia Office of the University Architects for Facilities Planning (Kevin Kirsche, UGA, January 25, 2008), UGA has no immediate projects of significant consequence planned for areas surrounding the proposed South Milledge Avenue Site. Five significant development projects anticipated by the University over the next 5 years and 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). However, it is anticipated that the rapid population growth of Clarke County would continue with associated increase of traffic on highways and roadways in the area.

The ROI for traffic was determined to be the 2-mile radius around the South Milledge Avenue Site. It is not likely that future foreseeable actions beyond this area would have a cumulative effect on traffic. Although the NBAF would result in an increase in traffic within this radius, there would be not be substantial cumulative impacts since there are no identified future actions within the ROI.

3.11.4. Manhattan Campus Site

3.11.4.1Affected Environment

3.11.4.1.1 Highways and Roads

The Manhattan Campus NBAF site is located in north-central Manhattan, Kansas, at the southeast corner of Denison and Kimball Avenues (Figure 3.11.4.1.1-1). The major highway in the vicinity of the Manhattan Campus NBAF is I-70, which runs east-west approximately 12 miles (19.3 kilometers) south of the Manhattan Campus NBAF site.

3.11.4.2Construction Consequences

3.11.4.2.1 Highways and Roads

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during construction of the Manhattan Campus NBAF. Construction vehicles would operate primarily during the daylight hours and be parked onsite over night. Parking for site or construction workers during hours of construction activities would be on or adjacent to the Manhattan Campus NBAF construction site. During construction activities, some vehicular and pedestrian traffic may be rerouted to avoid the construction areas. Any roadway or pedestrian walkway closures and associated rerouting would be limited to the immediate area of construction and would not include general area traffic within the immediate vicinity or effect regional traffic patterns. The construction phase would be temporary and in some cases may be intermittent, occurring only during certain construction stages or times of day.

Mobilization and demobilization would result in trips of heavy equipment and light- and medium-weight vehicles for the entire 4-yr construction period. Deliveries of soil, backfill, and building materials are expected to occur an average of twice daily for a 6-month window of time (NDP 2007a).

3.11.4.3 Operation Consequences

3.11.4.3.1 Highways and Roads

According to a 2005 traffic analysis performed by the National Transportation Board, the traffic flow critical to the Manhattan Campus NBAF is Denison Avenue from Anderson Avenue to Kimball Avenue. This portion of Denison Avenue is classified as a Collector road by the City of Manhattan, Kansas. It is currently one lane in each direction. A range of intersection controls exist throughout the study corridor from signals to stop control. Because the corridor borders the west side of the KSU campus, there is heavy pedestrian and bicycle traffic in conjunction with vehicular traffic. Recommended improvements to the Denison Avenue corridor include modifying Denison Avenue to a three-lane section (one lane in each direction with a center turn lane) for the length of the corridor, the complete reconstruction of pavement from Claflin Road to Kimball Avenue, and intersection improvements at Anderson Avenue, Claflin Road, Jardine Road, and Kimball Avenue (HNTB 2005).

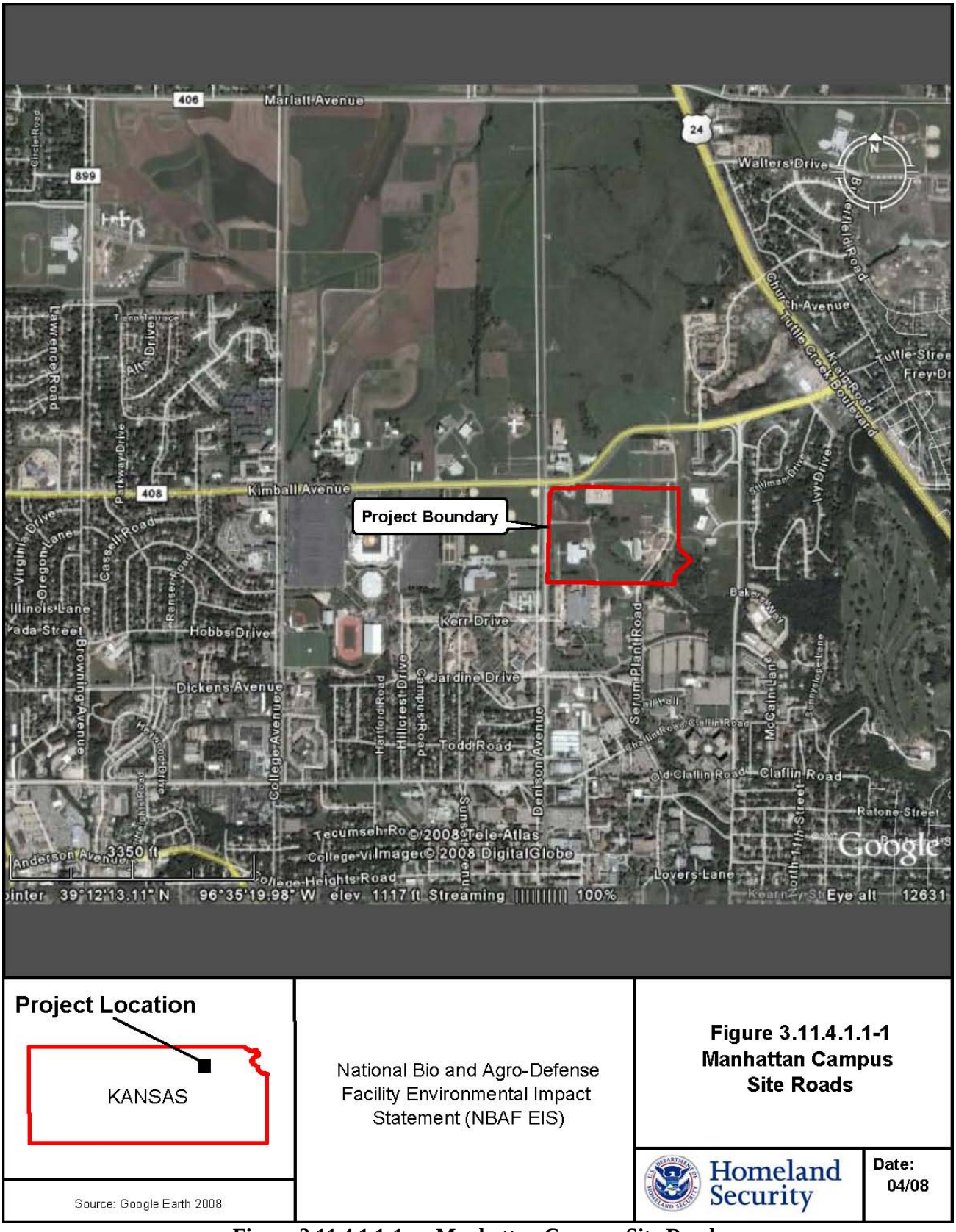
The 2005 average daily traffic (ADT) for the Denison Avenue corridor segment from Jardine Road to Kimball Avenue (adjacent to the Manhattan Campus NBAF) was reported as 10,031 vehicles per day. Using the projected traffic growth rate of 4.6 per annum, the 2008 ADT for the Denison Avenue corridor segment from Jardine Road to Kimball Avenue. is estimated at 11,480 vehicles per day (HNTB 2005). The Manhattan Campus NBAF will impact traffic in the Denison Avenue corridor by the addition of 350 new employees making approximately 1,000 trips per day. This impact would increase the daily traffic volume within the Denison Avenue corridor by approximately 8.7%. The additional vehicles from approximately 350 new employees represent 0.9% of the total vehicles in Riley County (41,160) (City Data 2007).

The City of Manhattan would provide fire and emergency services to the Manhattan Campus NBAF. A manned fire station is located directly north of the proposed site on Kimball Avenue. As a result fire response time is expected to be less than 1 min.

Cumulative Impacts

According to KSU (Ron Trewyn, KSU, January 28, 2008), there are 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.



Project Location

Source: Google Earth 2008

National Bio and Agro-Defense Facility Environmental Impact Statement (NBAF EIS)

Figure 3.11.4.1.1-1 Manhattan Campus Site Roads

Homeland Security

Date: 04/08

Figure 3.11.4.1.1-1 — Manhattan Campus Site Roads

The ROI for traffic is a 2-mile radius around the proposed NBAF site. The NBAF would result in an increase in traffic as described in Section 3.11.4, and the additional future projects would contribute to the increase in traffic as well. The addition of 150 to 180 full- or part-time jobs with the Kansas State Equine Education Center and the Flint Hills Horse and Park Events Center to the 250-350 jobs with the proposed NBAF represents a small percentage of related traffic on the KSU campus and Riley County.

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.

3.11.5 Flora Industrial Park Site

3.11.5.1Affected Environment

3.11.5.1.1 Highways and Roads

The Flora Industrial Park Site is located in the northern part of Flora, Mississippi (Figure 3.11.5.1.1-1). U.S. Highway 49 borders the western edge of the Flora Industrial Park Site and runs southeast from the Town of Flora to Jackson, Mississippi. U.S. 49 and State Highways 22 and 463 provide access to Interstates 55 and 20, which are both less than 20 miles from the proposed site. The site would be accessed from the northbound lane of U.S. 49 near the intersection with Middle Road.

3.11.5.2Construction Consequences

3.11.5.2.1 Highways and Roads

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during construction of the NBAF. Construction vehicles would operate primarily during the daylight hours and be parked onsite over night. Parking for site or construction workers during hours of construction activities would be on or adjacent to the Flora Industrial Park construction site. During construction activities, some vehicular and pedestrian traffic may be rerouted to avoid the construction areas. Any roadway or pedestrian walkway closures and associated rerouting would be limited to the immediate area of construction and would not include general area traffic within the immediate vicinity or effect regional traffic patterns. The construction phase would be temporary and in some cases may be intermittent, occurring only during certain construction stages or times of day.

Mobilization and demobilization would result in trips of heavy equipment and light- and medium-weight vehicles for the entire 4-yr construction period. Deliveries of soil, backfill, and building materials are expected to occur an average of twice daily for a 6-month window of time (NDP 2007a).

3.11.5.3Operation Consequences

3.11.5.3.1 Highways and Roads

The transportation corridor critical to the Flora Industrial Park Site is U.S. Highway 49 in Flora, Mississippi, north of the intersections with Cox Ferry Road and First Street North. The Flora Industrial Park Site fronts U.S. Highway 49, which is a four-lane divided highway, and the proposed entrance aligns with an existing median break. Improvements to U.S. Highway 49 resulting from the installation of the NBAF would include a left turn lane (south bound Highway 49), as well as typical acceleration and deceleration lanes at the entrance drive. There appears to be sufficient room within the median and the right-of-way to construct these improvements (NDP 2008).

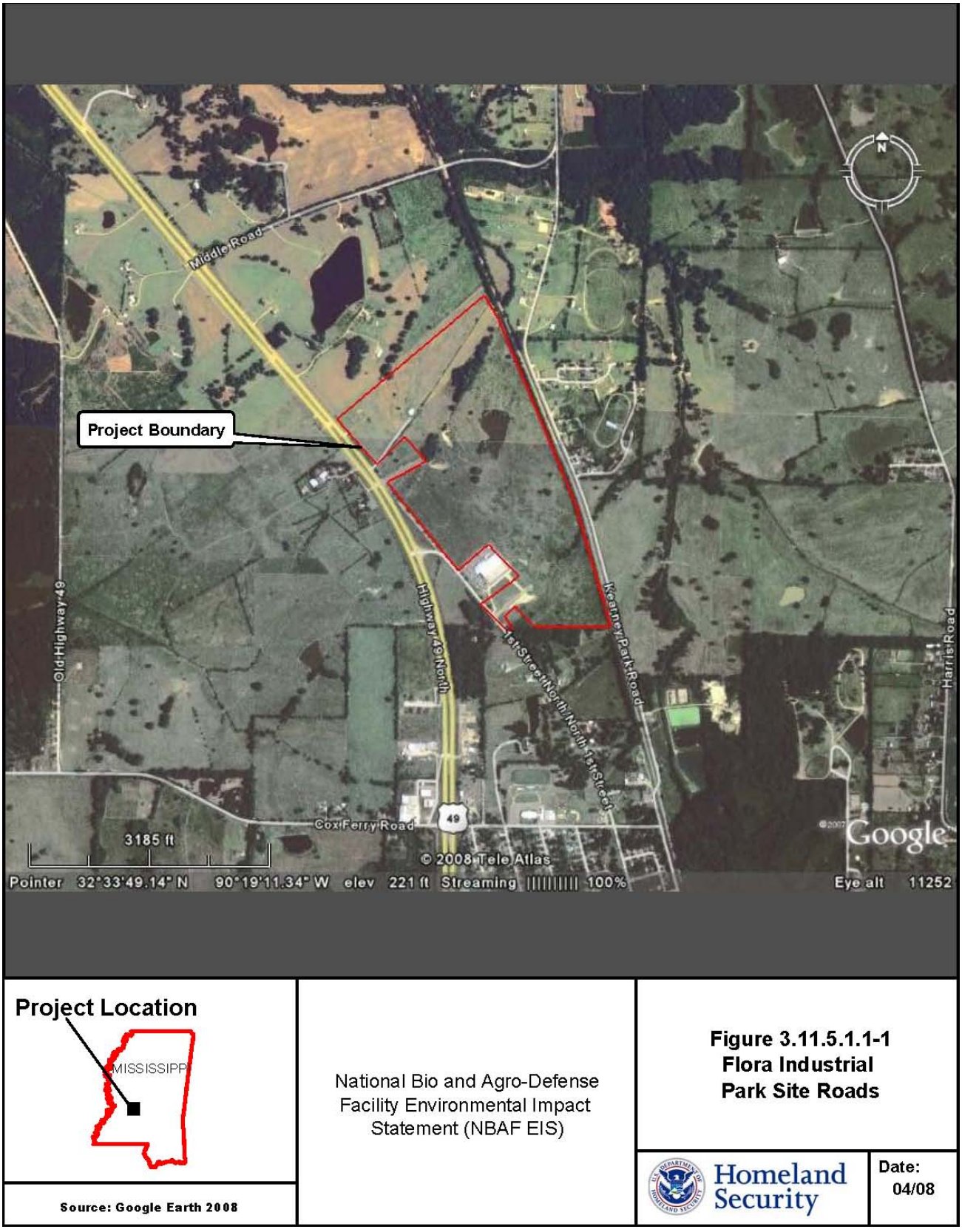


Figure 3.11.5.1.1-1 — Flora Industrial Park Site Roads

The 2002 ADT for U.S. Highway 49 in Flora, Mississippi north of the intersection with First Street North was reported by the Mississippi Department of Transportation (MDOT) as 11,000 vehicles per day. The projected 2010 ADT for this segment of U.S. Highway 49 is estimated at 14,828 vehicles per day (MDOT 2002b). The NBAF is projected to impact traffic in the identified Highway 49 corridor by the addition of 350 new employees making approximately 1,000 trips per day. This impact would increase the daily traffic volume within the Highway 49 corridor by approximately 6.7%.

The Town of Flora would provide fire and emergency services to the Flora Industrial Park Site (MCEDA 2007). The response time for fire and emergency services to the Flora Research Park Site is anticipated to range from 3 to 5 min based a response distance of 2.0 miles at an average response speed of 40 mph.

Cumulative Impacts

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 were not available to state 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.

The Metro Jackson Chamber of Commerce stated that there are no non-residential economic development projects scheduled for Flora within the next 5 years. Therefore, from a private sector commercial and industrial perspective, there are no anticipated cumulative effects that would impact the Flora area.

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

The ROI for traffic is the Town of Flora. The NBAF would result in an increase in traffic as is described in Section 3.11.5, and the additional future projects would contribute to the increase in traffic, as well. The volume of traffic from the NBAF is projected to be 1,000 daily trips. New road construction or improvements to existing roadways may be required to increase residual roadway capacity to accommodate the additional traffic load.

For the ROI, 2030 projections state that there will be 9,589 people and 3,516 total housing units. Assuming a rate of 10 daily trips per household unit, there would be a total of 35,160 daily trips by 2030 for residential traffic. However, this would not account for commercial- and industrial-based traffic activity. Based on these projections, approximately 4,800 people and 1,750 total housing units would be accounted for year 2015. Based on the same daily trip rates for traffic in 2030, there would be total of 17,580 daily traffic trips for the residential component of Flora in 2015. It is assumed that there would be 20% to 30% increase over the projected 2015 and 2030 figures to calculate commercial- and industrial-based traffic activity and a 5% increase for freight traffic. Based on that assumption, the daily traffic cumulative trip total would increase to approximately 23,000 daily trips in 2015 and 45,000 daily trips in 2030.

3.11.6 Plum Island Site

3.11.6.1 Affected Environment

A description of the existing highways, roads, and marine transportation associated with the restricted ferry access to Plum Island from Long Island, New York, and Connecticut is located in Section 3.11.2.1

3.11.6.2 Construction Consequences

3.11.6.2.1 Highways, Roads, and Marine Transportation

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used on-site during construction of the Plum Island NBAF. Mobilization and demobilization of heavy equipment and light- and medium-weight vehicles will occur during the entire 4-yr construction period. Deliveries of soil, backfill, and building materials to Plum Island would be expected to occur an average of once daily for a 6-month window of time (NDP 2007a). Construction vehicles would operate primarily during the daylight hours and would remain on the island as required by construction scheduling.

For reasons of time and transportation costs, the logistical transport of construction equipment and materials will likely originate from the Orient Point Ferry Terminal on Long Island, New York or from some adjacent public ferry terminal by special arrangement. This preference would contribute to the increased use of the primary collector roads in the Long Island North Fork area, NYS Route 25, and CR 48. The staging of equipment and the daily commute by construction personnel in the early morning and late afternoon hours would have a noticeable, but short-term, impact on the traffic patterns for Route 25. The added traffic pressures would, however, be transient and would dissipate as construction schedules are completed. No parking issues are anticipated from increased construction personnel traffic due to the expansive parking facilities available at the Orient Point Ferry terminal.

Although the infrastructure at the Old Saybrook ferry station precludes its use for the staging and transport of construction equipment and materials to Plum Island, the ferry service could serve to transport construction personnel to and from the construction site on Plum Island. The availability of multiple transportation routes to the Old Saybrook ferry station would minimize the impact of construction personnel's daily commutes. These routes are largely limited to two-way light-commercial streets. Concentrated peak flows of workers coming to/from the Old Saybrook ferry station on a daily basis would result in localized congestion in the dock area. This condition would soon dissipate as vehicles disperse from the marina area. Conversely, parking at the Old Saybrook ferry station offers a different set of challenges. Because the Old Saybrook ferry station is not owned/controlled by DHS, off-street parking is only available in the paved lot controlled by the station's private owners. Large numbers of commuting vehicles cannot be accommodated in this lot during the active marina season, from May 1 to October 31. During off-season periods, adequate parking would be available for construction workers.

3.11.6.3 Operation Consequences

3.11.6.3.1 Highways, Roads, and Marine Transportation

No substantial impact is anticipated on highways and roads with regard to the post-construction phase of the NBAF at the Plum Island Site. The number of employees on Plum Island would be increased from 200 at the existing PIADC facility to approximately 350 people with the building of the new facility. Of the current PIADC employees, approximately 50% commute from New York and 50% from Connecticut. It is anticipated that the additional staff would commute to the island in the same ratios as the existing employees resulting in an additional 75 employees at each ferry terminal. The NBAF is projected to impact traffic in the Route 25, West Fork Long Island corridor and the Highway 95, Old Saybrook, Connecticut, corridor from the addition of 75 new employees making approximately 150 trips per day for each identified corridor. This

impact would marginally increase the daily traffic volume within the both the Route 25, West Fork Long Island corridor and the Highway 95, Old Saybrook, Connecticut, corridor.

The existing PIADC facility has two fire trucks and an ambulance. A second ambulance is planned for purchase to provide emergency services to the NBAF. A fire brigade and a mutual aid agreement with the local community are also in place for the existing facility. The mutual aid agreement would need to be updated or revised for the NBAF. NBAF security measures on property would also be incorporated.

Cumulative Impacts

The ROI for traffic is Suffolk County. The evaluation of the effects of the NBAF on traffic is included in Sections 3.11.6.2 and 3.11.6.3. As previously stated, population growth in Suffolk County has increased only modestly in recent years. However, traffic congestion is a problem in the county due to an increase in the number of registered vehicles and licensed drivers. Construction and operation of the NBAF would result in only a negligible cumulative effect to traffic.

3.11.7 Umstead Research Farm Site

3.11.7.1Affected Environment

3.11.7.1.1 Highways and Roads

The Umstead Research Farm NBAF site is located in a mostly rural area outside the city boundaries of Butner, North Carolina, and is serviced by no primary or alternate means of public transportation. All property surrounding the Umstead Research Park NBAF site is owned by the State of North Carolina and managed by agencies within the state.

The Umstead Research Farm Site is a 249-acre parcel located within the southwest portion of the 4,035-acre North Carolina Department of Agriculture and Consumer Services Umstead Research Farm. It shares a partial northern border with the North Carolina State University Beef Cattle Field Laboratory property; shares a partial southern border with the North Carolina Department of Juvenile Justice and Delinquency Prevention, C.A. Dillon School; and is adjacent to the Butner Federal Prison property to the southwest. The Umstead Research Farm Site is located approximately 4 miles northwest of the intersection of Interstate Highway I-85 and SR 1103, and approximately 2,208 feet due north from the intersection of Old Route 75 and SR 1120 (Veazey Road) (NDP 2007b). Figure 3.11.7.1.1- 1 provides a graphic of roads near the Umstead Research Farm Site.

3.11.7.2Construction Consequences

3.11.7.2.1 Highways and Roads

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during construction of the NBAF. Construction vehicles would operate primarily during the daylight hours and be parked onsite over night. Parking for site or construction workers during hours of construction activities would be on or adjacent to the NBAF construction site. During construction activities, some vehicular and pedestrian traffic may be rerouted to avoid the construction areas. Any roadway or pedestrian walkway closures and associated rerouting would be limited to the immediate area of construction and would not include general area traffic within the immediate vicinity or effect regional traffic patterns. The construction phase would be temporary and in some cases may be intermittent, occurring only during certain construction stages or times of day. Mobilization and demobilization would result in trips of heavy equipment and light- and medium-weight vehicles for the entire 4-yr construction period. Deliveries of soil, backfill, and building materials are expected to occur an average of twice daily for a 6-month window of time (NDP 2007a).

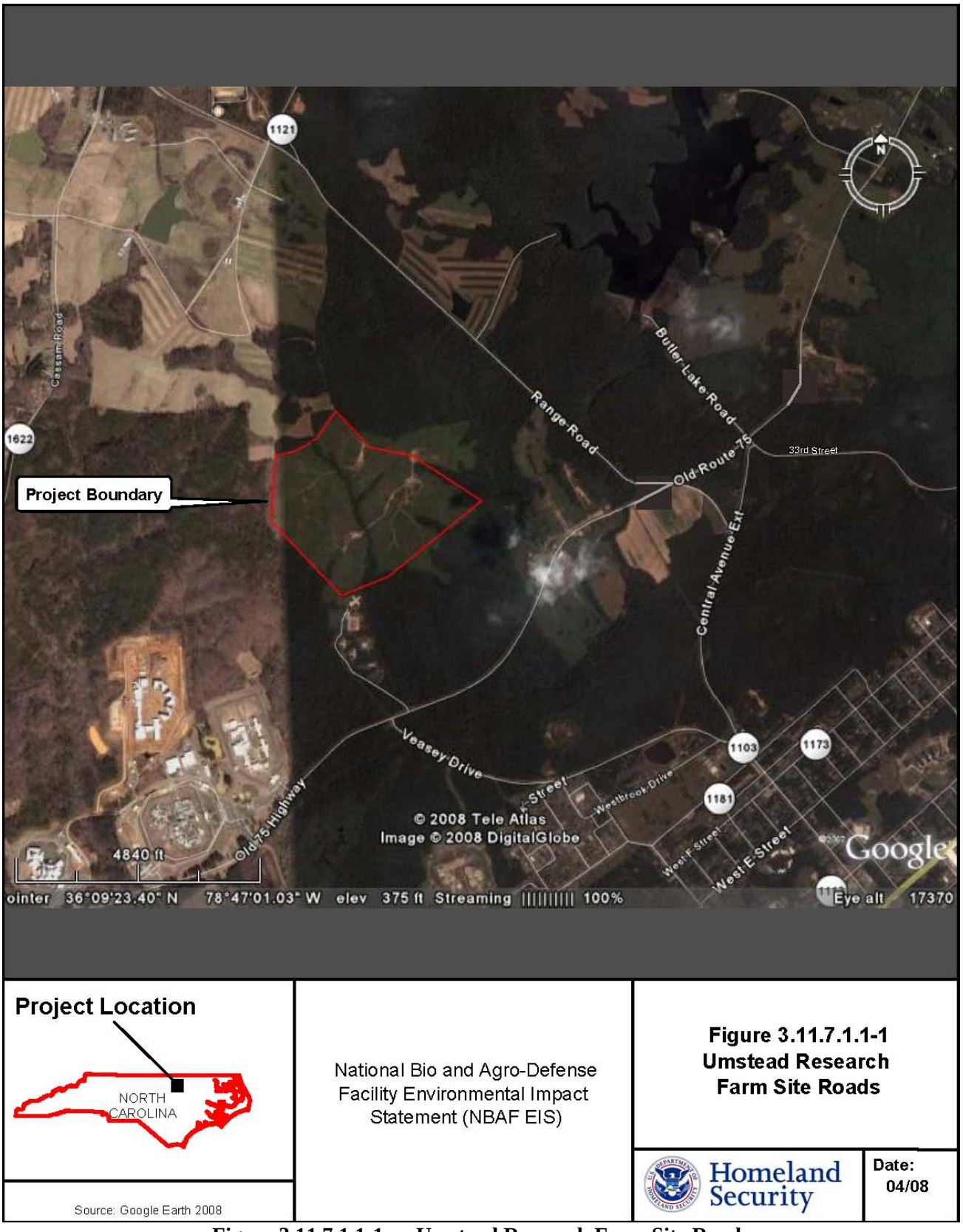


Figure 3.11.7.1.1-1 — Umstead Research Farm Site Roads

3.11.7.3Operation Consequences

3.11.7.3.1 Highways and Roads

According to a 2007 comprehensive transportation plan prepared by the County of Granville, North Carolina, the transportation corridors critical to the Umstead Research Farm NBAF include SR 1121 (Range Road) and Old Route 75 (GCCTP 2007). The Umstead Research Farm Site would be accessed primarily from Range Road. Currently, a dirt road intersecting Range Road leads to the site. Approximately 4,100 feet of new road would replace the dirt road to connect the Umstead Research Farm Site to Range Road. Access to Range Road is from Old Route 75. Both routes have been designated as boulevards needing improvement by the County of Granville, Comprehensive Transportation Plan of 2007. Planned improvements to Range Road include (from Old Route 75 to Little Mountain Road) constructing new four-lane divided highway with raised median facility, curb, gutter, and 110 foot right-of-way (ROW). There would also be a need for a deceleration lane and a left turn lane on Range Road at the Umstead Research Farm NBAF driveway entrance to facilitate traffic flow (NDP 2007a). Planned improvements to Old Route 75 include (from Julian Daniel to Range Road) widening of Old Route 75 to a four-lane divided highway with raised median facility, curb, gutter, and 110 foor ROW (Granville County 2007).

The 2006 ADT for Range Road (SR 1121) and Old Route 75 were reported by the North Carolina Department of Transportation (NCDOT) as 2.0 and 2.2 vehicles per day, respectively (NCDOT 2006). The Umstead Research Farm NBAF is projected to impact the transportation infrastructure in the identified transportation corridors by the addition of 350 new employees making approximately 1,000 trips per day. This impact would increase the average daily traffic volume on both Range Road and Old Route 75 by approximately 476%.

The Town of Butner would provide fire and emergency services to the NBAF (NCDCCPS 2007). Butner's fire fighting equipment includes two class-A pump trucks, one 95-foot ladder truck, one 2,000-gallon tanker, and one skid unit brush truck. The response time for fire and emergency services to the NBAF would range from 7 to 10 min based on a response distance of approximately 5.0 miles at an average response speed of 40 mph.

Cumulative Impacts

The ROI for traffic was determined to be the 2-mile radius around the Umstead Research Farm Site. The NBAF would result in an increase in traffic in the immediate area. However, no future traffic impacts have been identified since there are no future planned projects proposed for the area. Recent population growth trends for Granville County are located either in Oxford or the southern portion of the county. Therefore, it is not likely that the area surrounding the proposed NBAF site would experience any cumulative increase in traffic.

3.11.8 Texas Research Park Site

3.11.8.1Affected Environment

3.11.8.1.1 Highways and Roads

The Texas Research Park NBAF site is located in a mostly rural area far outside the city boundaries of San Antonio and is serviced by no primary or alternate means of public transportation. The site of the Texas Research Park NBAF is a 100.1-acre parcel located within the northwest portion of the 1,236-acre Texas Research Park. The Texas Research Park is located approximately 4 miles west of Interstate Loop 1604 West, on State Highway 211 (Texas Research Parkway), between U.S. Highway 90 West and State Highway 1957 (Potranco Road) (Figure 3.11.8.1.1- 1) (BSA 2007).

The Texas Research Park NBAF site is accessed from State Highway 1957 (Potranco Road) by boulevard-type streets that include Zeta Drive, Theta Drive, Lambda Drive, and Omicron Drive. The Texas Research

Park NBAF site is also accessed from State Highway 211 (Texas Research Parkway) at Lambda Drive, a boulevard-type street (BSA 2007).

3.11.8.2Construction Consequences

3.11.8.2.1 Highways and Roads

Vehicles (such as light trucks) and heavy machinery (bulldozers, dump trucks, cranes, and cement mixer trucks) would be used onsite during construction of the NBAF. Construction vehicles would operate primarily during the daylight hours and be parked onsite over night. Parking for site or construction workers during hours of construction activities would be on or adjacent to the construction site. During construction activities, some vehicular and pedestrian traffic may be rerouted to avoid the construction areas. Any roadway or pedestrian walkway closures and associated rerouting would be limited to the immediate area of construction and would not include general area traffic within the immediate vicinity or effect regional traffic patterns. The construction phase would be temporary and in some cases may be intermittent, occurring only during certain construction stages or times of day.

Mobilization and demobilization would result in trips of heavy equipment and light- and medium-weight vehicles for the entire 4-yr construction period. Deliveries of soil, backfill, and building materials are expected to occur an average of twice daily for a 6-month window of time (NDP 2007a).

3.11.8.3Operation Consequences

3.11.8.3.1 Highways and Roads

According to a 2007 traffic analysis of FM 1957 (Potranco Road) prepared by Rodriguez Transportation Group for the Texas Department of Transportation (TXDOT), the transportation corridors critical to the Texas Research Park NBAF include State Highway 211 (Texas Research Parkway) and State Highway 1957 (Potranco Road) (TXDOT 2007a). Both transportation corridors would provide access to the NBAF. The first phase of the TXDOT SH 211 improvement project to install a two-lane highway with wide shoulders (between US 90 to SH 1957) was completed in 1991. The second phase of the improvement project, scheduled for completion by 2010, is to expand the roadway into a four-lane highway (TXDOT 2007b). With regards to SH 1957, planned improvements include the upgrade of the current two-lane, 6- to 8-foot shoulders with a 4-lane highway from SH 471 in Medina County to County Road 381 (approximately 2 miles west of the SH 1957/SH 211 intersection) and six lanes from County Road 381 to Loop 1604. The planned roadway cross-section would consist of raised medium, bike lanes, and side walks. The projected completion schedule for these improvements to SH 1957 are scheduled for completion by 2010 (TXDOT 2007c).

The projected 2010 ADT for State Highway 211 from US 90 to FM 1957 (Potranco Road) is estimated at 16,100 vehicles per day (TXDOT 2007a). The TXDOT traffic analysis also identified the anticipated 2010 peak hourly traffic volumes for intersections along the SH 1957 corridor. The peak hourly traffic volume in 2010 for the intersection of SH 1957 and SH 211 was estimated at 1,000 vehicles per hour (TXDOT 2007a). The Texas Research Park NBAF is projected to impact the transportation infrastructure in the identified transportation corridors by the addition of 350 new employees making approximately 1,000 trips per day. This impact would increase the average daily traffic volume on SH 211 by approximately 6.2%.

San Antonio would provide fire and emergency services to the Texas Research Park NBAF. Response time is currently 12 to 14 min. Bexar and Media County assets respond in emergency situations as well. Security for the Texas Research Park is currently provided by the University of Texas Health Sciences Center San Antonio Police force. The Texas Research Park also has an Entry Control Station that is manned 24-hours per day by security personnel, with periodic roving patrols.

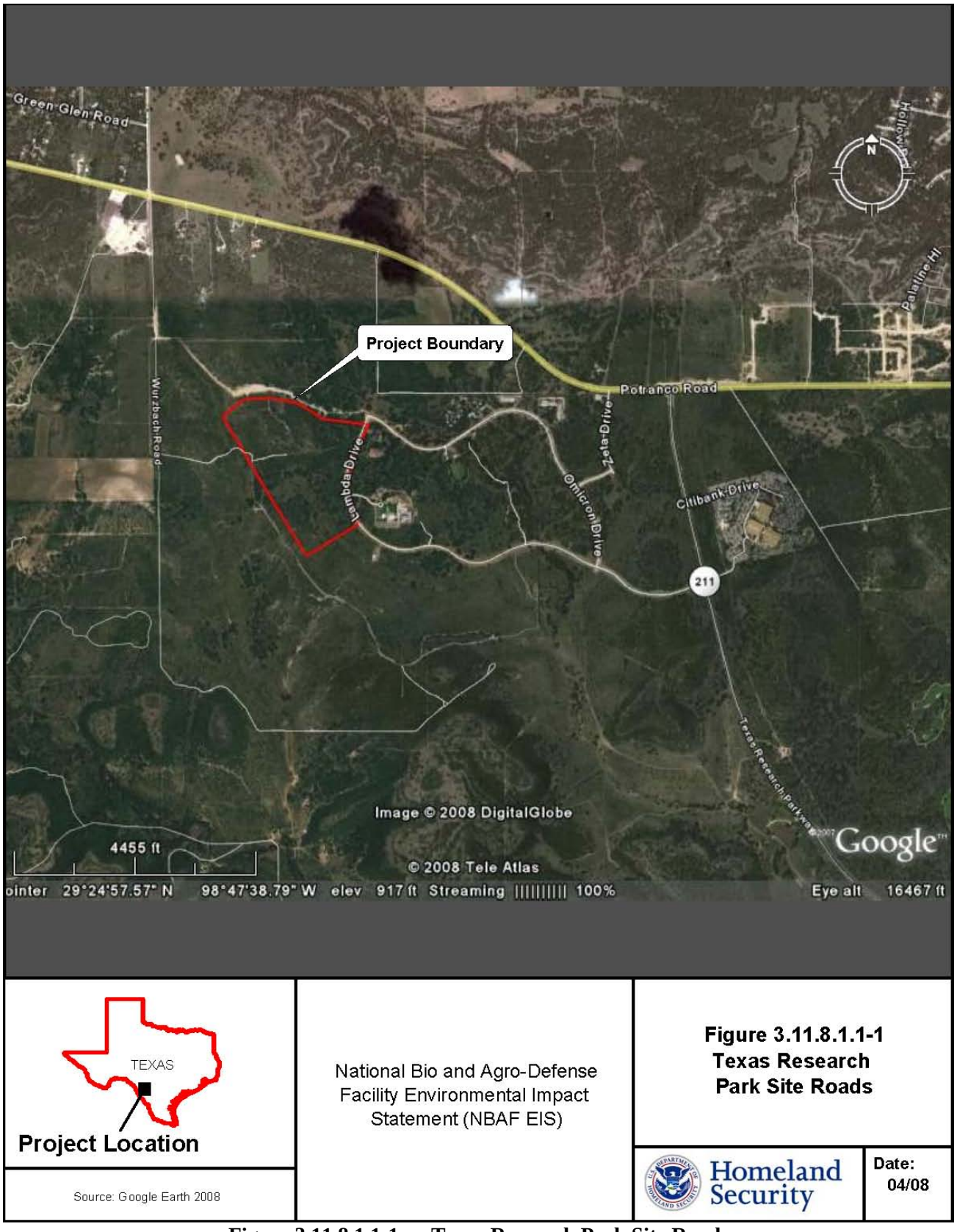


Figure 3.11.8.1.1-1 — Texas Research Park Site Roads

Cumulative Impacts

In Bexar County, there are several other public and private activities proposed or ongoing that would have potential to impact area highways and roads. Future planned projects in the vicinity of the Texas Research Park Site include a number of new residential development projects 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 ROI for traffic is the area within a 2-mile radius of the Texas Research Park Site. The NBAF would result in an increase to local traffic. However, the amount of traffic generated by the NBAF would be minor when compared to the traffic potentially generated by the planned new residential units in the ROI. The residential traffic generated would total an estimated 135,320 daily trips and 13,532 peak hour trips. An increase in associated commercial/industrial activity would produce an additional estimated 40,000 daily trips.

3.11.9 Transportation Shipments of Infectious Materials

Regulations concerning transportation of packages of biological or other agents are intended to ensure that the public and workers in the transportation chain are protected from exposure to any agent in the package. Transportation of biological agents is regulated by the Public Health Service, USDOT, U.S. Postal Service, the International Air Transport Association, and the Occupational Safety and Health Administration. Statistical data show that these regulations are effective in protecting both the contents of packages and the persons who handle the packages. As of November 2005, no cases of illness due to the release of a diagnostic specimen or infectious substance during transport were reported. In addition, only 106 (0.002%) of the 4,920,000 primary containers shipped in 2003 to worldwide laboratories and other destinations were reported broken during transit. In each of the 106 reported breakages, absorbent in appropriately prepared packages contained the leaking material, and none of the secondary or outer containers were damaged (ASM 2005).

The USDOT defines an "infectious substance" as a material known or reasonably expected to contain a pathogen. A pathogen is a microorganism (including bacteria, viruses, rickettsiae, parasites, or fungi) or other agent, such as a proteinaceous infectious particle (prion) that can cause disease in humans or animals.

Infectious substances in transit on U.S. transportation infrastructure are governed by USDOT regulations (49 Code of Federal Regulations [CFR] 171, 172, 173, and 178). Accidents and incidents involving infectious substances and materials are tracked and reported by USDOT. Based on USDOT data, the general population risk from 1999 to 2003 from all hazardous materials transportation was 1 in 23,350,000 or 4.2 fatalities per 100 million shipments (USDOT 2005).

An annualized listing of infectious substance incidents compared to total incidents from all hazardous substance classes is provided below as Table 3.11.9-1. The number of infectious substance incidents varied from 0.2% to 5.2% of the total incidents for all hazardous material classes.

In Georgia, hazardous material incidents (546) accounted for only 2.9% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007). By comparison, the general population risk per year for motor vehicle accidents is 1 in 7,700. In Kansas, hazardous material incidents (397) accounted for only 2.1% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007). In Mississippi, hazardous material incidents (148) accounted for only 0.8% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007). In New York, hazardous material incidents (530) accounted for 2.8% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007). In North Carolina, hazardous material incidents (492) accounted for 2.6% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007). In Texas, hazardous material incidents (1,556) accounted for 8.1% of the national hazardous material incidents total (19,125) for 2007 (USDOT 2007).

Operations of the NBAF would require between 2,600 and 4,160 shipments per year of infectious materials. Nationally, a range of 1,460,000 to 29,200,000 shipments of infectious materials are transported within the United States on a yearly basis (USDOT 1998). The number of infectious materials shipments projected for the NBAF operations represents less than one-half of 1% of the annual infectious materials shipments in the United States. In addition, strict adherence to state and federal transportation and packaging requirements provides reasonable expectation that a transportation accident would not release an infectious organism resulting in exposure to humans or animals. An increase in infectious material traffic from theNBAF would not materially increase the risks associated with the shipment of infectious substances.

Table 3.11.9-1 — Infectious Substance Incidents in the United States

Hazardous Material Class	Year	Incidents	Percent of Total	Hospitalized	Non-Hospitalized	Fatalities	Damages
		No.		No.	No.	No.	$
All	2007	19,063	100.0%	35	175	10	87,331,467
Infectious (Etiologic)		292	1.5%	0	1	0	79,000
All	2006	20,433	100.0%	30	203	6	70,895,432
Infectious (Etiologic)		1,067	5.2%	0	0	0	12,583
All	2005	16,006	100.0%	173	780	36	59,368,001
Infectious (Etiologic)		256	1.6%	0	0	0	0
All	2004	14,982	100.0%	44	245	13	52,586,831
Infectious (Etiologic)		292	1.9%	0	4	0	36,519
All	2003	15,462	100.0%	17	102	15	53,602,375
Infectious (Etiologic)		34	0.2%	0	4	0	4,390

Note: USDOT 2007 data.

3.12 EXISTING HAZARDOUS, TOXIC, OR RADIOLOGICAL WASTE CONTAMINATION

3.12.1 Methodology

This section describes the baseline environmental conditions at each of the proposed NBAF locations that relate to the possible presence of environmental contamination. (Waste generation and management activities associated with the construction and operation of the proposed NBAF are discussed in Section 3.13.) Existing contamination may be the result of former or current operations at the proposed site locations or at adjacent and nearby properties if hydrogeologic conditions suggest that possible contamination at these properties could have migrated to the proposed location. Baseline environmental conditions relating to possible contamination must be taken into account during the construction phase of the project to protect the health and safety of workers at the construction site. If environmental contamination is suspected at or near the NBAF during the operational phase of the project, characterization and remediation may be required. In severe cases, environmental contamination has the potential to disrupt the operation.

Assessing baseline environmental conditions is also performed as part of the "due diligence" process associated with acquiring commercial property. This process entails evaluating the potential liabilities associated with the remediation of contamination arising from former activities at the property or originating from neighboring locations.

Most of the information presented on each of the proposed locations derives from Phase I Environmental Site Assessments (ESAs) performed in accordance with the requirements of American Society for Testing and Materials (ASTM) E-1527-05 or previous versions of this standard that were in effect at the time the assessments were performed. The primary goal of these studies is to determine whether there is a "recognized environmental condition," commonly called a "REC" indicating:

> the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. (ASTM E-1527-05)

The presence of a REC generally indicates that further studies must be performed to dismiss the REC or to characterize and manage the risks to the project posed by the environmental conditions that are present. If further studies (e.g., a Phase II ESA or a specialized study) are required, they may be performed before or after an NBAF site is chosen assuming a decision is made to proceed with the action alternative.

The authors of Phase I ESAs evaluate the potential for contamination by researching the

- Current and prior uses of the land proposed for the NBAF location; and
- Current and prior uses of adjacent properties and locations.

The following types of data are used to inform their evaluations:

- Visual assessments;
- Land records relating to past uses;
- Aerial photographs;
- Data from regulatory databases suggesting that contamination could be present, or that operations with the potential to cause contamination are present, or were present in the past;
- Data from other sources, such as interviews with key site personnel familiar with the history of use of the proposed location and adjacent locations; and
- Monitoring data for environmental media, to the extent it is readily available.

Environmental sampling is not required as part of Phase I ESAs performed in accordance with ASTM E-1527-05. Phase I ESAs are preliminary studies designed to reduce, but not eliminate, uncertainties related to existing contamination. In addition, all Phase I ESAs have limitations (e.g., related to scope, time frame, etc.), data gaps, or deviations from ASTM E-1527-05. Understanding these assessment-specific limitations, data gaps, and deviations is necessary to place ESA findings, recommendations, and RECs in their proper context.

None of the data from the Phase I ESAs and other sources presented below would rule out any of the sites being considered for the NBAF location, assuming a build alternative is implemented. In some cases, however, additional data gathering must be performed to mitigate the possible impacts of existing contamination.

3.12.2 No Action Alternative

Under the No Action Alternative, the existing PIADC would continue to operate. Because this alternative involves no new construction or operations beyond ongoing infrastructure upgrades, baseline environmental conditions would have no new impacts on continued operations.

3.12.3 South Milledge Avenue Site

3.12.3.1Affected Environment

Geo-Hydro Engineers conducted a Phase I ESA at the South Milledge Avenue Site in January 2007 (Geo-Hydro Engineers 2007). The purpose of the assessment was to perform due diligence on behalf of UGA, the site owner, before the sale of the property and to determine if there is a REC as defined under ASTM E-1527-05.

The scope of the assessment included

- Reviewing site history using aerial photographs, maps and data, and historical use information;
- Performing site reconnaissance to identify present use and improvements, topography, hydrology, presence of hazardous chemicals and polychlorinated biphenyls (PCBs), wells, pits, sumps, storage tanks, water sources, and utilities;
- Performing a windshield tour of adjoining properties;
- Taking photographs to document site conditions;
- Conducting interviews with persons knowledgeable about the property; and
- Reviewing records related to regulatory listings [National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); Underground Storage Tanks (USTs)], subsurface soil conditions, geology, and former solid waste disposal.

No environmental sampling was performed (Geo-Hydro Engineers 2007).

The assessment found that the property encompasses 67 acres of pastureland that is located on the UGA Whitehall Farm and is currently used by UGA Equestrian Team. Adjoining property to the north, west, and south is wooded and pasture. There are some residences adjoining the northeast portion of the parcel that are located off a private road. The UGA Animal Science Arena is located to the southeast. The property also serves as a land buffer to the Middle Oconee River (Geo-Hydro Engineers 2007).

According to the property owners (the UGA Board of Regents), the property has historically been used for agricultural purposes. It has been owned by UGA since 1936. Historical records and aerial photographs dating back to 1938 indicate that the properties surrounding the South Milledge Avenue Site have been used for agricultural purposes since the 1940s. However, deed records indicate that a yarn mill (Whitehall Mills) was located on South Milledge Avenue (one of the roads bounding the South Milledge Avenue Site) in the 1920s and 1930s (Geo-Hydro Engineers 2007).

Based on a search of regulatory databases for records that could indicate potential contamination on properties in the vicinity of the proposed South Milledge Avenue Site, Geo-Hydro Engineers determined that three properties needed additional review. Their findings with respect to these properties are summarized below.

- The Georgia Forestry Commission, Clarke-Oconee Unit (GA FC) reported a suspected leaking underground storage tank in 1997 to the Georgia Environmental Protection Division (EPD). Records from the Georgia EPD indicate that this site was closed in 2001 with a "No Further Action" status. The GA FC site is approximately 0.5 miles east of the South Milledge Avenue Site and is at a higher elevation. However, because it "appears to be in different drainage basin than the South Milledge Avenue Site," Geo-Hydro Engineers does not consider it to be a REC under ASTM E-1527-05 (Geo-Hydro Engineers 2007, p. 9).
- The UGA Hazardous Materials Treatment Facility (UGA HMTF) is a large quantity generator of hazardous waste and is listed in databases pertaining to *Resource Conservation and Recovery Act* (RCRA) corrective action (CORRACTS); the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) [it is a "No Further Remedial Action Planned" (NFRAP)

site in the CERCLIS]; and spills in the state of Georgia (due to a sewage spill into the Oconee River). The Will Hunter Road location of this site is approximately 1 mile northwest of the South Milledge Avenue Site. The data indicated that the UGA HMTF had a total of 80 RCRA violations but that all had been brought into compliance by July 2005. According to the CORRACTS database, there are four RCRA Facility Investigations (RFIs) and the latest RFI Workplan, approved December 19, 2005, determined that migration of contaminated groundwater was under control and groundwater monitoring will continue to confirm containment of contaminated groundwater. Because the UGA HMTF location "does not appear to be upgradient from the subject property," Geo-Hydro Engineers does not believe it constitutes a REC with respect to the South Milledge Avenue Site (Geo-Hydro Engineers 2007, p. 9).

- The University of Georgia Milledge Avenue Site at the former UGA Botanical Gardens landfill is referenced as a solid and hazardous waste site in regulatory listings. A release of lead in groundwater was reported, and cleanup was being conducted for source materials, soil, and groundwater. Although this site is "at a higher elevation and may be upgradient" to the South Milledge Avenue Site, Geo-Hydro Engineers concludes that it is unlikely that past or present releases have resulted in contamination of the soil or groundwater there because of it is more than 1 mile north of the site, and it is in a separate drainage basin (Geo-Hydro Engineers 2007)[19].

The Geo-Hydro Engineers report discusses another property, the Whitehall Mills facility, which was not referenced in the regulatory databases. The facility operated in the 1920s and 1930s. Because former industrial facilities have the potential to contaminate soil or groundwater and the former Whitehall Mills facility location "is at a higher elevation than and may be upgradient to" the South Milledge Avenue Site, it is an exception to the Geo-Hydro Engineers conclusion that there is no evidence of a REC in connection with the site. The Geo-Hydro Engineers report concludes, however, that the potential for a release of hazardous substances or petroleum from the former Whitehall Mills facility to the South Milledge Avenue Site is low because of "the lack of local, state, or federal records for the Whitehall Mill facility and the amount of time elapsed since operations have ceased" (Geo-Hydro Engineers 2007, p. 15).

Overall, the conclusion from the Geo-Hydro Engineers Phase I ESA is that "the potential for a past or present release of hazardous or petroleum substances leading to contamination of soil or groundwater at the subject property [the South Milledge Avenue Site] is low" (Geo-Hydro Engineers 2007, p. 15).

Terracon Consultants conducted an updated Phase I ESA for this property in the fall of 2007. Their regulatory database search turned up the GA FC, Clark Oconee Unit, and the UGA HMTF discussed above and assessed by Geo-Hydro Engineers. However, because these facilities are more than 3,000 feet from the proposed NBAF site, Terracon determined that they were not of environmental concern in relation to the South Milledge Avenue Site (Terracon 2007f).

Terracon's updated investigation on the Whitehall Mills facility determined that the former yarn mill was located approximately 2,500 feet and cross-gradient from the South Milledge Avenue Site and therefore was not of environmental concern. Terracon's conclusion with respect to the Whitehall Mills facility is as follows, "Based on distance and topographic gradient, the former yarn mill is not considered a REC to the site" (p. 18). Terracon's overall recommendation is that there are no RECs associated with the South Milledge Avenue Site that warrant further testing or investigations at this time (Terracon 2007f, pp. 18-19).

[19] Newspaper stories from the late 1990s/early 2000s provide additional information about the contamination that occurred at the UGA Botanical Gardens landfill and the subsequent cleanup that occurred. These stories report that UGA buried radioactive and chemical waste from its science labs at the Milledge Avenue Site until 1979. Several other area agencies also used the landfill, including the U.S. Forest Service and the EPA's Athens research lab. Solvents from the site leaked into the groundwater for the City of Athens, and soils at the site contained relatively small amounts of chloroform, benzene, and methylene chloride. The cleanup involved a water treatment system downstream of the landfill, construction of a clay cap and subterranean cut-off wall, and phytoremediation to clean up the soil (Kiser 1998, McLauglin 2002, and Melancon 2001).

3.12.3.2Environmental Consequences

Because there are no RECs at the proposed South Milledge Avenue Site or at adjoining properties, no construction or operational impacts are anticipated due to existing hazardous, toxic, or radiological waste contamination.

3.12.4 Manhattan Campus Site

3.12.4.1Affected Environment

Allied Environmental Consultants conducted a Phase I ESA of the Manhattan Campus Site KSU in April 2007. The work included:

- A visual inspection of the site,
- A review of available historical documents and sources,
- A review of previous ownership and site usage, and
- A review of reasonably ascertainable environmental records for the site (AEC 2007).

The ESA also included an inspection of the adjoining properties and surrounding area to determine if businesses or other parties engage in activities that may affect environmental conditions at the site. Allied Environmental Consultants contacted federal, state, and local agencies to determine if potential environmental problems exist related to the site or adjoining properties, and they interviewed utility and property representatives about environmental conditions on or around the property (AEC 2007).

The principal current land use of the Manhattan Campus Site is agricultural. It includes pasture, animal husbandry structures (e.g., animal enclosures, barns, feed mills), and woods. An electrical substation owned by Westar Energy and the BRI occupy small portions of the property. Land uses for adjoining properties include other KSU facilities (teaching, research, and agricultural storage facilities; a public safety/fire department building; and athletic fields), residential housing, and a product research and development company. Past uses of the site appear to have been primarily agricultural (animal husbandry and feed milling), associated with the educational mission of the university. The site development apparently dates to the late 1800s when the facility was established as a land-grant institution (AEC 2007).

Allied Environmental Consultants reviewed federal and state environmental records (relating to RCRA, CERCLA, and other environmental programs) obtained from Environmental Data Resources, Inc., and the Kansas Geological Society to identify possible sources of existing contamination. Using these records, Allied Environmental Consultants identified and discussed the following sites that are within a 0.5 miles of the Manhattan Campus Site:

- KSU is a RCRA large-quantity generator of hazardous waste. Medical, hazardous, and universal waste is stored in a building less than 0.125 miles north-northeast of the Manhattan Campus Site and shipped off-site for treatment and disposal at least every 90 days. A closed landfill [known as the Old Chemical Waste Landfill (OCWLF)] between 0.25 and 0.5 miles west-northwest of the Manhattan Campus Site is responsible for a number of regulatory database listings found including a CERCLIS NFRAP site listing, inclusion on the CORRACTS list, and groundwater monitoring wells included on the Kansas Registry of Water Wells. (These database listings indicated the potential for environmental contamination.) The OCWLF is currently in a monitored natural attenuation program that is overseen by the KDHE. Contaminants of concern include VOCs and radiochemicals in the groundwater. Because groundwater flow from the OCWLF site is toward the northeast and away from the Manhattan Campus Site, the contaminated groundwater would have no adverse impact on the

facility[20]. RCRA enforcement records show 42 KSU violations associated with the storage facility and the OCWLF; 41 of these violations have been resolved (AEC 2007).

- The KSU Agronomy Research Farm on Kimball Avenue, which is less than 0.125 miles north-northeast of the Manhattan Campus Site, has a compost landfill registered with the KDHE. No records indicate contamination. It also has an aboveground storage tank (AST) for used oil storage. A leaking underground storage tank associated with the facility was discovered in 1991 and later closed. Levels of contamination at the site did not exceed state cleanup levels (AEC 2007).
- The fire department is a small-quantity generator (SQG) of hazardous waste with no reported violations. It also has an active diesel UST with no reported problems. The fire department is between 0.125 and 0.25 miles northwest of the Manhattan Campus Site.

Other items noted in the Allied Environmental Consultants Phase I ESA involving properties that are just beyond 0.5 miles from the Manhattan Campus Site are summarized below.

- Formerly leaking USTs that were closed in compliance with state cleanup levels were identified at the KSU Manhattan Transmitter Site and the KSU Denison/Marlotte site. Both sites are just over 0.5 miles west of the Manhattan Campus Site (AEC 2007).
- Besides the groundwater monitoring wells associated with the OCWLF, wells were also found associated with the following landowners all located between 0.5 and 1 mile from the Manhattan Campus Site: Samarrai, Leiszier Oil Co. and Amoco Remediation (AEC 2007).

The overall conclusion of the Phase I ESA performed by Allied Environmental Consultants for KSU is that the assessment "revealed no evidence of RECs in connection with the property" (AEC 2007, p. iii).

Terracon performed a subsequent Phase I ESA in the fall of 2007. Their findings were similar to those of Allied Environmental Consultants, except that

- They identified a leach field adjacent to the east of the site that represents a REC warranting further investigation, and
- They recommended that an on-site septic system associated with an inactive recycle storage building be investigated for proper closure in accordance with applicable regulations (Terracon 2007c, p. iii.).

Both of these environmental conditions were identified based on interviews with KSU personnel during a site visit. Terracon's presentation of the information that led to these findings is quoted below.

> East of the site is the current location for the KSU Swine Research facility. During a site visit, Terracon noted the footprint of the former serum (molasses) making facility. West of this facility is a leach field associated with former serum plant operations. According to information provided by KSU professor Dr. Emeritus McKee, KSU operated this building to develop a serum to prevent "Blackleg" for animals. Operation of this plant stopped prior to 1979 and the plant was demolished in 2001. Dr. McKee also indicated that wastes discharged to the leach field would have been sanitary wastes and wash down from the serum equipment (Terracon 2007c, p. 25).

> Mr. Carlson [KSU Facilities Planning Office] reported to Terracon that a septic system which has been inactive for more than 30 years was present at the recycle storage building (#12). This facility was previously called the "herdsman's house" and was previously used as a residence. Mr. Carlson did not know if the septic system was properly abandoned according to local and/or state regulations. The system is reported to be located southwest of this

[20] A restrictive covenant circumscribes future uses of the OCWLF site, which is between 0.25 and 0.5 miles west-northwest of the proposed Manhattan Campus Site. It requires preservation of the waste containment system; protection of permanent survey markers and benchmarks; consultation with the KDHE before commencement of any on-site excavation, construction, etc. (except for the installation of monitoring wells or other monitoring devices); and continued maintenance of waste containment and monitoring systems if title to this property is transferred (State of Kansas 1989).

building. Stressed vegetation or noxious odors was not observed in the vicinity of Building #12. According to Mr. Carlson, the remaining site facilities are connected to the City of Manhattan sanitary sewer system (Terracon 2007c, p. 21).

3.12.4.2Environmental Consequences

A leach field adjacent to the site represents a REC warranting a subsurface investigation. This type of investigation could determine if the presence of hazardous constituents associated with former serum plant operations could have construction impacts or require remediation before construction occurs. In addition, an on-site septic system should be closed in accordance with applicable regulations if there is no evidence that this has not already occurred. Assuming a build alternative is implemented and the Manhattan Campus Site is the chosen location, DHS would pursue a Phase II ESA and any other necessary studies before construction begins.

3.12.5 Flora Industrial Park Site

3.12.5.1Affected Environment

David Holman, PE, conducted a Phase I ESA for the Flora Industrial Park Site in 1993 for the Town of Flora and the Madison County Development Authority. The objective of the assessment was to assist the Town of Flora and Madison County in assessing the risk associated with acquiring the property for the purpose of developing it into an industrial park (Holman 1993).

The study involved

- Examining the chain of title for the previous 50 years;
- Reviewing current and past zoning and land use;
- Interviewing past owners;
- Reviewing information in the files of state regulatory agencies including listings for the NPL, CERCLIS, RCRA sites, and leaking USTs; and
- Performing a site inspection.

The state file review encompassed looking for sites within a 1-mile radius of the property. No sampling was performed (Holman 1993).

The study found that the property had been used exclusively for agricultural purposes for at least 50 years. No evidence of environmental problems was found within a 1-mile radius of the site in the files of state regulatory agencies. Because there was no evidence of environmental contamination, the risk of environmental liabilities was determined to be low. The Holman assessment noted the presence of three old, abandoned water cisterns that appeared to be free of contamination (but they have not been tested) (Holman 1993).

Mendrop~Wages performed an updated Phase I ESA in April 2007 for the MCEDA. The assessment involved records review and gathering information from site reconnaissance and interviews. The primary changes that occurred in the intervening 14 years (between 1993 and 2007) with respect to the Flora Industrial Park Site are as follows:

- The Primos manufacturing facility was built to the west of the Flora Industrial Park Site.
- While the Flora Industrial Park Site and its immediate environs remain for the most part undeveloped, Madison County, experienced “exponential growth” since the early 1990s with its population almost doubling.
- Property improvements including access points and an overhead electrical line were noted in the updated assessment (Mendrop~Wages 2007).

The Mendrop~Wages assessment did not reveal the presence of any adverse environmental conditions on the Flora Industrial Park Site that would negatively affect any proposed site development activities. The presence of the abandoned water cisterns (mentioned in the 1993 Holman report) were noted as evidence of former residential structures once located on the property but not as sources of potential contamination (Mendrop~Wages 2007).

Terracon performed a third Phase I ESA for this property in the fall of 2007. The information and conclusions presented in the Terracon report are similar to the previous reports, except that the presence of regulatory database listings referring to a Hurricane Katrina debris disposal site and two facilities with USTs are noted. According to Terracon, these listings do not present environmental concerns for the following reasons:

- The debris disposal site was apparently never used.
- One UST listing refers to a gasoline UST installed in 1978 and removed in 1994. No listings suggest environmental contamination, and the UST's former location is more than 1,500 feet southwest and topographically separated from the Flora Industrial Park Site.
- There is apparently a 12,000-gallon diesel UST at a facility 3 miles south of the Flora Industrial Park Site. It does not represent an environmental concern based on its distance from this location (Terracon 2007b).

An interview conducted by Terracon with the Executive Director of the MCECD established that the water cisterns associated with former tenant houses on the property had been filled in by the Town of Flora. The Terracon report concludes that there are no environmental conditions associated with the Flora Industrial Park Site that warrant additional investigation (Terracon 2007b).

The protective covenants imposed by the MCEDA on Flora Industrial Park tenants are included as Appendix C.7.4 in the State of Mississippi's February 2007 submission of additional information to their expression of interest for potential sites for the NBAF. The objective of these covenants is to ensure that the park remains a desirable site for the location of industry, manufacturing, processing, and related operations. These covenants will remain in effect until January 1, 2020, or until they changed, altered, or amended by the legally constituted zoning authority or by the owners of the majority of the acreage in the Flora Industrial Park. Paragraph 109.01-07 of these covenants specifically prohibits the "processing, incineration, or storage of dead animal materials, including offal reduction; curing, tanning, and storage of hides; distillation of bones; and rendering of fat" (MS 2007, Appendix C.7.5).

3.12.5.2Environmental Consequences

Because there are no RECs at the Flora Industrial Park Site or at adjoining properties, no construction or operational impacts are anticipated due to existing hazardous, toxic, or radiological waste contamination. However, protective covenants prohibiting the processing, incineration, or storage of dead animal materials may need to be changed or clarified. As the owner of the Flora Industrial Park, the MCEDA is authorized to change this covenant if this is necessary or prudent to clarify that it does not apply to a scientific research facility, such as the NBAF (personal communication between Chuck Pergler, Tetra Tech, Inc., Duane O'Neill, MCEDA, January 22, 2008). Assuming a build alternative is implemented and the Flora Industrial Park Site is the chosen location, DHS would work with the Madison County Economic Development Authority to determine if a clarification or change to the Flora Industrial Park protective covenants is necessary.

3.12.6 Plum Island Site

3.12.6.1Affected Environment

Plum Island is a self-contained island in the Long Island Sound located approximately 12 miles southwest of New London, Connecticut, and 1.5 miles from the northeast tip of Long Island, New York. It began operation as a Department of the Army fort in 1879 (Fort Terry) and operated in that capacity until it was declared

surplus in 1948. It served as a U.S. Army Chemical Corps facility until 1954 when ownership was transferred to the U.S. Department of Agriculture's Agricultural Research Service (ARS) to develop and maintain a diagnostic capability for exotic animal diseases foreign to the United States and to conduct research on the prevention and control of these diseases. Many of the former military fortifications found on Plum Island were used in the initial decades of PIADC's operation as animal holding facilities. Later, various chemicals and other surplus materials were stored and abandoned in the military batteries. PIADC remained under ARS control until June 2003 when it was transferred to the DHS (Terracon 2007a; BMT Entech 2006).

The proposed Plum Island Site is adjacent to the current PIADC laboratories; these existing laboratories are west of the proposed Plum Island Site. The Long Island Sound is to the north; the wastewater treatment plant, undeveloped land, and wetlands are to the south; and undeveloped land and a quarry pit are to the east (Terracon 2007a).

A management-imposed "nothing leaves the island" policy that was instituted at the outset of PIADC's establishment meant that all waste streams and their residuals generated on the island remained there; they could not be transported off the island for further treatment and/or disposal. The purpose of the policy was to ensure that waste removal processes would not be responsible for allowing biological agents under study to escape the confines of the island. This policy encompassed all materials and objects used, consumed, and discarded at PIADC including wastes generated by diagnostic and research activities. Items that could be burned were incinerated in one of several incineration units. Non-burnable materials (metal, glass, and ceramics) and items too large to be incinerated were chemically and/or thermally decontaminated and disposed in or on the land (BMT Entech 2006; Terracon 2007a).

In 1991, ARS approved a new biological safety plan that modified safety procedures pertaining to waste handling and disposal practices. This plan permitted the removal of most solid waste streams after appropriate decontamination protocols were observed. Some waste streams were subsequently transferred from the island to permitted treatment, storage, and disposal facilities on the mainland (BMT Entech 2006).

In recent years, clean up and removal actions have occurred at multiple sites where wastes were historically disposed. These actions were coordinated with appropriate federal, state, and local authorities responsible for ensuring compliance with applicable environmental and public health regulations including RCRA and CERCLA (Terracon 2007a; BMT Entech 2002, 2004, 2006, 2007a, 2007b, 2007c, and 2007d).

Pursuant to a 1994 Compliance Order issued by the U.S. Environmental Protection Agency (EPA) Region 2 under RCRA, PIADC was required to assess 87 sites (buildings) to determine if their operational and hazardous waste compliance history suggested they had been used for hazardous waste treatment, storage, or disposal. PIADC was further required to develop and implement a Closure Plan in accordance with RCRA Interim Status regulations at sites where hazardous waste had been managed. After the initial site investigations and assessments, regulatory oversight was transferred to state (NYSDEC) and county (Suffolk County Department of Health Services) regulators (BMT Entech 2006).

The first phase of the assessment found that 53 of the 87 sites had not been associated with hazardous waste management. Thirteen of the 34 remaining sites were eligible for "administrative closure," that is no further actions or investigations were required for them to be considered closed in accordance with RCRA. The 21 remaining sites requiring further action (i.e., screening, contamination removal, and remediation) were comprised of individual buildings and structures having a broad range of historical use at Plum Island. Extensive media sampling in and around each of the 21 buildings/structures was performed. As a result, no further action was required at 3 of the 21 sites. Remedial and removal actions were taken to achieve RCRA closure at the remaining 18 sites (BMT Entech 2006), 3 of which (Buildings 101, 103, and 115) are located in close proximity to the Plum Island Site.

Under CERCLA, investigations were undertaken at PIADC to evaluate the nature and extent of waste disposal activities that had historically occurred on the island and to determine if Plum Island was eligible for

placement on the NPL[21]. A September 2002 BMT Entech report describes the results of initial CERCLA investigations undertaken at PIADC. These investigations of potential waste disposal areas encompassed 49 sites: 21 Waste Management Areas (WMAs), 15 additional Areas of Potential Concern (AOPCs) (identified from historical aerial photography), 10 historical Army batteries, and 3 Army support structures. Regulator-approved work plans were developed in support of the site investigation and were implemented during a field program conducted in 1999. Findings from the site investigations resulted in specific recommendations for the 49 individual sites that were investigated. Regulatory and PIADC personnel agreed to these recommendations at a meeting in May 2001. A small number of sites required post-meeting investigations; the first phase of these investigations occurred in 2002 (BMT Entech 2002).

The investigatory phase of the field program involved the collection of more that 1,000 media and quality assurance/quality control samples that were analyzed for volatile and semi-volatile compounds, pesticides, PCBs, and metals. Screening of the risks posed by Plum Island contamination to possible targets and receptors suggested that the site should not be placed on the NPL. Investigation by excavation (IBE) followed by removal was performed at 10 sites that contained large quantities of laboratory wastes, including glassware, bottles, and small quantities of hypodermic syringes and needles. These laboratory wastes had been autoclaved prior to disposal to render them biologically inactive. Because of the presence of sharps in these materials, they were considered treated regulated medical waste by the State of New York and they could not be reburied. The IBE project also encompassed a limited surface removal action at two sites to recover scrap metal (BMT Entech 2002).

Of the original 49 CERCLA investigation sites, 3 are partially within the footprint of the Plum Island Site (Terracon 2007a). At the site known as WMA 4/AOPC11, IBE and removals were performed. According to BMT Entech, initial sampling results showed a small number of polycyclic aromatic hydrocarbon and numerous metal exceedances of screening benchmarks in soils data. These same analytes were observed in the confirmation data in roughly the same frequency and concentrations as that encountered in the 1999 data. The elevated concentrations of some metals were attributed to the construction debris and metallic materials encountered and recovered. The benzo(a)pyrene exceedance may be attributable to the past disposal of ash in this landfill. There were numerous PCB exceedances but not at particularly high levels. Groundwater samples collected in 1999 revealed several dissolved metals in excess of state drinking water standards, and some of them (calcium, potassium, sodium, and magnesium) were present at levels in excess of the same analytes in overlying soils. BMT Entech attributes this result to salt water encroachment from the nearby Long Island Sound. BMT Entech does not consider groundwater contamination of potable island water supplies to be a realistic threat from WMA 4/AOPC 11 because all potable wells on the island are located a considerable distance upgradient (BMT Entech 2007d).

At the site known as WMA 6, IBE and removals were performed. Sampling results in soil before IBE showed metal exceedances of screening benchmarks and one VOC exceedance. Confirmation sampling results showed no VOC exceedances but broader and more numerous metal detections. BMT Entech attributes the elevated metals concentrations to construction debris and metallic materials encountered and recovered at this site. No groundwater exceedances were detected in initial samples, and no additional samples were collected. Because PIADC potable well fields are located a considerable distance upgradient of WMA 6 and would not be impacted by remaining contaminants, BMT Entech recommends no further action under CERCLA (BMT Entech 2007d).

At the site known as AOPC 6, IBE and removals were performed. Post-remediation in 1999 sampling results showed exceedances for some metals and benzo(a)pyrene. Post-removal sampling also contained a PCB detection of 21,000 parts per billion (which is more than two times New York State's 10,000 parts per billion subsurface benchmark for this substance). The elevated concentrations of some metals are likely attributed to construction debris and metallic materials encountered and recovered at this site, and the benzo(a)pyrene may be attributable to the past disposal of ash in this landfill. Because the PCB detection was in a sample taken at

[21] The NPL lists sites where the extent of known or threatened releases of hazardous substances, pollutants, or contaminants makes clean up of the site a "national priority."

6-8 feet below ground surface, BMT Entech did not believe a removal/remedial response was warranted to address this exceedance. Because PIADC's existing potable well fields are located a considerable distance upgradient from AOPC 6 and would not be impacted by residual contamination, BMT Entech recommends no further action under CERCLA (BMT Entech 2007d).

Terracon performed a Phase I ESA at the proposed NBAF location on Plum Island between October and December 2007. It included a regulatory database review, historical and physical records review, interviews, user-provided information, and a visual reconnaissance of the site and adjoining properties. No environmental sampling was performed (Terracon 2007a). This ESA was completed before the BMT Entech confirmation sampling, and recommendations discussed in the previous paragraphs were available for the three CERCLA investigation sites that are partially within the footprint of the Plum Island Site.

Terracon's review of state and federal environmental databases found entries for the PIADC and its support facilities (e.g., Plum Island Ferry Terminal) (Terracon 2007a). The primary environmental concerns raised by these sources involve the possible environmental impacts of PIADC's former waste management practices and the potential for contamination arising from the island's extensive fuel storage and distribution system.

Because Terracon did not have confirmatory sampling results associated with the three PIADC CERCLA remediation sites that are within or partially within the footprint of the Plum Island Site, Terracon concluded that contamination may still exist at the site. Terracon recommends soil sampling to verify the effectiveness of remediation activities and preparation of a detailed Health and Safety Plan and Soil Management Plan prior to the initiation of construction activities. Terracon notes that although two additional CERCLA sites have not been completely remediated, they do not pose a reasonable threat to the environmental integrity of the Plum Island Site because they are located 1,000 feet to the northeast of the proposed site and cross-gradient. [Lack of funding has prevented the complete remediation of these areas (Terracon 2007a)].

The Terracon Phase I ESA also presents information relating to PIADC's fuel storage and distribution system and secondary containment systems. PIADC uses No. 2 fuel oil for heating, hot water, emergency power, and incineration. It also uses gasoline for vehicles, diesel for heavy machinery and ferries, and used oil for heating[22]. In total, the island stores approximately 650,000 gallons of petroleum products. The majority of this total is fuel oil that is stored in three 210,000 gallon aboveground storage tanks (ASTs) that are fueled by a tanker from the harbor area through a designated aboveground pipeline. These ASTs, six USTs, as well as tractor-trailer-mounted generators and boilers are located to the west of the existing laboratory, approximately 1,000 feet from the Plum Island Site and cross-gradient (Terracon 2007a).

With regard to spills, Terracon notes that an underground pipe leak from a No. 2 fuel oil UST was discovered in 1995 near a building that is approximately 1,000 feet west and cross-gradient from the Plum Island Site. An automated recovery system was installed in the area of contamination in 2000, and approximately 4,500 gallons of fuel oil has been removed. However, Terracon concludes that this spill and other spills documented in environmental databases do not pose a threat to the environmental integrity of the site (Terracon 2007a).

3.12.6.2Environmental Consequences

Results of confirmatory sampling associated with three remediation sites within or partially within the footprint of the Plum Island Site need to be evaluated before it is possible to determine if there could be construction or operational impacts associated with the previous burial of hazardous and toxic wastes in the vicinity of the Plum Island Site. Based on the results of this evaluation, additional studies (e.g., assessment of construction worker risk) may be needed to determine what types of measures (e.g., Health and Safety Plan, Soil Management Plan, additional remediation) should be used to mitigate the construction or operational

[22] Used oil from PIADC ferries, vehicles, and from the cafeteria is collected in a 500-gallon tank and used to heat one building (E-mail from Thomas Dwyer, DHS to Judith Weintraub, TetraTech, on April 14, 2008).

impacts of former waste management practices. The evaluation of confirmatory sampling results will occur before DHS chooses an NBAF location, assuming a build alternative is implemented.

3.12.7 Umstead Research Farm Site

3.12.7.1Affected Environment

Withers & Ravenel conducted a Phase I ESA at the Umstead Research Farm Site in October 2007. The assessment included a site inspection, historical research, municipal research, and a search of national and state environmental databases. No environmental sampling was performed (Withers & Ravenel 2007b).

At the time of the site inspection, the property was vacant and consisted of undeveloped woodlands with some cleared former logging trails and logging decks. Large portions of the property were impassible due to dense vegetation. There were no indications of structures, utilities, or other man-made improvements. Water supply wells, groundwater monitoring wells, pits, lagoons, etc., were absent. The site is bordered to the north by undeveloped woodlands and agricultural fields belonging to the North Carolina State University (NCSU) Agricultural Research Farm; to the south by undeveloped woodlands and the Dillon School, a state juvenile correction facility; and to the east and west by undeveloped woodlands. Other facilities located in close proximity to the property include the Umstead Research Farm (1,500 feet southeast), a federal corrections facility (3,000 feet southwest), and a state hospital (John Umstead Hospital) (5,000 feet southwest) (Withers & Ravenel 2007b).

Based on available records, interviews, and aerial photographs, the Withers & Ravenel ESA describes the ownership history and past uses of the Umstead Research Farm. Prior to 1942, the Umstead Research Farm Site and surrounding areas were privately owned and used for residential and agricultural purposes. In 1942, the U.S. government purchased approximately 43,000 acres of land, including the proposed Umstead Research Farm Site, to establish the Camp Butner Training Facility[23]. It was heavily used throughout World War II but was considered excess by 1947. In 1950, 9,800 acres of that former camp, including the Umstead Research Farm Site, were transferred to the State of North Carolina by the U.S. government. It was administered by the Hospitals Board of Control until the early 1990s when it was transferred to the North Carolina Department of Agriculture. This property is now utilized by the Department of Agriculture and NCSU. Other portions of the former Camp Butner property were transferred to private individuals, the National Guard, and the Federal Corrections System (Withers & Ravenel 2007b).

Based on information in local, state, and federal environmental databases, Withers & Ravenel present the following analyses of potential environmental threats posed by surrounding and nearby properties:

- The Hazardous Substance Disposal Sites list contains locations of uncontrolled or unregulated hazardous waste sites. The Range Road Burn Site was identified on this list; it is approximately 2,600 feet (almost 0.5 miles) northeast of the Umstead Research Farm Site. In 1970, an EPA Region IV team concluded that the Athol Manufacturing Company, a former manufacturer of polyvinyl chloride film and laminates, burned their hazardous waste by-products at this site. The site was investigated by a North Carolina CERCLA team in 1986. One soil sample collected from zero to 6 inches below the land surface was analyzed for various parameters. Total lead levels in the sample were 44,000 parts per million (ppm), and extractable lead levels were 9.5 ppm. Total cadmium levels were 1,500 ppm, and extractable cadmium levels were 3.0 ppm. No other soil or groundwater assessment data were available in available files and Withers & Ravenel "suspect" that no additional assessment activities were completed. In addition, they point out that the extent of contamination in the burn site area has not been determined, the burn site area is open and readily accessible to the surrounding population, and the site is "topographically isolated from the subject property by an unnamed, southerly flowing tributary of Knap of Reeds Creek, which extends in a north-south

[23] The Camp Butner Training Facility is also referred to as the Fort Butner Training Camp, Camp Butner, and Former Camp Butner in the sources used to prepare this section.

orientation between the subject property and the Range Road Burn Site." Based on available information, Withers & Ravenel "does not consider the Range Road Burn Site to be a REC relative to the subject property" (Withers & Ravenel 2007, p. 10).

- Withers & Ravenel evaluated a hazardous incident spill record and a leaking underground storage tank record applicable to the John Umstead Hospital. Because the hospital is located almost 1 mile from the Umstead Research Farm Site, they do not consider it to be an environmental concern (Withers & Ravenel 2007b).
- Withers & Ravenel evaluated data associated with the Fort Butner Training Camp, which is identified as a Formerly Used Defense Site where the USACE is taking necessary cleanup actions. They reviewed the Engineering Evaluation/Cost Analysis (EE/CA) on the Camp Butner site (Parsons 2004) and interviewed a representative of the USACE Wilmington District Office[24]. Withers & Ravenel found that the former Camp Butner site was divided into six areas for evaluation purposes. The Umstead Research Farm Site falls into Area 5. One area that is currently used by the U.S. Army National Guard (Area 6) as a training facility was not evaluated in the EE/CA. Digital geographic mapping using EM-61 and EM-61 MK 2 metal detectors was conducted to identify and locate surface and subsurface geophysical anomalies for intrusive sampling. A total of 7,087 anomalies were intrusively investigated in the five areas studied; 2,029 of these anomalies were in Area 5, and 2,028 of them were identified as non-ordnance and explosives (OE) scrap. The OE scrap item found in Area 5 was inert and identified as a single "spider" plate (pressure plate) from an M1 anti-tank practice mine. It was recovered from the ground surface approximately 365 feet north of the Umstead Research Farm Site. One area (A5G00019) on the Umstead Research Farm Site was assessed and no unexploded ordnance (UXO) was discovered. The USACE Wilmington representative explained that the Umstead Research Farm Site was not part of any firing ranges, it was not used to store munitions, and no UXO or ordnance scraps were found on the property. Based on the recommendations presented in the EE/CA, the USACE and Granville County implemented institutional controls on all five areas evaluated, including Area 5 where the Umstead Research Farm Site is located[25]. The USACE Wilmington District Office representative also explained that there is a local belief in Butner that the 78th Infantry Division (the division that formerly utilized the former camp) dumped ammunition into Lake Lightning, which is now a portion of Lake Holt Reservoir. This reservoir is located northeast of the Umstead Research Farm Site. USACE installed groundwater monitoring wells around the lake to assess groundwater samples for munitions contamination. No contamination has been found to date, and the NCDENR has issued a "Notice of No Further Action" (Withers & Ravenel 2007b).

Withers & Ravenel conclude that "no RECs were identified in connection with the subject property." However, they believe that the following finding should be considered during development of the property:

> The location of off-site sources of potential groundwater contamination, i.e., the former Camp Butner facility, the existing agricultural research facilities, and the existing National Guard Training facility, has the potential to create regional groundwater contamination. Therefore, use of groundwater on the subject property for any purpose is not recommended without additional research or assessment of groundwater quality. (Withers & Ravenel 2007b, p. 25)

Terracon conducted an updated Phase I ESA for this property in the fall of 2007. In particular, they reviewed the information relating to the former Fort Butner Training Camp described by Withers & Ravenel. As discussed below, additional information regarding the possible risks posed by this facility was derived from an additional interview and their review of a USACE report describing drinking well sampling that was performed to determine if groundwater quality had been impacted by former DoD activities.

[24] The Wilmington District Office oversaw the assessment and remediation activities associated with the former Camp Butner facility.
[25] Institutional controls are legal or other non-engineered controls on access. Examples include zoning, permitting, deed notifications, deed restrictions, sign-posting requirements, and restrictive easements or covenants.

Terracon interviewed a Research Station Division Forester with the North Carolina Department of Agriculture (the previous owner) regarding environmental concerns associated with the site. She indicated that "all of the military training operations that were previously conducted at the larger Camp Butner property did not occur at or near the site and that she is unaware of any unexploded ordinance (UXO) have been discovered at the site" (Terracon 2007e, p. 8).

Recent and continuing USACE investigation and cleanup activities (i.e., from Fiscal Year 2006 through the end of Fiscal Year 2008) associated with former Camp Butner operations involve Area 1, Area 4, and the Lakeview subdivision, which is a residential subdivision formerly included in Area 4. These activities are described in meeting minutes of the former Camp Butner Restoration Advisory Board, which are posted on a USACE Web site devoted to Camp Butner (http://www.saw.usace.army.mil/campbutner/index.htm). No activities are currently planned for Area 5, where the Umstead Research Farm site is located.

The Terracon report describes the results of the USACE report entitled *Final Sampling Report: Drinking Well Sampling Event – Former Camp Butner NC.* According to Terracon,

> "Samples were collected at or near known firing ranges previously used during artillery and training operations. The closest range is located approximately 1.5 mile northeast of the northern boundary of the site. According to results, nine substances were collected above the project screening levels which included: chloroform; bis(2-ethylexyl)phthalate; alpha-chlordane; gamma-chlordane; heptachlor epoxide; perchlorate, iron, lead, and manganese. Evaluation of these substances indicates only perchlorate and lead may be present [above project screening levels] in the areas where artillery training activities occurred at Camp Butner" (Terracon 2007e, p. 21)

Because the closest former firing range is more than 1.5 miles northeast of the Umstead Research Farm Site, Terracon concludes that the former Camp Butner operations do not constitute a REC relative to the Umstead Research Farm Site. Further, Terracon concludes that there are no RECs that warrant further investigation at this time (Terracon 2007e).

3.12.7.2Environmental Consequences

Because there are no RECs at the Umstead Research Farm Site or at adjoining properties, no construction or operational impacts are anticipated due to existing hazardous, toxic, or radiological waste contamination.

Although the UXO risk associated with the Umstead Research Farm Site appears to be low, institutional controls still remain in effect at the property. Adherence to these controls may require that site construction workers be properly trained before they begin their employment at the worksite.

3.12.8 Texas Research Park Site

3.12.8.1Affected Environment

Raba-Kistner consultants conducted a Phase I ESA for the Texas Research Park Site in 2003 for the Texas Research Park Foundation. The foundation was established in 1986 when land was donated to create the park.

The Raba-Kistner Phase I ESA was performed to provide documentation that the landowner had no reason to suspect that hazardous substances had previously been disposed on, or near, the property. The assessment was based on

- Research and evaluation of readily available and practically reviewable federal and state documents and databases (e.g., NPL, CERCLIS, RCRIS, and USTs);

- Interviews with persons knowledgeable about the site; and
- Site reconnaissance by an environmental professional.

No environmental sampling was performed (Raba-Kistner 2003).

Raba-Kistner reported that the property is located in an area that is rural but developing with nearby educational and research facilities. It had no physical improvements and had previously been used as agricultural pasture. Aerial photographs dating back to 1938 show the site and adjacent properties as undeveloped and vacant land in a native wooded state. Research Plaza, located northeast of the site, first appeared in photographs in 1997. Other Texas Research Park tenants in 2003 included the University of Texas Health Science Center, San Antonio (UTHSCSA); the Cancer Therapy and Research Center; the Southwest Oncology Group; and Genzyme Corporation (Raba-Kistner 2003).

The TRP was established in 1986, when land was donated to create the park. It is owned and operated by the Texas Research and Technology Foundation.

Based on the information reviewed, Raba-Kistner found no evidence to suggest that the site or adjacent properties were contaminated with hazardous substances. Four nearby properties were generators of hazardous waste, and two nearby properties owned regulated petroleum storage tanks. No evidence was found linking these properties to corrective action or environmental enforcement actions (Raba-Kistner 2003).

An environmental attributes and utility capacity summary was prepared for the Texas Bio and Agro-Defense Consortium by BSA Environmental Services in February 2007. The findings are similar to those of Raba-Kistner. There were no listings for the Texas Research Park Site or surrounding properties within a 1-mile radius on any federal, state, local, or tribal database (BSA 2007).

Terracon prepared a Phase I ESA for this property in October to December of 2007. Their findings are similar to those presented in the Raba-Kistner and BSA Environmental Services reports. While other Texas Research Park tenants (UTHSCSA, Cancer Therapy and Research Center; University of Texas Institute of Biotechnology) are found in environmental databases, these listings are not associated with environmental contamination or enforcement actions. These properties are in these databases because they generate hazardous waste or own USTs. Consequently, Terracon concludes that there are no environmental conditions associated with the Texas Research Park location that warrant additional investigation (Terracon 2007d).

3.12.8.2Environmental Consequences

Because there are no RECs at the Texas Research Park Site or at adjoining properties, no construction or operational impacts are anticipated due to existing hazardous, toxic, or radiological waste contamination.

3.13 WASTE MANAGEMENT

3.13.1 Methodology

This section describes the existing waste management infrastructure at each of the proposed NBAF sites and the impacts of the construction and operation of the NBAF. Most of the waste management construction and operation impacts would be the same at all of the proposed NBAF locations. These common impacts are described in Section 3.13.2. The affected environment and the waste management impacts that would vary by site are described in Sections 3.13.3 – 3.13.9 for the No Action Alternative and the six proposed NBAF locations, respectively.

General information on the waste streams that would be generated by the construction and operation of the facility and on the disposition of these waste streams (Section 3.13.2) was derived based on

- NBAF Design Partnership engineering, and feasibility studies (NDP 2007a; NDP 2007b; NDP unpublished information 2007; NDP 2008);
- Widely available scientific studies and articles (NABCC 2004; Etherington 2008; NSWMA 2004; HERC 2007; CDC and NIH 2007); and
- Experience with and knowledge of wastewater and solid, hazardous, and infectious waste management practices.

Information on the affected environment and waste management impacts that would vary by site (Sections 3.13.3 – 3.13.9) was primarily derived from:

- Information submitted to DHS in Expressions of Interest and supplemental data,
- Site visits and other information gathered by the EIS preparation team, and
- Publicly available information from municipal, state, and federal regulatory and environmental Web sites and databases.

3.13.2 Waste Management Impacts Common to All Alternative Sites

If a build alternative is implemented, there would be waste impacts associated with the construction and operation of the facility regardless of location. This section describes the wastes that are likely to be generated by the construction and operation of the facility and explains how they would be managed.

3.13.2.1 Construction Consequences

Construction of the NBAF would generate construction debris, sanitary solid waste, and wastewater. Hazardous wastes could also be generated. The disposition of these construction waste materials is discussed below.

Construction Debris

All of the states where the NBAF may be located have landfills that accept construction debris. To the extent that local capacity is an issue, the construction debris may be transported to neighboring localities and states. The construction contract may require that some construction materials (e.g., metals) be salvaged when economically feasible to decrease the amount of construction debris to be disposed.

Municipal Solid Waste

Municipal solid waste that may be generated over the course of NBAF construction could include waste generated by construction workers, such as disposable food containers and paper. Municipal solid waste is routinely imported or exported by all of the states where the NBAF may be located (Table 3.13.2.1-1). The ability of municipal solid waste to cross state lines for treatment and disposal suggests that disposal capacity would not be an issue at any of the proposed locations.

Wastewater

During construction, equipment would be washed down as necessary in a designated area with appropriate controls for collecting and managing the wash water. This wastewater stream would then be disposed of in accordance with applicable permits and regulations.

Table 3.13.2.1-1 — Municipal Solid Waste (MSW) Imports and Exports by State

State	MSW Generated (106 tons/yr)	MSW Imports (106 tons)	Percent Imports of Generation	MSW Exports (106 tons)	Percent Exports of Generation	Net Imports (+)/ Exports (-)
GA	10.7	1.445	13.5	0.600	5.6	+0.845
KS	2.8	0.698	24.9	0.371	13.3	+0.327
MS	2.5	0.580	20.0	0.113	3.9	+0.467
NY	36.3	0.311	0.9	8.248	22.7	-7.936
NC	12	0.133	1.1	0.971	8.1	-0.838
TX	43.7	0.251	0.6	0.511	1.2	-0.260

Source: Repa 2005.

Hazardous Waste

For any hazardous waste that is generated during construction, the general contractor would be responsible for disposing of the waste in accordance with all applicable regulations[26]. Hazardous waste is routinely imported or exported by all of the states where the NBAF may be located (Table 3.13.2.1-2). The ability of hazardous waste to cross state lines for treatment and disposal suggests that disposal capacity is not an issue at any of the proposed locations.

Table 3.13.2.1-2 — Interstate Hazardous Waste Shipments (Tons) for 2001

State	Hazardous Waste Generated	Imported	Largest Quantity Imported From	Exported	Largest Quantity Exported to	Net Imports (+)/ Exports (-)
GA	760,043	12,663	FL (33%)	106,512	AL (30%)	-93,849
KS	1,571,587	19,846	AR (27%)	42,643	OK (59%)	-22,797
MS	2,165,734	67,090	AL (47%)	35,905	TX (26%)	+31,085
NY	3,534,261	113,706	NJ (28%)	118,471	NJ (45%)	-4,765
NC	327,721	14,611	SC (44%)	79,607	SC (39%)	-64,996
TX	7,555,402	220,000	LA (30%)	200,953	LA (35%)	+19,047

Source: NSWMA, May 2004.

3.13.2.2Operation Consequences

Operation of the proposed NBAF could generate sanitary solid, medical, hazardous, and radiological wastes, as well as sanitary and industrial wastewater. These wastes would either leave the facility by being discharged through the sanitary sewer system to a publicly owned treatment works (POTW) near the proposed facility location, if appropriate, or they would be collected and disposed at regulated, permitted solid, hazardous, or radiological waste management facilities. All of the potentially infectious waste generated at the facility would undergo pretreatment before it is discharged to the sanitary sewer system or packaged and transported to an appropriate off-site management facility. Liquid biowaste from BSL-3E, BSL-3Ag, and BSL-4 areas would undergo redundant on-site treatment before being discharged to the sanitary sewer. Generation, treatment, and disposition information for the following specific waste categories are as follows: wastewater; waste solids; animal carcasses/pathological waste; radiological waste; and medical, hazardous, and industrial solid waste.

[26]The generation of hazardous waste is not expected during the construction of the NBAF, but it is possible at Plum Island. At Plum Island, the excavation of former landfills could result in the generation of known or suspected hazardous items (e.g., lead acid batteries, compressed gas cylinders, intact or damaged chemical items) requiring different types of regulated disposal, including hazardous waste disposal.

Wastewater

Wastewater generated by the NBAF would be discharged to the sanitary sewer. The wastewater stream would consist of treated biological and infectious waste (i.e., wastewater that is sterilized in biowaste cookers), other laboratory waste liquids (e.g., waste from BSL-2 laboratories), liquid effluents from carcass disposal, conventional sanitary sewer waste (discharges from sinks, toilets, and showers in non-BSL-3 and BSL-4 areas), and cooling tower blowdown (NDP 2007a; NDP 2007b; NDP 2008). Wastewater generation rates may be impacted by the carcass disposal methodology chosen for the facility with alkaline hydrolysis (a form of tissue digestion) generating the most wastewater (NABCC 2004). Table 3.13.2.2-1 presents estimated average and maximum daily wastewater generation rates for the NBAF in all locations.

Table 3.13.2.2-1 — Estimated NBAF Average and Maximum Daily Wastewater Generation Rates (Gallons Per Day)

State	Sterilized Wastewater	Non-Sterilized Wastewater	Cooling Tower Blowdown	Estimated Daily Average	Estimated Daily Maximum
GA	35,000	16,100	21,200	72,300	150,000
KS	35,000	16,100	16,400	67,500	140,000
MS	35,000	16,100	26,000	77,100	150,000
NY	35,000	16,100	11,600	62,700	125,000
NC	35,000	16,100	18,500	69,600	150,000
TX	35,000	16,100	28,800	79,900	150,000

Sources: NDP 2007c; NDP 2008.

While the amount of sterilized and non-sterilized wastewater generated by the NBAF remains constant at all of the proposed locations, the amount of cooling tower blowdown[27] entering the wastewater stream is higher in areas located in warmer climates because more cooling water would be used in the facility. The estimated daily average is the sum of sterilized, non-sterilized, and cooling tower blowdown values.

Table 3.13.2.2-2 summarizes the types of waste that may be discharged to the sanitary sewer system from the proposed NBAF (excluding cooling tower blowdown) and the pretreatment processes that would be applied to each type of waste before entering the sanitary sewer system. The pretreatment requirements applicable to the biological and infectious wastes that would be discharged to the sanitary sewer are derived from Biosafety in Microbiological and Biomedical Laboratories (BMBL) (CDC and NIH 2007). These requirements involve taking appropriate precautions that are based on risk assessment, and they become more stringent as biosafety levels increase. The BMBL also requires documentation of the decontamination of liquid wastes generated in BSL-4 areas, and the decontamination process must be validated physically and biologically. Biological validation must be performed at least annually (CDC and NIH 2007). Additional requirements may need to be met to conform to the acceptance criteria of the individual POTWs handling NBAF wastewater discharges.

Biowaste from the BSL-3E, BSL-3Ag, and BSL-4 areas would enter a dedicated treatment system that involves thermal treatment (sterilization) followed by subsequent decontamination. Various technologies are being considered for the liquid effluent decontamination system, including steam sterilization technologies, reverse polymerization systems, chemical systems, heat and chemical systems, irradiation systems, etc. Steam sterilization is recommended by the NBAF design team because it is a proven methodology offered by multiple vendors. Decontamination system tanks would be located in a dedicated space below the floors of the BSL-3E, BSL-3Ag, and BSL-4 areas. Biowaste would be gravity drained to the liquid waste decontamination system. Biowaste piping would be double walled in areas that are not accessible for inspection (NDP 2007a; NDP 2008). Some liquid waste streams from these areas that are comprised of chemical disinfectants, such as liquids from dunk tanks or chemical showers, may enter the decontamination system without first undergoing sterilization.

[27] Blowdown is the portion of the circulating water in the cooling system that is removed to maintain the amount of dissolved solids and other impurities at an acceptable level.

pH adjustment may be necessary for liquid wastes originating in BSL-2 areas (to raise the pH) and for liquid wastes generated by the alkaline hydrolysis process (to lower the pH), if this process is chosen for carcass disposal (NDP 2007a; NDP 2008; NABCC 2004). pH adjustment for corrosivity is required by national pretreatment standards promulgated under the *Clean Water Act* (U.S.C., Title 33, Chapter 26). These national pretreatment standards prohibit the discharge of wastes from all non-domestic sources that are corrosive, including any discharge with a pH of less than 5.0 (unless the POTW is specifically designed to handle corrosive wastes). If a build alternative is implemented, other minimum pretreatment standards that would apply to liquid wastes involve prohibitions related to ignitability; solids or viscous pollutants; oxygen demanding pollutants; temperature; oils; or pollutants that produce toxic gases, vapors, or fumes sufficient to cause health and safety problems (see 40 CFR 403.5(b)).

Waste Solids

As shown in Table 3.13.2.2-3, all waste solids from BSL-3E, BSL-3Ag, and BSL-4 areas and from Class III Biosafety Cabinets (BSCs) located in BSL-2 areas would leave these areas after either

- Passing through an autoclave, or
- Undergoing gas decontamination or chemical disinfection.

Materials that are not heat sensitive and not very large would be autoclaved, while gas and chemical disinfection would be used on heat-sensitive materials and objects too large to be autoclaved. Waste that has been treated by autoclaving, gas decontamination, or chemical disinfection may be discarded as sanitary solid waste unless laboratory procedures dictate that particular waste material cannot be disposed of in the sanitary solid waste stream or if the waste material is hazardous by EPA definitions. The BMBL requires that disposable materials from BLS-3E and BSL-3 Ag areas be incinerated following on-site decontamination through autoclaving or other methods (CDC and NIH 2007). Because no on-site incinerator is planned for non-pathological wastes, they would be transported to an off-site licensed, permitted municipal solid, medical, or hazardous waste incinerator as appropriate, depending on constituents[28].

It is estimated that the NBAF could generate 15,000 cubic yards per year of municipal (i.e., sanitary) solid waste and 592.6 cubic yards per year of special medical waste. These estimates were made by extrapolating actual generation rates from a similar facility in proportion to total floor space in the facilities. Using these estimates, the combined annual total volume of municipal solid waste and special medical waste that could be generated per year at the NBAF would be approximately 15,592 cubic yards (13,134 tons[29]) (BSA 2007).

[28] Pathological wastes include animal carcasses, organs, and tissues. An on-site incinerator is being considered for these wastes but not for the treatment of other types of waste solids.
[29] Assumes specific gravity of 1.

Table 3.13.2.2-2 — Summary of Sanitary Sewer Wastes [a]

Type of Waste	Origins	Pretreatment	Comments
Biological liquid waste from BSL-4 [b] areas	Animal suites and laboratory areas, emergency decontamination showers, liquids from dunk tanks, effluent from autoclaves, chemical showers	Dedicated biowaste gathering and treatment system that includes batch sterilization (as necessary) followed by liquid effluent decontamination in biowaste cookers	Biowaste from these areas would be gravity drained to the liquid effluent decontamination system. The piping would be double walled in areas that are not accessible for inspection. Various liquid disinfectants would be used as surface disinfectants, and these would subsequently be sent to the biowaste cookers.
Biological liquid waste from BSL-3E containment areas	Pathology, analytical chemistry, virus isolation, immunology, vaccine testing, and reagent production research and support laboratories; cage wash for smaller animals; insect holding and experiments; effluent from autoclaves; effluent from toilets and shower out facilities serving BSL-3 and BSL-4 areas	Dedicated biowaste gathering and treatment system that includes batch sterilization (as necessary) followed by liquid effluent decontamination in biowaste cookers	Biowaste from these areas would be gravity drained to the liquid effluent decontamination system. The piping would be double walled in areas that are not accessible for inspection. Various liquid disinfectants would be used as surface disinfectants, and these would subsequently be sent to the biowaste cookers.
Biological liquid waste from BSL-3 Ag [c] areas	Animal housing and research studies; decontamination of corridors; washdown of animal holding rooms; equipment washing; liquids from dunk tanks; effluent from autoclaves; effluent from toilets and shower out facilities serving BSL-3 and BSL-4 areas	Dedicated biowaste gathering and treatment system that includes batch sterilization (as necessary) followed by liquid effluent decontamination in biowaste cookers	Biowaste from these areas would be gravity drained to the liquid effluent decontamination system. The piping would be double walled in areas that are not accessible for inspection. High-pressure washing systems for the cleaning of animal facilities would include hot high-pressure washing and localized addition of chemicals, although low-pressure, flooding systems may be investigated. The volume of this waste stream would be impacted by the type of system used for room decontamination. For example, the use of gas for room decontamination would result in a lower volume sanitary sewer waste stream.

Table 3.13.2.2-2 — Summary of Sanitary Sewer Wastes[1] (Continued)

Type of Waste	Origins	Pretreatment	Comments
Liquid effluent from carcass disposal	Rendering and alkaline hydrolysis would both result in animal tissue being reduced to liquid	The effluent from alkaline hydrolysis may need pH adjustment	Alkaline hydrolysis would produce more liquid than rendering.
Liquid wastes from BSL-2 areas (except the insectary) and the cGMP [d] module	Cell culture, media production, reagent development, test development, microbiology, molecular biology, glassware/metal wash, autoclaves associated with Class III BSC [e] material, sinks for hand washing	Treatment system that includes pH monitoring, reagent injection capability, and a sample port to allow for monitoring of the waste stream leaving the treatment system	The treatment system would treat effluent from the BSL-2 areas to within discharge limitations of 5 to 9 pH units.
BSL-2 insectary wastes	The BSL-2 insectary is used for the breeding, rearing, manipulating, and pre-test and post-test holding of insects – they are not infected with pathogens	Lab wastes from these areas would be sterilized before they enter the sanitary sewer to ensure that all larvae are destroyed	Treatment (sterilization) would be in the containment area.
Conventional sanitary waste	Washing of equipment from non-BSL-3 and BSL-4 areas, effluent from toilets and showers in non-BSL-3 and BSL-4 areas	All clothing and towels from BSL-3 and BSL-4 biocontainment areas would be sterilized before washed	None

[a] Excludes cooling tower blowdown.
[b] BSL = Biosafety Level.
[c] Ag = Agricultural.
[d] cGMP=current Good Manufacturing Practice.
[e] BSC=Biosafety Cabinet.
Sources: NDP 2007 a; NDP 2007b; NDP 2008; HHS 2007; NABCC 2004.

Table 3.13.2.2-3 — Summary of Waste Solids

Type of Waste	Origin	Pretreatment	Disposition
Waste solids from BSL-3E [a], BSL-3Ag, and BSL-4 functions (laboratories, procedure rooms, animal rooms, and storage/centrifuge rooms) that are not heat sensitive; waste solids from Class III BSCs [b] in BSL-2 laboratories	Waste bedding, packaging, sharps, PPE [c], medical supplies, pathological waste (samples), waste tissues and organs harvested from animals; empty feed packaging; waste resulting from the processing of samples	All wastes from these areas that are not heat sensitive would be autoclaved. Some of these wastes (e.g., animal bedding) would be surface disinfected first.	Solid waste management facility (off-site incinerator or landfill)
Heat-sensitive solids and some large pieces of equipment from BSL-3E, BSL-3Ag, and BSL-4 functions (laboratories, procedure rooms, animal rooms, and storage/centrifuge rooms)	Some PPE, plastics, paper goods, equipment wastes	Gas decontamination (e.g., vaporized hydrogen peroxide, chlorine dioxide, formaldehyde burn, or ethylene oxide) or disinfection in dunk tanks	Solid waste management facility (off-site incinerator or landfill)
Animal carcasses	Necropsy suites	Incineration, rendering, and alkaline hydrolysis are being considered.	Solid residuals would be tested and sent to solid or hazardous waste management facilities; as appropriate
Radiological waste	Research and clinical operations	All waste with radiological constituents would be containerized and sent off-site for treatment and/or disposal. Operational protocols would preclude discharge of radioactive waste through the plumbing system.	Low-level radioactive waste management facility
Chemical waste (RCRA [d] hazardous)	Solvents and chemical wastes from laboratory operations	Some chemical waste may be neutralized in containers before they are transported off-site.	Hazardous waste management facility
Conventional solid waste	Non-hazardous wastes from BSL-2 laboratories and the administrative areas of the facility	Not required	Solid waste management facility

[a] BSL = Biosafety Level.
[b] BSC = Biosafety Cabinet.
[c] PPE = Personal Protective Equipment.
[d] RCRA = *Resource Conservation and Recovery Act.*
Sources: NDP 2007 a; NDP 2007b; NDP 2008; CDC and NIH 2007; NABCC 2004.

Treatment of Animal Carcasses/Pathological Waste

A number of different technologies are being considered for the on-site treatment of the estimated 375 to 1,200 euthanized animal carcasses that could be generated annually at the facility. Table 3.13.2.2-4 provides a brief comparison of three of these technologies: incineration, alkaline hydrolysis, and rendering. There are different options available for all of these technologies; Table 3.13.2.2-4 consequently focuses on generic advantages and disadvantages.

Incineration was formerly the most common method of treating infectious medical waste. Between 1997 and 2004, however, the number of hospital/medical/infectious waste incinerators (HMIWIs) is estimated to have dropped from 2,400 to 111 (a 95% reduction). This reduction has been attributed to the costs of complying with 1997 *Clean Air Act* (CAA) regulations, which set strict emissions limits based on the size of the HMIWI, monitoring and testing requirements to demonstrate compliance, siting requirements, the requirement to develop a waste management plan, and training/qualifications requirements for HMIWI operators; the increased costs associated with equipment upkeep, labor, and energy; and the emergence of alternative technologies (HERC 2007).

Alkaline hydrolysis a relatively new and versatile process for the treatment of a variety of biologic, biohazardous, and hazardous wastes in a manner that is relatively nonpolluting and potentially more efficient and economical than incineration. At present, lack of experience with the process and uncertainty as to its availability are its primary disadvantages (NABCC 2004; Etherington 2008). Alkaline hydrolysis may produce an effluent waste stream with the following characteristics:

- Biological Oxygen Demand (BOD) – 10,250 mg/l
- Chemical Oxygen Demand (COD) – 19,600 mg/l
- Suspended Solids – 1,400 mg/l;
- pH – 9.48 (NDP 2008)[30]

If an alkaline hydrolysis process is used at the NBAF, its effluent is estimated to comprise approximately only 2% of the total wastewater effluent stream. Consequently, when combined with the rest of the wastewater stream, the BOD, COD, and Suspended Solids levels of the total wastewater effluent stream are expected to be orders of magnitude lower. Wastewater effluent streams would be mixed in a blending tank before they are discharged to the sanitary sewer (NDP 2008).

[30] BOD and COD are a measure of the relative oxygen-depletion effect of a waste contaminant. BOD and the amount of suspended solids in wastewater indicate how much secondary treatment is likely to be required before it is discharged to the environment.

Table 3.13.2.2-4 — Comparison of Technologies Being Considered for Carcass/Pathological Waste Disposal

Technology	Brief Description	Advantages	Disadvantages
Incineration	Modern, fixed-facility incinerators burn animal carcasses to destroy them. An NBAF incinerator would be fueled by natural gas. Afterburner chambers would be used to reduce emissions by burning the gas and particulate matter exiting from the primary chamber. The incineration process produces ash residuals that can be disposed in hazardous or non-hazardous waste landfills, depending on the ash constituents.	Mature technology that is extensively regulated for environmental emissions Biosecure	Low public acceptance Achieving low emissions requires operational expertise Most carcasses are not considered good burning material; fuel and dry burning materials would have to be added
Alkaline hydrolysis	Alkaline hydrolysis uses sodium hydroxide or potassium hydroxide to catalyze the hydrolysis of biological material into a sterile aqueous solution. Steam pressure and heat are applied to accelerate the process. It is carried out in a tissue digester that consists of an insulated, steam-jacketed, pressure vessel operated up to 70 psi. The pH of the liquid effluent (hydrolyzate) would generally have to be lowered to meet the requirements of most sanitary sewers of between 5 and 9. This can be done using bubbling carbon dioxide.	Can be used to eliminate radioactively contaminated tissues The solid residuals of the process are low volume (solids reduction is 97%) and sterile; liquid residuals are sterile, too Well suited to batch operations and has low manpower requirements No emissions, and odors can be controlled with appropriate technology	Relatively new technology with a limited number of technology providers Produces a large amount of liquid effluent that must be monitored and tested before it is released to the sanitary sewer Besides treatment for pH (see column 1), treatment may also be required to lower total suspended solids and biological oxygen demand Requires secondary support services such as a steam boiler
Rendering	The rendering process being considered involves conversion of carcasses into carcass meal (solids), melted fat, and water using a steam-jacked pressure vessel with an internal (steam) heat exchange-rotating shaft with spokes and paddles. Appropriate emissions and odor control technologies can be added to the rendering process, if needed.	Proper operation of rendering processes should result in non-infectious residuals that can be safely disposed Consists of mature technologies	Produces a large quantity of solid and liquid residuals requiring disposal Requires secondary support services such as a steam boiler

Source: NDP 2007a; NDP 2007b; NDP 2008; NABCC 2004.

The rendering process uses high temperature and pressure to convert whole animal and poultry carcasses or their by-products to fat, protein materials, and water. It is a combination of mixing, cooking, pressurizing, fat melting, water evaporation, and microbial and enzyme inactivation. There are many different types of rendering processes (NABCC 2004). While the primary purpose of the technology is to manufacture products of commercial value, this would not be the case if rendering were used at the NBAF. All of the process residuals would be disposed, including liquids in the sanitary sewer system and solids and fat in regulated and permitted solid or hazardous waste management facilities (as appropriate based on constituents). If a rendering process is used at the NBAF, it may be modeled after the process available at the U.S. Department of Agriculture National Veterinary Laboratories in Ames, Iowa (NDP 2007a).

The final design for the NBAF will probably include more than one technology for the treatment of animal carcasses/pathological waste. Among the factors that may be considered in making this decision are individual site requirements and restrictions, air emissions, liquid and solid waste stream by-products, and operation and maintenance requirements (NDP 2008).

Radiological Waste

Experiments/procedures that would generate radiological waste are not currently part of the planned mission of the NBAF. If radiological waste is generated at the NBAF in the future, operational protocols would preclude its discharge into the building plumbing systems because the NBAF would not have a piped radioactive waste collection or storage system (NDP 2007a). Radiological waste would be collected, packaged, and transported in accordance with applicable state, Nuclear Regulatory Commission (NRC), and Department of Transportation requirements and it would be disposed in NRC-licensed disposal facilities.

Medical, Hazardous, and Industrial Solid Waste

Disposal of medical, hazardous, and industrial solid waste is governed by federal and state regulations promulgated under the RCRA. In addition, treatment of industrial solid waste in non-hazardous waste incinerators (i.e., municipal waste combustors) is governed by federal and state regulations promulgated under the CAA. As discussed above, incinerators used to treat hazardous, medical, and infectious waste are also governed by CAA regulations.

Off-Site Disposal Capacity for Waste Solids

The vast majority of wastes, other than sanitary sewer wastes, generated at the NBAF requiring off-site disposal would be industrial solid waste, which would be disposed at municipal solid waste landfills. Waste acceptance criteria for municipal solid waste landfills are developed by facility owners and operators based on federal, state, and local regulations and ordinances; facility permits; and technical criteria related to the characteristics of the facilities themselves. (For example, packaged waste may be subject to container size, weight, or volume restrictions that are related to optimum stacking efficiency in disposal cells.) All municipal solid waste landfills will have waste acceptance criteria related to waste characterization (e.g., to show that the waste is not hazardous and that liquids are not present), and many will have criteria related to preventing void spaces in the landfill.

Almost all states import and export municipal solid waste to other states and the amount of municipal solid waste making interstate movements is increasing. On average, approximately 10% of the municipal solid waste generated in the United States was exported to another state for disposal in 2003. The majority of shipments tend to occur between neighboring states. Federal courts have repeatedly ruled that restrictions on interstate waste shipments are unconstitutional (NSWMA 2004). Because of the ability of the NBAF to ship industrial solid waste to out-of-county and even out-of-state facilities, local capacity for industrial solid waste disposal is not an issue. Disposal costs would, however, be impacted by transportation costs. Table 3.13.2.1-1 shows municipal solid waste imports and exports by state for the six states being considered as NBAF locations.

The interstate movement of hazardous waste shows similar trends. All states import and/or export RCRA hazardous wastes. Of the 40.82 million tons of hazardous waste generated in the United States in 2001, 4.15 million tons (10.2%) was transported to another state (or jurisdiction) for treatment and disposal (NSWMA 2004). Because of the ability of the NBAF to ship hazardous waste to out-of-county and even out-of-state facilities, local capacity for hazardous waste disposal is not an issue. Disposal costs would, however, be impacted by transportation costs. Table 3.13.2.1-2 shows hazardous waste imports and exports by state for the six states being considered as NBAF locations.

3.13.3 No Action Alternative

3.13.3.1Affected Environment

At the existing PIADC, wastewaters generated by research activities would continue to be treated/decontaminated and then sent to Plum Island's central wastewater treatment plant in Building 102. This plant also receives sink, drain, and sewage wastes from the non-research support facilities on the island. The wastewater treatment plant is a tertiary treatment facility that includes chemical treatment and irradiation (with ultraviolet light) to enhance disinfection of the effluent. Treated wastewater passes through reed beds specifically designed to "polish" the effluent prior to its discharge from an outfall into Plum Gut Harbor. The wastewater treatment plant is currently permitted to treat 80,000 gpd.

Waste solids generated by PIADC activities undergo onsite treatment or they are transported to appropriately permitted offsite facilities. PIADC currently operates three incinerators. Waste generated as a result of operations that cannot be treated in one of the PIADC incinerators is packaged, manifested, and transported to an appropriately permitted receiving facility. Many materials are recycled. Table 3.13.3.1-1 shows the weight of materials handled by the PIADC recycling program in 2006.

Table 3.13.3.1-1 — Materials Handled by the PIADC Recycling Program in 2006

Material	Weight (lb)
Cardboard	14,350
Paper	5,450
Plastic Bottles	860
Aluminum Cans	810
Glass	350
Books/Magazines	31,425

Source: PIADC Environmental Notes 2007.

3.13.3.2Environmental Consequences

Under the No Action Alternative, the existing waste management procedures for PIADC would continue. Because the NBAF would not be constructed, no construction impacts beyond ongoing infrastructure upgrades or new operational waste impacts would occur.

3.13.4 South Milledge Avenue Site

3.13.4.1Affected Environment

The Athens-Clarke County Middle Oconee Wastewater Treatment Facility is located on Will Hunter Road, approximately 2 miles from the site. This facility has a permitted treatment capacity of 6 million gpd and currently utilizes approximately 75% of this capacity (4.5 million gpd). The wastewater treatment process includes a bar screen, grit separator, activated sludge process, clarifiers, digesters for biosolids removal, and chlorine disinfection (ACC 2008). A planned facility upgrade would increase its capacity to 10 million gpd. This upgrade is expected to be completed by 2012.

Approximately 10.7 million tons of municipal solid waste and just over 760,000 tons of hazardous waste are generated annually in the State of Georgia (Tables 3.13.2.1-1 and 3.13.2.1-2). Georgia is a net importer of municipal solid waste and a net exporter of hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.4.2 Construction Consequences

Construction of the proposed NBAF at the South Milledge Avenue Site would generate construction debris, sanitary solid waste, and wastewater. The generation of hazardous waste is possible but not expected. Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.4.3. Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2, along with the proposed treatment methods for animal carcasses/pathological wastes. However, the following information regarding sanitary wastewater and disposal of waste solids is specific to the South Milledge Avenue Site.

The proposed NBAF would discharge sanitary wastewater into the Athens-Clarke County sewer system. NBAF project engineers anticipate collecting sanitary sewer wastewater outside the basement level of the proposed facility. It would have to be pumped 9,500 feet to a gravity line (the closest sewer line) through a force main that would be installed along South Milledge Avenue (NDP 2008). From there, the waste would be piped to the Middle Oconee Wastewater Treatment Facility. However, planned improvements include a 12-inch sewer line from the NBAF to the Middle Oconee Wastewater Treatment Facility. Once the planned upgrade of this facility to 10 million gpd is completed in 2012, the estimated impact of an additional wastewater discharge of 72,300 gpd average, or 150,000 gpd maximum, that could be contributed by the NBAF would be to use less than 2% of capacity on a maximum discharge day. The treatment of liquid wastes, prior to entry into the sewer line, is discussed in Section 3.13.2.2.

Sewage acceptance criteria may apply to the wastewater discharged from the NBAF. The proposed NBAF would comply with these requirements to not negatively impact regional sewage treatment capability due to flow rate or potentially harmful wastewater constituents.

Georgia is a net exporter of hazardous waste (Table 3.13.2.1-2). Because of the ability of Georgia to ship hazardous waste to other jurisdictions, disposal capacity for hazardous waste would not be an issue.

Cumulative Impacts

According to the University of Georgia Office of the University Architects for Facilities Planning (Kevin Kirsche, UGA, January 25, 2008), UGA has no immediate projects of significant consequence planned for areas surrounding the proposed South Milledge Avenue Site. Five significant development projects anticipated by the University over the next 5 years and 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).

It is unknown at this time the potential impacts of future projects on the Middle Oconee Wastewater Treatment Facility's capacity. However, it is anticipated that the rapid population growth of Clarke County would continue, and use of this facility would increase accordingly.

The wastewater effluent for the proposed NBAF is estimated at 72,300 gpd. This represents less than 2% of the Middle Oconee Wastewater Treatment Facility's current capacity of 6 mgd. Based on the available

information, the NBAF would not have a significant cumulative effect on wastewater treatment capability. As the population continues to grow in the region, it is likely that additional wastewater treatment facilities would be constructed as is currently the case. This would occur with or without the NBAF.

3.13.5 Manhattan Campus Site

3.13.5.1Affected Environment

Wastewater is collected and treated by the City of Manhattan in their wastewater treatment plant. The plant's capacity is 8.7 million gpd and peak flow is 6.95 million gpd, or almost 80% of capacity. The City of Manhattan is currently planning a major wastewater treatment plant expansion and upgrade to address general growth needs and anticipated environmental regulations that are expected to be more stringent than current requirements. The projected capacity of the city's wastewater treatment plant once it is upgraded is 10.7 million gpd, which is an increase of almost 23%. Project design is planned for 2008, with construction occurring in 2009 and 2010.

Approximately 2.8 million tons of municipal solid waste and 1.5 million tons of hazardous waste are generated in the State of Kansas annually. Kansas is a net importer of solid waste and a net exporter of hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.5.2Construction Consequences

Construction of the proposed NBAF at the Manhattan Campus Site would generate construction debris, sanitary solid waste, and wastewater. The generation of hazardous waste is possible but not expected. Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.5.3. Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2, along with the proposed treatment methods for animal carcasses/pathological wastes. However, the following information regarding sanitary wastewater and disposal of waste solids is specific to the Manhattan Campus Site.

The proposed NBAF would discharge sanitary wastewater into the City of Manhattan sewer system. Engineering studies propose having the sanitary sewer line from the proposed NBAF exit at the basement level of the facility and rerouted along the southeastern portion of the site to an existing 8-inch gravity sewer line along Denison Avenue. A lift-station system would be necessary to tie the NBAF in with the current sewer system (NDP 2008). If the NBAF adds an average discharge of approximately 67,500 gpd or a maximum discharge of 140,000 gpd, this would use up less than 2% of the expanded wastewater treatment plant capacity on a maximum discharge day.

Kansas is a net importer of solid waste and a net exporter of hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2). The ability of Kansas to import solid waste from and export hazardous waste to other jurisdictions suggests that disposal capacity for solid and hazardous waste is not an issue.

Cumulative Impacts

According to KSU (Ron Trewyn, KSU, January 28, 2008), it 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 to 100 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

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 ROI for wastewater capacity is the City of Manhattan, which provides wastewater treatment for the area including the Manhattan Campus Site. The NBAF would utilize less than 2% of the City of Manhattan's wastewater treatment facility's capacity and is not anticipated to be substantial; however, the effluent would represent an increase in the ROI cumulative wastewater load. Wastewater treatment capacity of the future projects in the ROI is not known but would contribute to the cumulative effects to the resource.

3.13.6 Flora Industrial Park Site

3.13.6.1Affected Environment

Wastewater is collected and treated by the Town of Flora. There is currently a 10-inch gravity line on the proposed NBAF site, which discharges into a 350 gpm lift station (NDP 2008). This sewer line currently has no flow, so it has 100% excess flow capacity. A 6-inch force main transports the waste to the Town of Flora treatment facility. The 6-inch force main currently has 52% excess flow rate capacity. Current lagoon capacity is 300,000 gpd, with 100,000 gpd being used. State funding is being sought for more than a two-fold increase in capacity. Wastewater is treated in an aeration lagoon, passed through a sand filter, and then discharged into a tributary of the Big Black River.

Approximately 2.5 million tons of municipal solid waste and just over 2 million tons of hazardous waste are generated in the State of Mississippi annually. Mississippi is a net importer of both solid and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.6.2Construction Consequences

Construction of the proposed NBAF at the Flora Industrial Park Site would generate construction debris, sanitary solid waste, and wastewater. Generation of hazardous waste is possible but not expected. Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.6.3. Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2 along with the proposed treatment methods for animal carcasses/pathological wastes. However, the following information regarding sanitary wastewater and solid waste disposal is specific to the Flora Industrial Park Site.

The proposed NBAF would discharge sanitary wastewater to the Town of Flora sewer system. NBAF project engineers anticipate collecting sanitary wastewater outside the basement level of the facility and connecting it via a gravity line to the existing 10-inch gravity line on the proposed site (NDP 2008). If the NBAF adds a discharge between 77,100 (average) and 150,000 (maximum) gpd to the Flora sanitary sewer system, between 40% and 75% of the current remaining lagoon capacity would be used. However, state funding is being sought for expansion of the discharge of this current lagoon. The peak and average flow rates into the lift station are not known at this time; therefore, the need for lift station upgrades cannot yet be determined.

Sewage acceptance criteria may apply to the Flora Industrial Park Site. The proposed NBAF would comply with these requirements and would not negatively impact regional sewage treatment capability due to flow rate or potentially harmful wastewater constituents. Industrial pretreatment criteria are dictated by the State of Mississippi Department of Environmental Quality (David Holman, Town of Flora, March 19, 2008, e-mail to Clarissa Hageman, Tetra Tech, Inc.).

Mississippi is a net importer of both solid and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2). The ability of Mississippi to import solid waste and hazardous waste from other jurisdictions suggests that disposal capacity for solid and hazardous waste is not an issue.

Cumulative Impacts

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 were not available regarding 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.

The Metro Jackson Chamber of Commerce stated there are no non-residential economic development projects scheduled for Flora within the next 5 years.

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

The demand for wastewater treatment capacity from the NBAF is not anticipated to be substantial; however, the effluent volume and constituents would represent an increase in the ROI cumulative wastewater record. The addition of 15,000 people by the year 2015 would occur with or without the NBAF and would result in additional use of the wastewater treatment capacity. It is likely that additional wastewater treatment capability would be needed in the future.

3.13.7 Plum Island Site

3.13.7.1Affected Environment

The proposed location of the NBAF at the Plum Island Site is adjacent to the current PIADC laboratories. The existing waste management facilities and procedures at PIADC are described in Section 3.13.3.1. PIADC is an existing large-quantity generator of sanitary, medical/infectious, hazardous, and universal waste.

Approximately 36.3 million tons of municipal solid waste and just over 3.5 million tons of hazardous waste are generated annually in New York. New York is a net exporter of municipal solid waste and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.7.2Construction Consequences

Construction of the proposed NBAF at the Plum Island Site would generate construction debris, sanitary solid waste, and wastewater. Hazardous wastes could also be generated. Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.7.3Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2 along with the proposed treatment methods for animal carcasses/pathological wastes. However, the following information regarding sanitary wastewater and solid waste disposal is specific to the Plum Island Site.

The NBAF would discharge sanitary wastewater into the PIADC wastewater treatment plant in Building 102. NBAF project engineers anticipate collecting sanitary sewer wastewater outside the basement level of the proposed facility. It would have to be pumped 1,000 feet from a new pump station to the existing plant. While the plant's current permitted capacity (80,000 gpd) could handle an estimated 62,700 gpd average from the NBAF, it is not sufficient to handle estimated peak loads of up to 125,000 gpd. Options being considered to address this shortfall include

- Constructing and permitting a new wastewater treatment plant,
- Expanding the existing plant to handle peak NBAF loads, and
- Adding pretreatment holding tanks allowing peak loads to be averaged and fall within current permitted capacity (NDP 2008).

As a generator of solid and hazardous wastes, PIADC is familiar with properly permitted outlets for the receipt, treatment, and disposal of these wastes. For example, approximately 965 tons of TRMW generated by PIADC investigation by excavation projects (see Section 3.12.6) were disposed in appropriately permitted landfills in Pennsylvania (PIADC Notes 2007). In addition, some of the policies and procedures applicable to the on-site management of solid and hazardous wastes would generally be applicable to the same and similar waste streams generated at the proposed Plum Island Site (see Section 3.13.3.1).

New York is a net exporter of municipal solid waste and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2). The ability of New York to export solid and hazardous waste to other jurisdictions suggests that disposal capacity for solid and hazardous waste is not an issue.

3.13.8 Umstead Research Farm Site

3.13.8.1Affected Environment

Wastewater collection, treatment, and disposal services for the Butner area are provided by the SGWASA. The SGWASA treatment plant has a capacity of more than 5 million gpd, and it is currently operating at less than 50% of capacity.

Approximately 12 million tons of municipal solid waste and almost 328,000 tons of hazardous waste are generated in the State of North Carolina annually. North Carolina is a net exporter of both municipal solid and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.8.2Construction Consequences

Construction of the proposed NBAF at the Umstead Research Farm Site would generate construction debris, sanitary solid waste, and wastewater. Generation of hazardous waste is possible but not expected.

Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.8.3Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2 along with the proposed treatment methods for animal carcasses/pathological wastes. However, the following information regarding sanitary wastewater and solid waste disposal is specific to the Umstead Research Farm Site.

The proposed NBAF would discharge sanitary wastewater to the SCWASA sewer system. NBAF project engineers anticipate collecting sanitary sewer wastewater outside the basement level of the facility and routing it approximately 2,500 feet from the facility to an existing gravity line south of the property running along Highway 75 (NDP 2008). Because the SGWASA treatment plant is currently operating at less than 50% of capacity, the addition of an estimated wastewater discharge from the NBAF of 69,600 gpd average, or 150,000 gpd maximum, would use less than 6% of available operating capacity on a maximum discharge day.

Sanitary wastewater from the NBAF would have to meet SGWASA acceptance criteria. Discharge of medical waste (defined as infectious agents, human blood and blood products, pathological wastes, sharps, body parts, contaminated bedding, surgical wastes, potentially contaminated laboratory wastes, and dialysis wastes), for example, must be specifically authorized by the SGWASA Director in a wastewater discharge permit.

North Carolina is a net exporter of both municipal solid and hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2). The ability of North Carolina to export solid waste and hazardous waste from other jurisdictions suggests that disposal capacity for solid and hazardous waste is not an issue.

Cumulative Impacts

According to the Granville County Economic Development Commission (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 slow down. It is unknown when the housing market will return to its level of previous years.

Although the majority of the 5 mgd wastewater capacity of the SGWASA sewage treatment plant has been allocated for residential use at this time, there is substantial wastewater capacity reserved for commercial and industrial uses. Over the next year, some of the capacity that has been allocated for residential use may return to SGWASA if the homes are not constructed within the time period allowed (Leon Turner, EDC, February 20, 2008). Wastewater capacity of 69,000 gpd for the NBAF represents approximately 1.3% of the total capacity of the plant and has been reserved with much more becoming available due to the housing slow down. There is also currently a plan to upgrade and expand the SGWASA wastewater treatment plant in Butner.

As previously discussed, the Knap of Reeds Creek is the receiving waters from the City of Butner's wastewater treatment, and Knap of Reeds Creek is currently not meeting all NCDENR, DWQ designated uses. The NBAF's contribution to the wastewater treatment facility's capacity is not anticipated to be substantial; however, the effluent volume and constituents would represent an increase in the ROI cumulative wastewater effluents entering the Knap of Reeds Creek.

3.13.9 Texas Research Park Site

3.13.9.1Affected Environment

Wastewater from the Texas Research Park Site flows through SAWS Far West area lines and eventually into the SAWS Medio Creek WRC. A SAWS project currently in the bidding phase will expand the Medio Creek WRC capacity to 16 million gpd from the current capacity of 8.5 million gpd.

Approximately 43.7 million tons of municipal solid waste and 7.5 million tons of hazardous waste are generated in Texas annually. Texas is a net exporter of solid waste and a net importer of hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2).

3.13.9.2Construction Consequences

Construction of the proposed NBAF at the Texas Research Park Site would generate construction debris, sanitary solid waste, and wastewater. Generation of hazardous waste is possible but not expected. Waste-related impacts from construction are similar under all action alternatives and are described in Section 3.13.2.1.

3.13.9.3Operation Consequences

Operation of the proposed NBAF would generate wastewater; waste solids; and medical, hazardous, and industrial solid wastes. Impacts related to these wastes from operation of the proposed NBAF are similar under all action alternatives and are described in Section 3.13.2.2, along with the proposed treatment methods for animal carcasses/radiological wastes. However, the following information regarding sanitary wastewater and solid waste disposal is specific to the Texas Research Park Site.

Wastewater collection, treatment, and disposal services for the proposed NBAF site at Texas Research Park would be provided by the SAWS through an existing 8-inch diameter sewer line to the east of the 100.1-acre tract. NBAF project engineers anticipate collecting sanitary sewer wastewater outside the basement level via a gravity line to the 8-inch sewer line (NDP 2008). A new sewer line would be extended to serve the proposed NBAF site, and this line would provide additional capacity sufficient for the projected NBAF demand. The tie-in to the SAWS water collection system would have to conform to SAWS Utility Service Regulations. With the Medio Creek WRC capacity expansion, SAWS would have sufficient capacity for the projected 79,000 gpd average and 150,000 gpd maximum NBAF demand. The NBAF wastewater discharge would use less than 1% of expanded SAWS capacity on a maximum discharge day. NBAF wastewater discharged to the sanitary sewer would have to comply with the City of San Antonio's Pretreatment Ordinance for wastewater.

Texas is a net exporter of solid waste and a net importer of hazardous waste (Tables 3.13.2.1-1 and 3.13.2.1-2). The ability of Texas to export solid waste and import hazardous waste from other jurisdictions suggests that disposal capacity for solid and hazardous waste is not an issue.

Cumulative Impacts

In Bexar County, there are several other public and private activities proposed or ongoing that would have potential to impact the wastewater treatment capacity. Future planned projects in the vicinity of the Texas Research Park Site include a number of new residential development projects 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 ROI for wastewater treatment capacity is the western portion of Bexar County in the area served by the SAWS Medio Creek Wastewater Reclamation Center. The contribution of wastewater effluent from the NBAF is projected to be approximately 26.5 million gpy. This represents less than 1% of the capacity of SAWS Medio Creek Wastewater Reclamation Center (8.5 million gpd) and is not anticipated to be substantial; however, the effluent volume and constituents would represent an increase in the ROI cumulative wastewater generation.