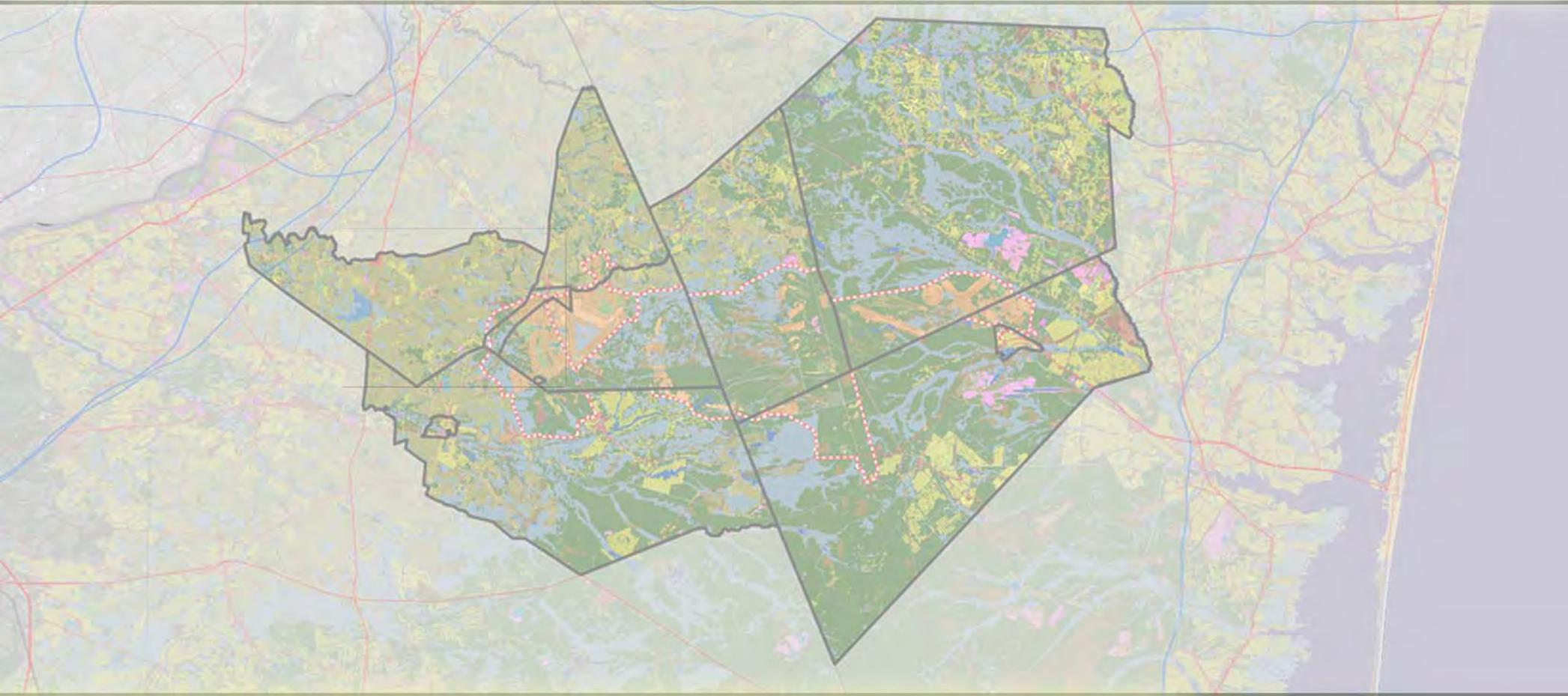




Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington

Final Report: April 2009

Sponsored by the Department of Defense, Office of Economic Adjustment and the County of Ocean



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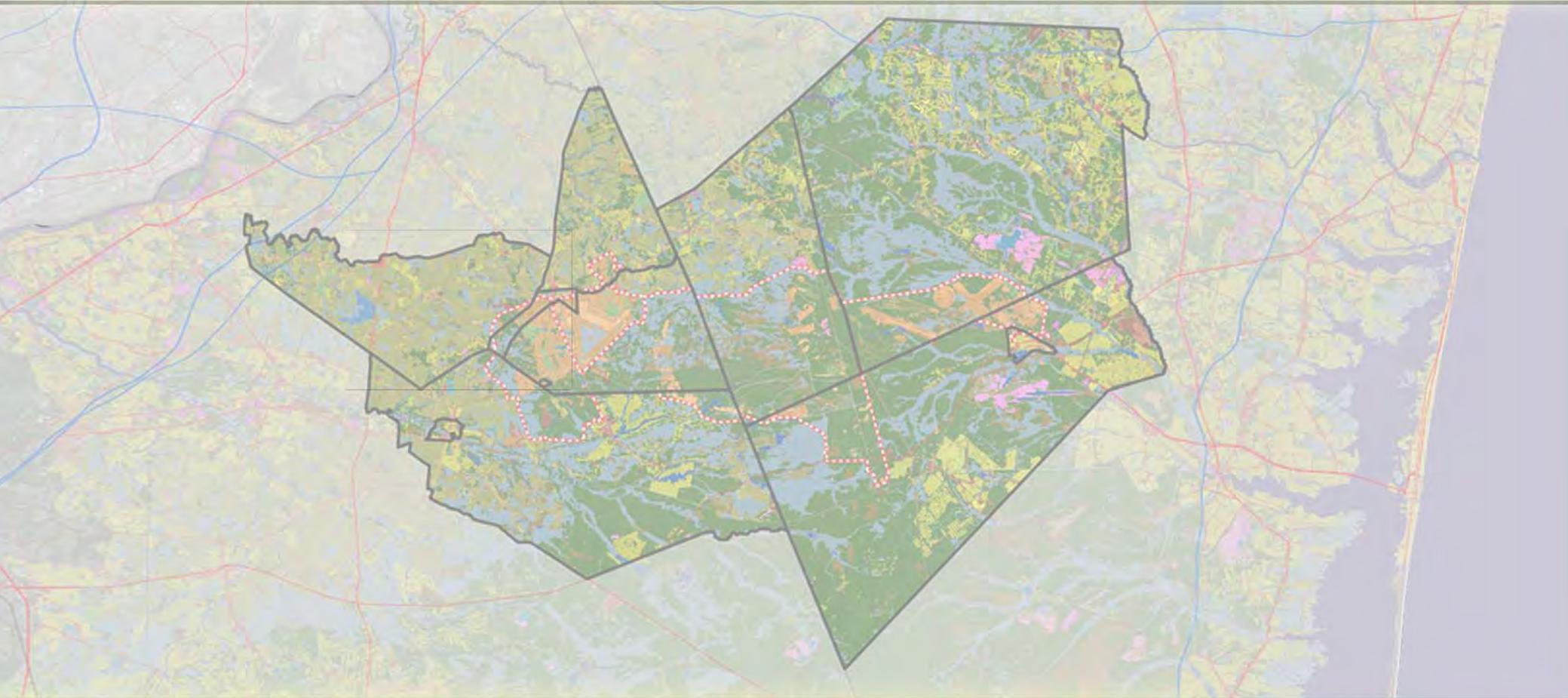
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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Executive Summary

Creation of Joint Base McGuire-Dix-Lakehurst

McGuire Air Force Base (AFB), Fort Dix, and Naval Air Engineering Station (NAES) Lakehurst, located within Burlington and Ocean Counties in New Jersey, will soon combine to form a Joint Base. The Joint Base extends 20 miles from east to west, encompasses 42,000 acres and employs some 22,000 people. Joint Base McGuire-Dix-Lakehurst will form the nation's only tri-service Joint Base.

The establishment of this Joint Base comes as a decision from the 2005 Base Realignment and Closure (BRAC) commission. BRAC is the congressionally authorized process that the Department of Defense uses to reorganize its military installations by making recommendations for the closure or realignment of installations inside the United States. In selecting military installations for closure or realignment the Department of Defense gives priority consideration to the following criteria:

1. The current and future mission capabilities and the impact on operational readiness of the total force of the Department of Defense, including the impact on joint war fighting, training, and readiness.
2. The availability and condition of land, facilities and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas and staging areas for the use for the Armed Forces in homeland defense missions) at both existing and potential receiving locations.
3. The ability to accommodate contingency, mobilization, surge, and future total force requirements at both existing and potential receiving locations to support operations and training.
4. The cost of operations and the manpower implications.
5. The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs.
6. The economic impact on existing communities in the vicinity of military

installations.

7. The ability of the infrastructure of both the existing and potential receiving communities to support forces, missions, and personnel.
8. The environmental impact, including the impact of costs related to potential environmental restoration, waste management, and environmental compliance activities.

The BRAC assessment of McGuire AFB, Fort Dix, and NAES Lakehurst was deemed to meet the acceptable criteria for continued operation and the Joint Base is anticipated to have an increase in military missions.



McGuire In-Flight Refueling

McGuire AFB was established in 1937 and was originally known as Rudd Field. Its origins were a single runway that was adjacent to Fort Dix. Over the years the base grew as it supported World War II efforts. In 1949, the base officially became known as McGuire AFB. McGuire AFB is the only Air Force base in New Jersey and is well known for transporting troops, cargo, and for providing in-flight refueling throughout the world.

Fort Dix has been in existence since 1917 and is currently the largest Army installation in the New York-Philadelphia Metropolitan Area. Fort Dix currently is a training, mobilization, and deployment center. Its primary mission is to provide on the ground training support to active and reserve units of all services and licensed non-Department of Defense (DoD) activities (police, FBI, etc).



Fort Dix Mobilization



NAES Lakehurst catapult testing

NAES Lakehurst was formed around the same time as Fort Dix. NAES Lakehurst began as an ammunition proving ground in 1915, was then acquired by the Army (known as Camp Kendrick), and became Naval Air Station Lakehurst in 1921. NAES Lakehurst may be best known for the Hindenburg crash in 1937 and the subsequent Hindenburg memorial. Hangar One, which housed the Hindenburg, is

Executive Summary

a registered national historic landmark. Today, NAES Lakehurst is known for its research and development for aircraft takeoff and landing from ships at sea.

McGuire AFB will lead the Joint Base administrative tasks including overall property management and each Base is expected to have an increase in activity and mission. With this expected increase, it is important to determine the possible effects to the nearby communities and to determine Joint Base needs in order to continue the military mission. The nearby communities and the Joint Base have an essential relationship that will benefit from reciprocated awareness and communication.

What is a Joint Land Use Study?

When military bases are first established they are often built in remote areas with little to no local population. Over time communities build up around the base often from off-base military housing, local companies offering services on the base, and supportive businesses offering services off base to the newly employed military and their families. The bases become a hub for regional growth due to this increased economic activity.

In 1985, the DoD formally recognized that as communities developed next to the military bases, military missions were impacted. Both civilian and military activities have the potential to negatively impact the other's active land use when those respective activities are in close proximity of each other. The DoD's Office of Economic Adjustment (OEA) began the Joint Land Use Study (JLUS) program to encourage cooperative land use planning between military installations and the surrounding communities where civilian encroachment is likely to impair the operations of an installation.

Joint Base Regional Communities

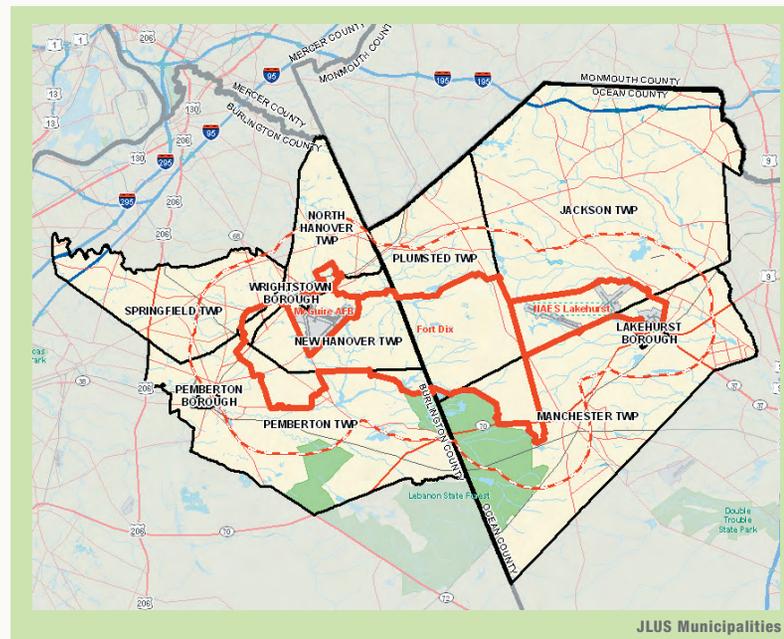
Burlington and Ocean counties are the two largest counties in the state. Despite a large growth in population and employment in the last fifty years, both counties maintain a vast amount of protected open space. The 10 municipalities that are part of this JLUS are Jackson Township, Lakehurst Borough, Manchester Township, and Plumsted Township in Ocean County, and New Hanover Township, North Hanover Township, Pemberton Borough, Pemberton Township, Springfield Township, and Wrightstown Borough in Burlington County.

Ocean County JLUS Communities

Manchester and Jackson Townships are the largest JLUS municipalities in Ocean County and have had significant residential growth in recent years. Jackson Township has grown due to its location with access to major transportation routes, its affordable housing stock,

and its tourism industry, which includes Six Flags, Wild Safari, Hurricane Harbor, and factory outlets. Manchester Township is known for its extensive retirement communities and was one of the fastest growing communities in New Jersey from the mid 1960's through the late 1980's. Despite their recent growth, both municipalities have a large portion of lands that are preserved. Sixty two percent of Jackson Township's overall lands are within wildlife management conservation areas or are designated for preservation, and sixty three percent of Manchester's lands are designated for preservation.

Plumsted Township is primarily an agricultural community that values and is looking to preserve its rural character. Plumsted Township has been active in land preservation and has successfully



preserved more land from development, in excess of 2,500 acres, than any other municipality in Ocean County. Since 2000, new residential growth has mostly been in the northeastern corner of the Township, located adjacent to Jackson Township. There is an ongoing revitalization plan for the New Egypt Main Street business district center.

Lakehurst Borough is the smallest Ocean County JLUS municipality. The Borough is mostly built out with predominantly residential growth and with pockets of commercial development along Route 70 and Union Avenue. Approximately 25 acres of the Borough is newly revitalized NAES Lakehurst housing. Adjacent to the NAES Lakehurst boundary is a light industrial area with a proposed area of light industrial redevelopment.

Joint Base McGuire-Dix-Lakehurst occupies lands within each Ocean County JLUS municipality. Fort Dix occupies approximately half of Plumsted Township and the western part of Manchester Township. Manchester Township, Lakehurst Borough, and Jackson Township have lands within the NAES Lakehurst boundary.

Burlington County JLUS Communities

New Hanover, North Hanover, and Springfield Townships are predominantly active farming communities. Each of these municipalities would like to preserve its rural character. North Hanover and New Hanover Townships are pursuing small regions of redevelopment area growth. New Hanover Township may be pursuing commercial and industrial redevelopment nearest to the Joint Base. North Hanover Township is pursuing an area of redevelopment that would offer commercial services adjacent to Wrightstown Borough. Small amounts of residential and commercial growth can be expected in Springfield Township but a large number of farms have been permanently preserved (approximately 25% of total land area). Springfield Township is also at the forefront of preserving lands for preservation in the state, incorporating for a long time a “right to farm” ordinance.

Pemberton Borough is the smallest Burlington County JLUS municipality and is entirely surrounded by Pemberton Township. The municipality has experienced some residential growth in recent years and is mostly built out for new residential growth. The Borough has a historical “main” street feel on Hanover and Jarvis streets with commercial uses along Hanover and W Hampton Streets.

Pemberton Township is the largest Burlington County JLUS municipality with the largest population. A large amount of Township lands are considered forest, wetlands or agricultural, providing large areas of preservation. Pemberton Township residential lands are within communities such as Brown Mills, Brown Mills Junction, and Presidential Lakes Estates. The Township currently plans for a revitalization and redevelopment of Browns Mills and a new growth center that will be integrated with Pemberton Borough.

Wrightstown Borough has seen past growth due to its location next to the McGuire AFB main gate. In the past, the Borough had supporting commercial development to Fort Dix and McGuire AFB and has limited residential growth. Over the years, as military missions have changed and the on-base population has changed, many Wrightstown businesses have struggled. Recently, Wrightstown is recreating its town center and is incorporating 42 acres that were previously part of Fort Dix. The new Wrightstown growth will be a mixed use development that will have commercial uses and residential development.

Joint Base McGuire -Dix-Lakehurst occupies lands within five of the Burlington County JLUS municipalities, with the exception of Pemberton Borough. McGuire AFB is located in New and North Hanover Townships, and in Wrightstown Borough. Fort Dix is located within New Hanover Township, Pemberton Township, Springfield Township and Wrightstown Borough.

Joint Base Regional Communities Growth

From 1980 to 2000, Jackson and Manchester Townships gained 170 and 132 persons per square mile (ppsm) respectively. During that same time period Plumsted Township (64 ppsm), Springfield Township (18 ppsm), and Pemberton Borough (18 ppsm) also saw an increase in their population density. The other five municipalities in the JLUS had decreasing population densities from 17ppsm (Pemberton Township) to 385 ppsm (Lakehurst Borough). Overall from 1980 to 2000, the state of New Jersey gained an average 165 ppsm.

While the JLUS municipalities combined did not have an overall increase in ppsm from 1980 to 2000, new population estimates show an average population density increase. With the expected increase of base activity, local population densities may also intensify in the near future.

JLUS process

The JLUS process encourages community decision-makers and installation representatives to study issues of compatibility in an open forum, balancing both military and civilian interests. The JLUS program seeks to empower local communities to work with their neighboring installations to guide the implementation of appropriate land use controls around military installations.

This is the first JLUS for McGuire AFB, Fort Dix or NAES Lakehurst. Prior to this JLUS, each base has interacted with the other JLUS municipalities and with the military installations in a different manner. With the completion of the JLUS, concurrently with the establishment of the Joint Base, a new unified interaction with the community is possible.

The following were the objectives for the Joint Base JLUS.

Community

- Protect the health, safety, and welfare of the existing residents
- Maintain quality of life for community residents
- Guide incompatible land uses away from air strips
- Encourage compatible land uses to locate near the Joint Base
- Maintain the economic vitality of the JLUS communities
- Provide for sustainable growth in an economically, environmentally, and socially sustainable manner

Military

- Protect the health, safety, and welfare of the military personnel
- Preserve the ability of the Joint Base to carry out planned missions, maintain military readiness, and support national defense objectives
- Establish a framework for communication and cooperation between the Joint Base and the surrounding communities

Policy and Technical Committees were created to help guide the yearlong study and to provide feedback during the JLUS. The Policy Committee for the Joint Base McGuire-Dix-Lakehurst study comprised of military representation from NAES Lakehurst, Fort Dix, and McGuire Air Force Base, elected and appointed officials from each participating local government—including the two counties and the ten surrounding municipalities—and senior representatives from the Pinelands Commission, the Office of Smart Growth, and the State Agriculture Development Committee. Also in attendance at the JLUS Policy and Technical Committee meetings were project managers from the Department of Defense's Office of Economic Adjustment and representatives from the offices of Congressman Saxton, Congressman Smith, and Congressman Adler.

Throughout much of the JLUS process, a website www.jointbasenj.org has been available to the public. The website hosts information defining what a Joint Land Use Study is, a "JLUS in the News" element, an interactive public survey, and a dynamic mapper of the JLUS study area. Two public open houses were held in September of 2008 to explain the study and allow for public interaction with representatives from the military bases. A follow up public hearing was held in March of 2009 to present the study findings and recommendations .

Study Scope

The existing and proposed operations of the Joint Base (Section 5) summarize the Base mission and help to determine existing and potential areas of conflicts with the JLUS communities. Noise and safety considerations (Section 6) are often associated with increased Joint Base missions. Identifying areas impacted by high noise levels and safety considerations, that are outside of the Joint Base boundaries, helps determine areas that may be a priority concern to the JLUS communities and the Joint Base.

The community analysis (Section 7) studied how JLUS communities have developed to date, their growth in proximity with the Joint Base, and what lands have the immediate potential for growth that may cause future incompatibility issues given current zoning. Growth potential for each of the municipalities was determined for the 2 mile study area surrounding the Joint Base and should be considered as a general reference utilizing the existing zoning scenarios. Actual build out of the municipalities may be more or less dependent on zoning, state planning considerations, infrastructure capacity, soil suitability, and the possibility of infill development of existing lots.

Growth potential in New Jersey must also take into consideration state land use planning considerations such as the State Development and Redevelopment Plan, the Pinelands Management Areas, and infrastructure capacity (Sections 8 & 9).

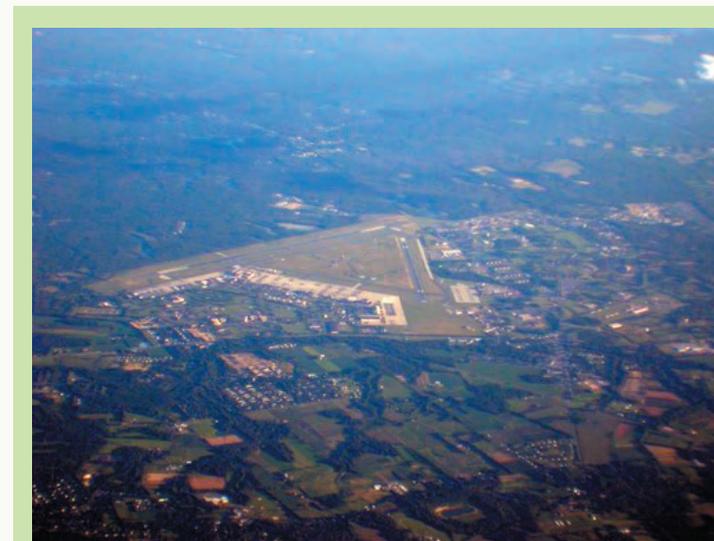
The Joint Base is a regional economic driver that offers potential economic stimulus to the municipalities (Section 10) and lies at the center of many potential compatible growth development opportunities.

Ocean and Burlington Counties, in cooperation with the Joint Base and JLUS municipalities, have been successful in preserving lands near the Joint Base (Section 11) that will help to prevent future compatibility concerns.

Over the course of this JLUS, the military, municipalities, counties and state agencies were interviewed and were also part of the committees to determine existing issues and concerns. The JLUS analysis incorporated available mapping and data to determine existing or potential concern to the safety of the communities and the protection of the continued military presence and mission. The dominant issues are summarized in the following table and the recommended implementation actions (Section 12) are designed to offer suggested solutions.

A JLUS can have a variety of issues that are pertinent to the prevention of urban encroachment, the safeguarding of the military mission, and the protection of the public health safety and welfare. Concerns may include manmade concerns, natural resources, and the competition for scarce resources. For this JLUS, manmade concerns such as existing and planned land use, safety zones, infrastructure capacity (including water, wastewater, and transportation), local housing availability, interagency coordination, and noise levels were considered a priority.

Table 1 summarizes the identified major JLUS compatibility issues and their proposed implementation action. The compatibility issues were determined from municipal and military base meetings, the JLUS technical and policy committees, DoD guidelines, and public input.



McGuire AFB Overview



NAES Lakehurst Overview

Table 1. Summary of Identified Compatibility Issues

Identified Issue	Recommendation Category	Recommended Implementation Action
<p><i>Lack of coordinated procedures between JLUS municipalities and Joint Base</i></p> <p><i>Ongoing support for identified JLUS strategies to be implemented</i></p>	<p>JLUS Review and Ongoing Support</p>	<p>A-1 Execution of a charter that defines future participation and goals</p> <p>A-2 Create a Joint Base JLUS Implementation Committee</p> <p>A-3 Develop Orientation and Procedures manual for incoming military and civilian officials</p> <p>A-4 Determine when an updated JLUS is warranted</p>
<p><i>Limited public awareness of the Joint Base and Mission</i></p> <p><i>Lack of Municipal dialogue and collaboration with Joint Base entities</i></p> <p><i>No forecast of military training schedules for affected municipalities</i></p>	<p>Communication/Coordination</p>	<p>B-1 Designate Joint Base planner(s) for representation at Municipal Meetings</p> <p>B-2 Create a Joint Base JLUS Implementation Committee</p> <p>B-3 Increase dialogue and collaboration</p> <p>B-4 Develop & Maintain a JLUS website link</p> <p>B-5 Update JLUS website</p>
<p><i>Urban Growth – New Residential Development within the 2 mile JLUS Study area</i></p> <p><i>Potential residential and incompatible development of land within Noise Zones and Accident Potential Zones (APZs)</i></p> <p><i>Height of new development may be a Hazard to Air Navigation</i></p>	<p>Land Use Approval</p>	<p>C-1 Revision of municipal Master Plans to include Joint Base missions and accident potential zones (APZ) and noise zones</p> <p>C-2 Rezone or incorporate an overlay district for high conflict zoning areas</p> <p>C-3 Create an APZ Overlay Zoning District</p> <p>C-4 Create a Noise Zone/Air Installation Compatible Use Zone (AICUZ) Overlay Zoning District</p> <p>C-5 Use Cluster Development Techniques and Planned Unit Development in land use protection zones (LUPZ)</p> <p>C-6 Use of Noise Attenuation Techniques</p> <p>C-7 Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas</p>

Table 1. Summary of Identified Compatibility Issues (Continued)

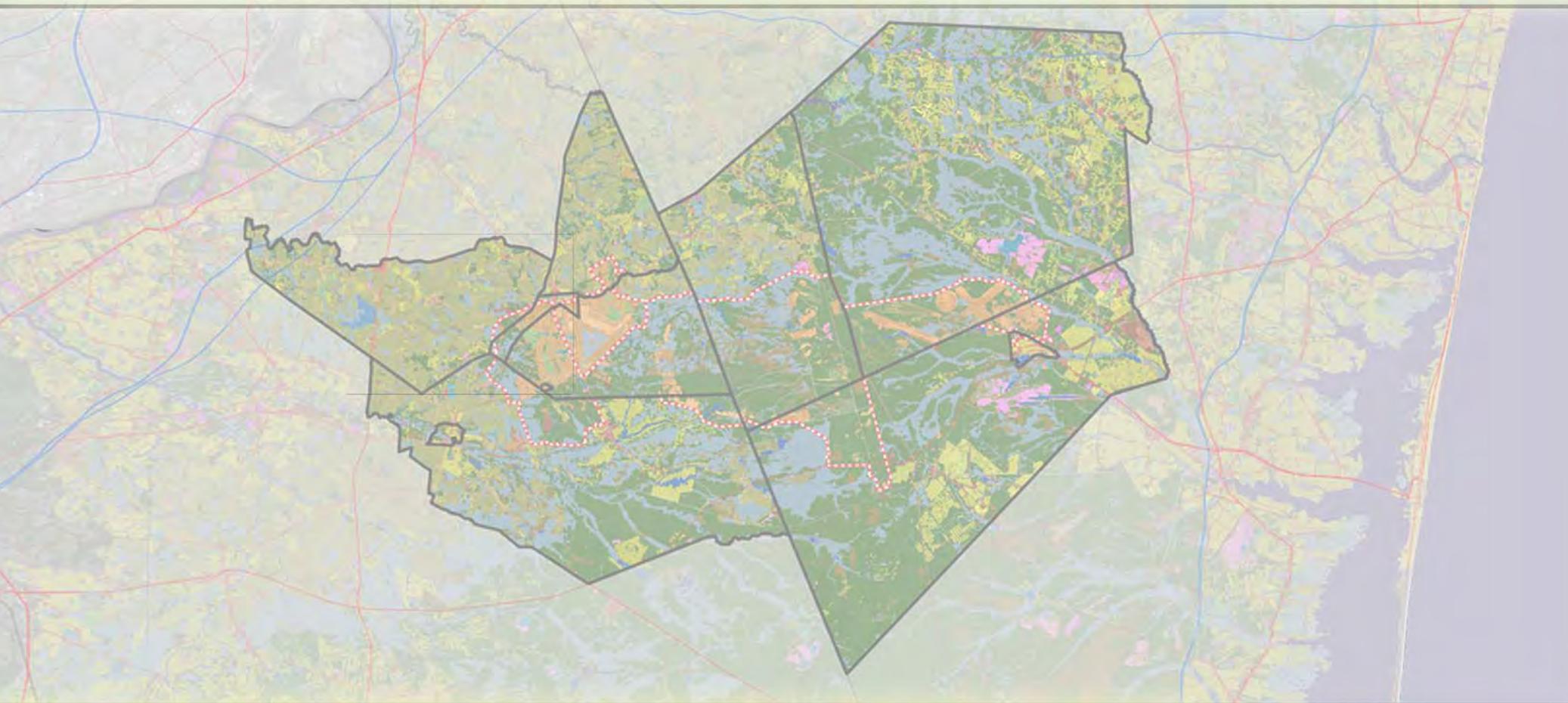
Identified Issue	Recommendation Category	Recommended Implementation Action
<p><i>Noise complaints in residential neighborhoods</i></p> <p><i>Lack of funding and standards for noise attenuation</i></p> <p><i>Residences located within safety zones</i></p>	Noise and Safety	<p>D-1 Determine Comprehensive Joint Base Impacts</p> <p>D-2 Make available voluntary noise attenuation options</p> <p>D-3 Update and Maintain Regional HUD Noise Map</p> <p>D-4 Establish Joint Base Priority Locations for Possible Acquisition</p> <p>D-5 Acquisition Program</p>
<p><i>No procedures in place for prospective home and land buyers to be aware of proximity to the Joint Base</i></p> <p><i>Limited procedures in place to encourage regional growth away from noise and APZs</i></p>	Community Development	<p>E-1 Develop JLUS Housing and Community Development Subcommittee</p> <p>E-2 Incorporate JLUS Municipal Transfer of Development Rights (TDR) Program</p> <p>E-3 Municipalities seeking to preserve land in buffer area through TDR require sewer service</p> <p>E-4 Real Estate Transfer of Ownership Disclosure</p> <p>E-5 Real Estate Joint Base Code</p>
<p><i>Availability of affordable housing and general quality of life</i></p>	Affordable Housing Development	<p>F-1 Reduce JLUS municipalities low-moderate income COAH obligations</p> <p>F-2 Develop JLUS Housing and Community Development Subcommittee</p>
<p><i>Concerns of Commercial Competition with the Joint Base and Local Economic Stability</i></p>	Economic Development	<p>G-1 Develop JLUS Economic Development Subcommittee</p>

Table 1. Summary of Identified Compatibility Issues (Continued)

Identified Issue	Recommendation Category	Recommended Implementation Action
<i>There is a lack of adequate infrastructure for JLU S Municipalities</i>	Infrastructure	H-1 Further analyze wastewater solutions for JLU S Municipalities H-2 Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic H-3 Develop Military traffic routing plan H-4 Explore transit opportunities for military and civilians H-5 Improve Community Design for Base Entrances
<i>Preservation of Agriculture and Open Space Surrounding the Joint Base</i> <i>Regional Groundwater Protection</i> <i>Protection of Natural Resources</i>	Natural Environment	I-1 Continue to Establish Priority Locations for Farmland and Open Space Preservation I-2 Implement County and Municipal farmland and open space preservation plans I-3 Perform locally known contaminant testing of local wells as a precautionary step I-4 Continue environmental impact studies in communication with Joint Base I-5 Implement best management practices, including wildfire management, dust and bird control I-6 Distribute Bird Aircraft Strike Hazard (BASH) Educational Materials I-7 Develop trespass avoidance procedures
<i>Local planning can be subject to regional and state planning regulations and guidelines</i>	Regional and State Planning Influences	J-1 Utilize PDC program J-2 Re-evaluate obligations and zoning requirements for Pinelands Management Areas J-3 Amend Jackson Township Pinelands Management Area J-4 Apply for State Plan Endorsement

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 1 - Background and Purpose of the Study

Ocean and Burlington counties of New Jersey have a rich heritage of supporting the military and military installations. The contribution of the military and its federal workforce to the economy of each county is very significant. In fact, the Naval Air Engineering Station Lakehurst and McGuire AFB/Fort Dix are Ocean and Burlington counties' largest employers respectively. The number of veterans that have served from World War II through the current Global War on Terrorism in the two counties is impressive. The operation of these bases also has an influence on the surrounding communities, including creation of demand for housing, services, infrastructure, and transportation systems, and causes noticeable effects from aircraft and base activities. The relationship between the local, county, and federal governments is a synergy that needs to be nurtured and developed in the best interests of all parties.

The history and mission of each base is a source of pride for the surrounding communities:

Naval Air Engineering Station Lakehurst is a United States Naval Station located three miles west of the central business district of Lakehurst Borough. The base also includes lands within Manchester Township and Jackson Township in Ocean County, New Jersey. The installation's history dates back to 1915 when the Russian Imperial Army operated an ammunition proving ground there. Naval Air Engineering Station (NAES) Lakehurst serves as the critical link between air Navy and sea Navy and is also home to the Naval Air Warfare Center (NAWC), Aircraft Division. NAES Lakehurst is responsible for development and testing of the catapults that launch the aircraft from the Navy's carriers; the landing aids that guide them back to the ship; the arresting gear that recovers them on the deck; and all of the support equipment to move, service, and maintain aircraft. This equipment assures that fixed and vertical wing aircraft operate safely and effectively from aircraft carriers, air capable ships and expeditionary airfields. In addition to NAWC, NAES Lakehurst hosts over twenty other tenant organizations.



McGuire Air Force Base is a United States Air Force Base located in parts of New Hanover Township, Wrightstown



Borough and North Hanover Township, in Burlington County, New Jersey. McGuire Air Force Base is comprised of the 305th AMW, the 514th AMW (AFRC), the 108th Air Refueling Wing (NJANG) and other tenant units that combine to form Team McGuire, which provides responsive, combat-readiness, mobility and expeditionary capability around the world. First known as Rudd Field, and established as a part of the Army in 1937, the base transferred to the Air Force in 1949. The base is named in honor of Major Thomas B. McGuire, Jr., the second leading American Air Ace of World War II and posthumous recipient of the Medal of Honor.

Fort Dix is a United States Army installation located in parts of New Hanover Township, Pemberton Township, Wrightstown Borough, and Springfield Township, in Burlington County, New Jersey and parts of Plumsted Township and Manchester Township in Ocean County. Fort Dix is a U.S. Forces Command (FORSCOM) Power Projection Platform for the Northeastern United States under the command and control of the U.S. Army Reserve



Command. Primary missions include being a center of excellence for training, mobilizing and deploying Army Reserve and National Guard units, and providing regional base operations support to on-post and off-post active and reserve component units of all services. Fort Dix originally named Camp Dix was created in 1917 as a training and staging area for troops during WW I and has been heavily utilized for troop training and mobilization for WW II, the Vietnam War and modern era conflicts.

In 2005, the Base Realignment and Closure (BRAC) Commission approved the realignment of 25 military installations across the country into 12 Joint Bases. The purpose of the BRAC is to consolidate installation management functions, streamline processes and achieve efficiency across redundant requirements. NAES Lakehurst, McGuire Air Force Base and Fort Dix will combine to form a Joint Base that extends 20 miles from east to west, encompassing 42,000 acres and employing 22,000 people. It will form the nation's only tri-service Joint Base. The Air Force will assume the lead for the installation management of Joint Base McGuire-Dix-Lakehurst. A summary of the histories and current operations at NAES Lakehurst, McGuire Air Force Base and Fort Dix are provided in Section 5.0 of this document.

Section 1 - Background and Purpose of the Study

Burlington and Ocean counties are the two largest counties in the state. Despite a large growth in population and employment, both counties maintain a vast amount of protected open space that enables management of future projected demand for land use of the area. This protected open space coupled with a cooperative approach with the military will encourage planning for compatible land use to prevent incompatible encroachment, and facilitate the continued operation of the military installations. This synergism is especially important in light of the increase in mission requirements at the three bases. As a result of Base Realignment and Closure (BRAC) 2005, McGuire Air Force Base (AFB) will absorb a number of aviation units from Naval Air Station (NAS) Joint Reserve Base (JRB) Willow Grove, PA (slated for closure no later than 2011). Additionally, Fort Dix was designated Joint Pre-Deployment Mobilization Site Dix/McGuire/Lakehurst. Although not BRAC related, Naval Air Engineering Station (NAES) Lakehurst will see an increase in mission requirements in support of the Air Force and New Jersey National Guard with the constructed Air Force C-17 assault landing strip, a National Guard Consolidated Logistics and Training Facility and a National Guard helicopter aviation facility. These new requirements will increase the number of personnel on each base, with an associated increase in potential noise-generating activity in and around each base.

In 1985, the Department of Defense (DoD) initiated the Joint Land Use Study (JLUS) program to create a participatory, community-based framework for land use planning around military installations. The objectives of the JLUS program are two-fold:

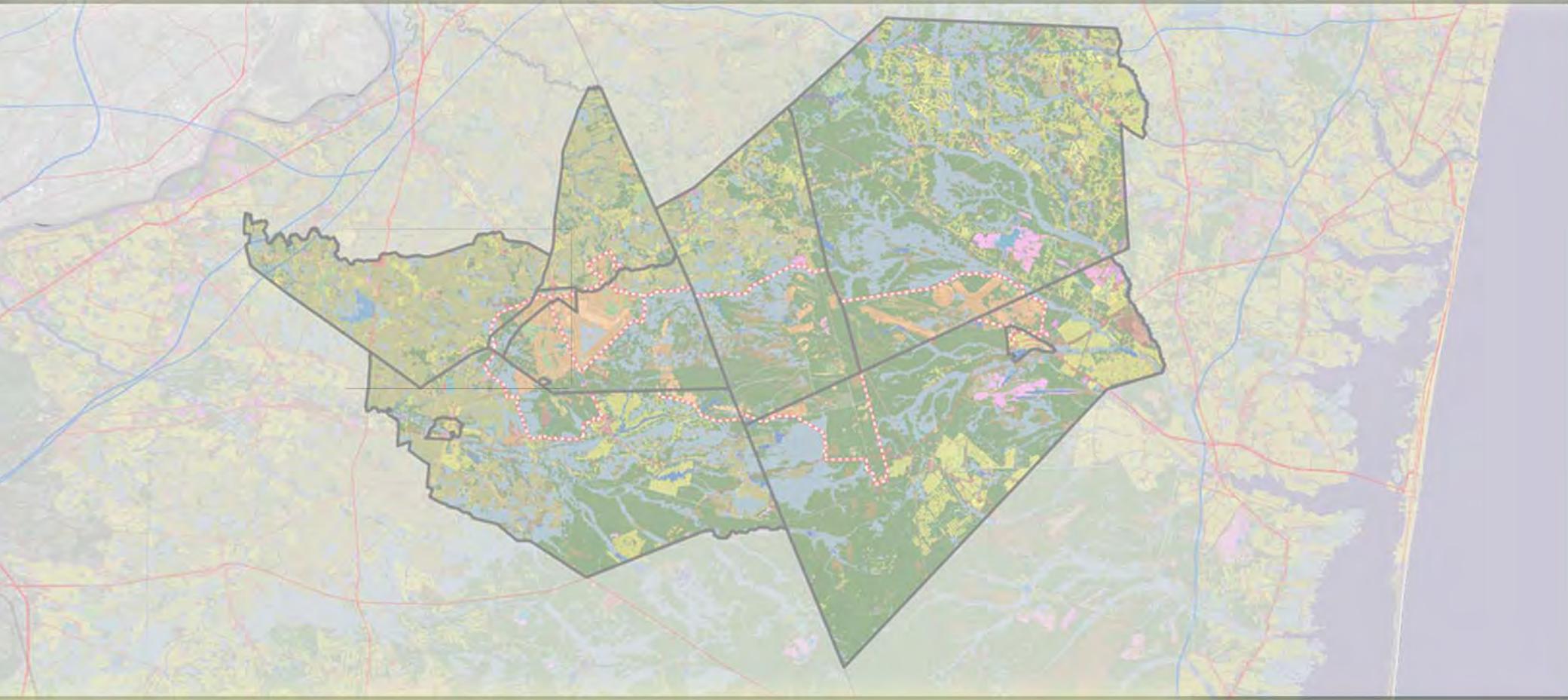
- To encourage cooperative land use planning between military installations and the surrounding community and
- To seek ways to reduce the operational impacts of military bases on adjacent land.

The JLUS process encourages residents, local decision-makers and installation representatives to study issues of compatibility in an open forum, balancing both military and civilian interests. Because the development of land use plans is a function of local government, DoD's JLUS program does not seek to create land use plans but instead presents information and land use recommendations that can be used by local government to in their preparation of land use plans. JLUS studies and their recommendations are also intended to guide local government in their implementation of appropriate land use controls around military installations.

This is the first JLUS for McGuire Air Force Base, Fort Dix or NAES Lakehurst. Prior to this

JLUS, each base has interacted with the municipalities in a different manner. Over the years the measure of cooperation and dialogue between the municipalities and the military installations has varied, subject to the influence and relative involvement of successive leadership. For instance, representatives of the military installations have sometimes directly participated in municipal planning initiatives, while at other times this involvement was absent. Military community outreach was also inconsistent with respect to sharing information regarding short term and long term mission changes. With the imminent establishment of Joint Base McGuire-Dix-Lakehurst the importance of open, shared communication takes on a new level of significance. Within the near term (i.e. October 2009) the Joint Base will speak with one voice and operate with common practices. This change should improve communication and serve as a catalyst for improved community relations with proactive initiatives and planning goals that will be shared and understood. The potential benefits of this JLUS can be maximized as its implementation time frame is nearly coincident with the establishment of the Joint Base.

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 2 - Objectives for this JLUS

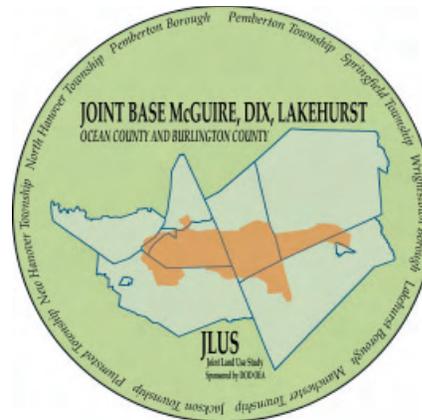
The Joint Base JLUS seeks to identify both community and military objectives by characterizing the military mission and the communities vision and existing land use.

Community

- Protect the health, safety, and welfare of the existing residents
- Maintain quality of life for community residents
- Guide incompatible land uses away from air strips
- Encourage compatible land uses near the Joint Base
- Maintain the economic vitality of the JLUS communities
- Provide for sustainable growth in an economically, environmentally, and socially sustainable manner

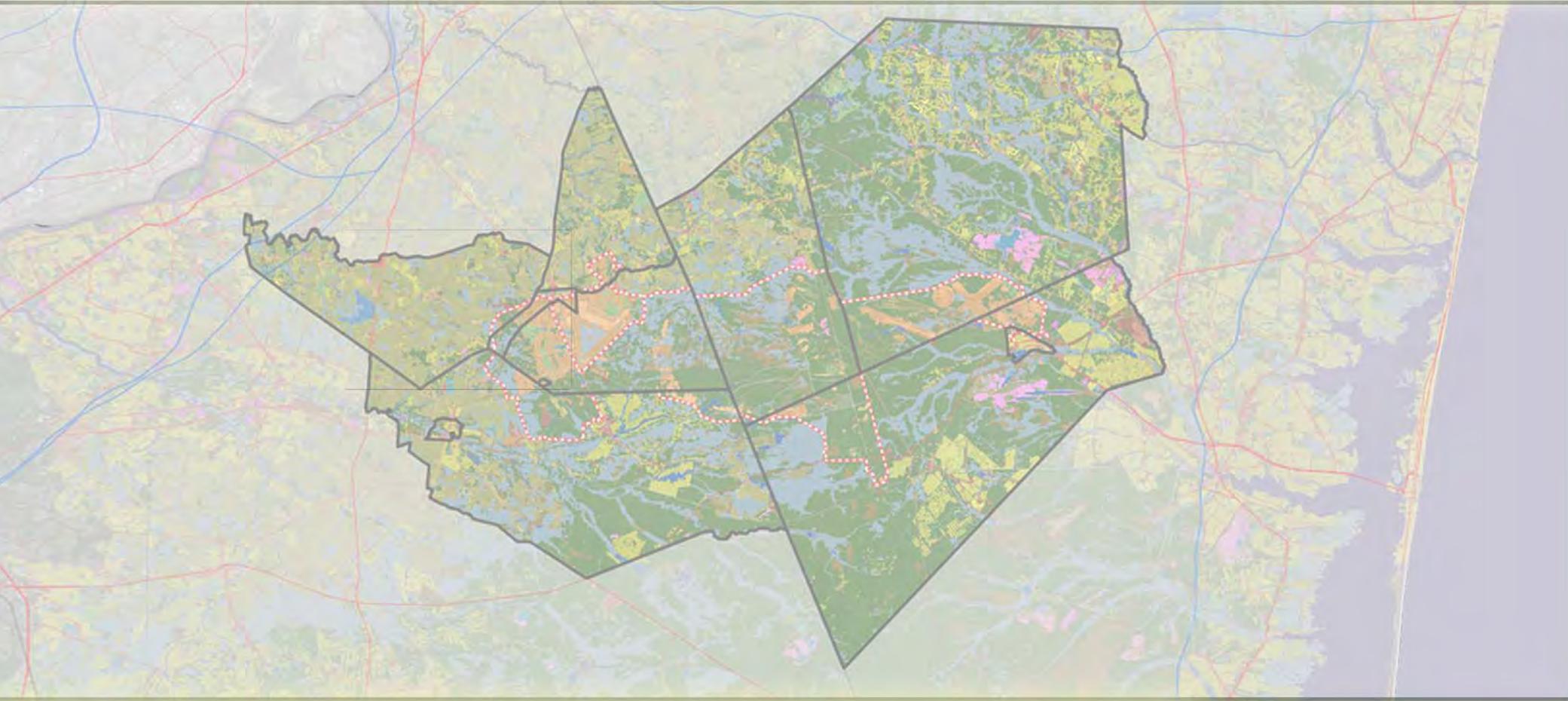
Military

- Protect the health, safety, and welfare of the military personnel
- Preserve the ability of the Joint Base to carry out planned missions, maintain military readiness, and support national defense objectives
- Establish a framework for communication and cooperation between the Joint Base and the surrounding communities



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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 3 - JLUS Study Area

The Joint Base McGuire-Dix-Lakehurst JLUS concentrated on the ten municipalities that are located near the Joint Base. Six municipalities are located in Burlington County and four are located in Ocean County as shown in Figure 3.1 and listed in Table 3.1.

Figure 3.1 JLUS Study Area

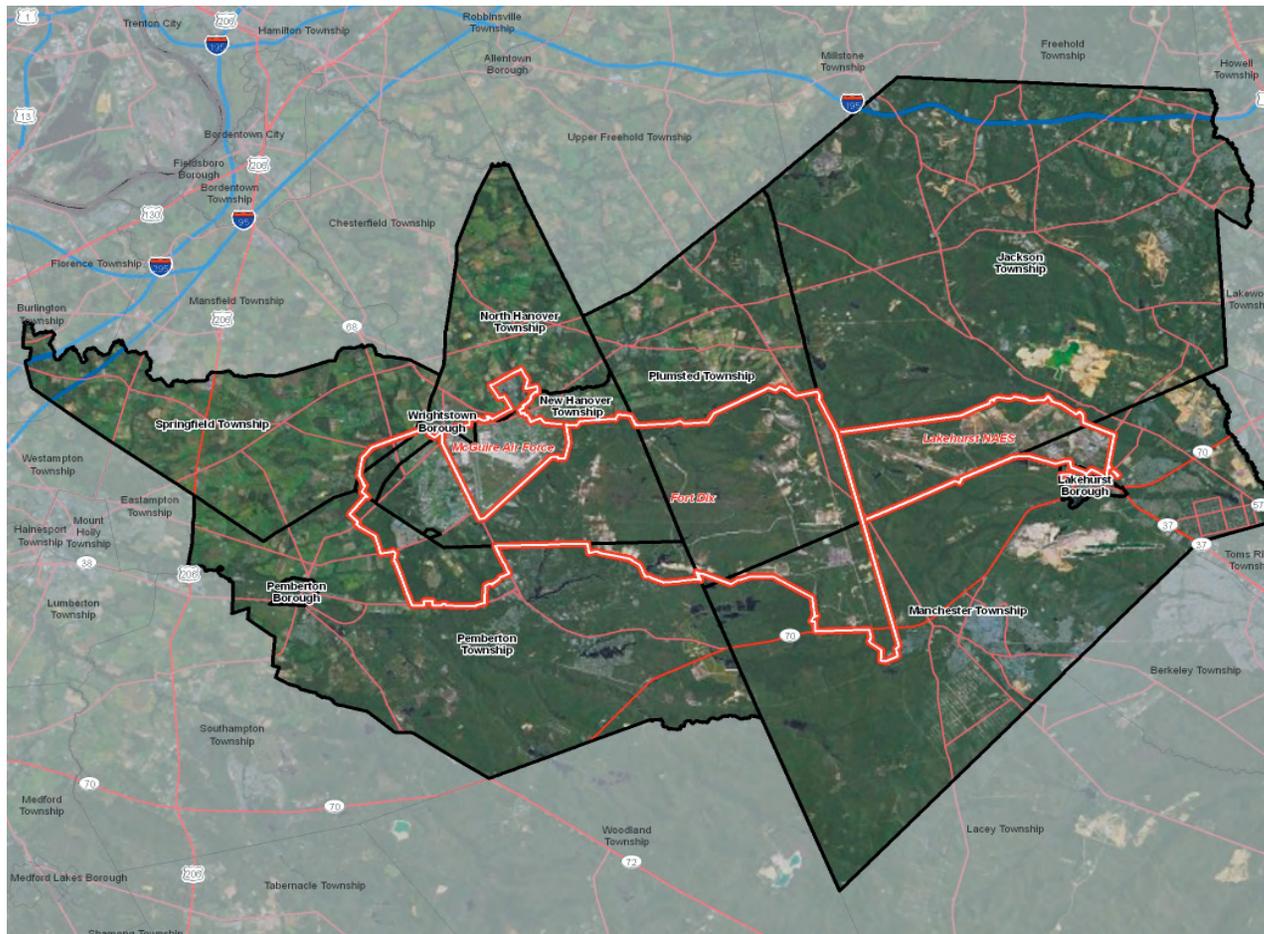


Table 3.1 Municipalities Involved in the JLUS

Within Ocean County	Within Burlington County
Jackson Township	New Hanover Township
Lakehurst Borough	North Hanover Township
Manchester Township	Pemberton Borough
Plumsted Township	Pemberton Township
	Springfield Township
	Wrightstown Borough

Ocean County

Ocean County is located in central New Jersey. Since Colonial times, the area of Ocean County has been rural in character, while supporting agricultural and fishing activities. During the late 1880's and through the 1900's Ocean County saw resort industry growth as part of the New Jersey Shore tourism. Many commercial activities in Ocean County were once associated with seasonal beach resorts. Since the 1950's the County has seen suburban growth as the population moved outward from the older urban centers in northern New Jersey into the less populated or rural areas of Ocean County. The 1954 opening of the Garden State Parkway allowed for an easier commute from the Ocean County area to job sectors in New York and northern New Jersey. Ocean County has two main transportation corridors, the Garden State Parkway running north-south of the County, and Interstate 195 running east-west of the County. U.S. Route 9 (a north-south highway) still remains a heavily traveled transportation corridor through the County. Development in Ocean County has occurred along the coastal beaches and in the corridor formed by the Garden State Parkway and US Route 9. Major interchanges along the Garden State Parkway have encouraged development along east-west corridors, such as County Routes 526 and 528, State Highway 37 and State Highway 72. Interstate 195, completed in its present state as of 1990, is playing an increasing role in the development of the northern portion of the County. The Interstate provides direct access to the major employment areas of Trenton to the west and Monmouth County to the northeast.

As of the 2000 U.S. Census, Ocean County was the fastest growing county in New Jersey. Almost all of the County's growth between 1960 and 2000 was due to in-migration rather than the natural increase in population. Ocean County had a population density of 800.68 (population/square mile) in 2000. Ocean County had a total population in 2000 of 510,916. According to the NJ Department of Labor, Ocean County is projected to have a population of 584,800 for 2009 indicating a 14% increase in population in roughly a decade. The New Jersey average increase was 4.8% growth during the same period. Ocean County had the largest percentage of persons aged 65 and over (22.2%) in the state in 2000.

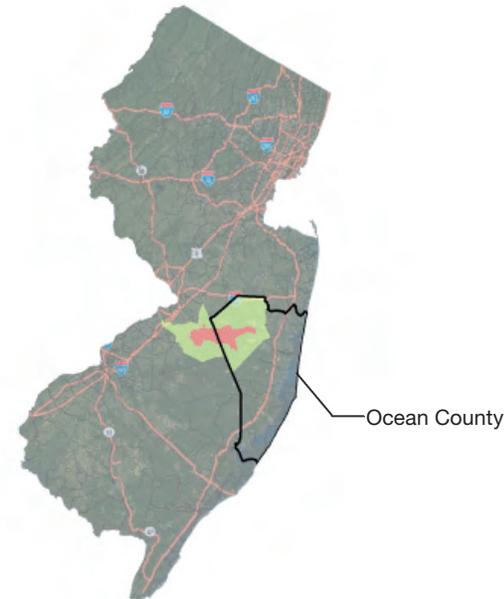
The U.S. Census Bureau released its 2000-2007 state and county housing unit estimates in August of 2008. New Jersey was estimated to have a 5.7% increase of housing units during the 2000-2007 time frame. New Jersey's growth was higher than Pennsylvania (4.3%) and

New York (3.4%) and was ranked 22nd in the nation. Ocean County added more housing units (24,410) than any other county in New Jersey.

The NJ Department of Labor predicts that New Jersey as a whole and Ocean County's labor force is projected to grow faster than its population. With the resulting population growth of recent years Ocean County's business sector has become increasingly diverse. The health care industry has been by far the fastest growing employment sector and is now the top employer in the County. Employment projections released by the NJ Department of Labor show that Ocean County will continue to be at the forefront of New Jersey employment growth well into the next decade.

The statistics may come from different years, but the growth scenario they present remain the same. Ocean County has seen population and housing growth at a faster rate than the rest of New Jersey and is projected to stay that way.

Figure 3.2 Ocean County Overview Map



Burlington County

Burlington County is the largest county in New Jersey covering 827 square miles and is comprised of 40 municipalities. The County is located in the Philadelphia-Camden metro area. Burlington County's development began back in the mid to late 1600's. Farming has historically been very prevalent in Burlington County. Proximity to waterways was also a principal factor in the early and successful growth for Burlington County. Burlington County is located to the east of the Delaware River, which is the boundary between New Jersey and Pennsylvania. The proximity to the River was an important factor for development in the area for agriculture, trade, and travel.

Burlington County has a diverse history with its growth in population closely aligning with the changing types of transportation and their associated patterns. Original patterns of development were closely influenced with the dependence on the Delaware River and tributaries changed with the development of the railroad and most recently influenced by highways and roads constructed in response to mass production of motor vehicles. Interstate Route 295 and State Route 206 are the two main north-south thruways in Burlington County. County Routes 70 and 38 are the major east-west thruways across the County. Burlington County is serviced by public transportation by the Riverline, a light rail transit system from Trenton to Camden with connections to NJ Transit (bus and rail transit), Amtrak, PATCO, and SEPTA trains.

Major populated areas in Burlington County still mostly remain along the Delaware River in Burlington City, Bordentown City, and Palmyra to name a few, and located near the Joint Base in Pemberton Township.

Farming is a major industry for Burlington County. The County has nearly 600 farms. More Burlington County acres are devoted to farming than any other county in the state, mostly producing sweet corn and fruit. The County is one the largest cranberry producing counties in the United States.

The County is also home to Burlington County College with campuses in Pemberton and Mt. Laurel and academic centers in Mt. Holly and Willingboro.

According to the U.S. 2000 Census, Burlington County had a population of 423,394. The County had a population density of 516.5 (population/square mile) at the time of the Census. According to population projections by the NJ Department of Labor, Burlington County is projected to have a population of 464,000 in 2009 indicating a 9.6% increase in population in roughly a decade. The New Jersey average increase was 4.8% growth during the same period.

As discussed within the Ocean County narrative, U.S. Census Bureau released its 2000-2007 state and county housing unit estimates in August of 2008. Burlington County was estimated to have over 13,000 new housing units in this time frame. This housing unit growth is above average when compared to other New Jersey counties.

Figure 3.3 Burlington County Overview Map



JLUS Municipalities

The 10 municipalities within the JLUS consists of approximately 358 square miles. Of this, 224 square miles are within Ocean County and 134 square miles are within Burlington County. Combined, the ten municipalities had a population of 142,508 in 2000 and an estimated 2004 population of 153,970. For the JLUS municipalities in Ocean County, there were 91,541 residents in 2000 and an estimated 101,561 residents for 2004; in Burlington County there were 50,967 in 2000 and an estimated 52,409 residents for 2004. Figure 3.2 displays the breakdown of population for the JLUS municipalities projected for 2004 by Census block group. Estimates from 2004 were based from the 2000 U.S. Census demographics. The entire JLUS area was anticipated to have an 8% increase in population from 2000-2004. Much of this growth was projected for the Ocean County JLUS municipalities, 10.9%, compared to a 2.8% growth projected for the Burlington County JLUS municipalities.

Table 3.2 US Census 2000 Summary Demographics

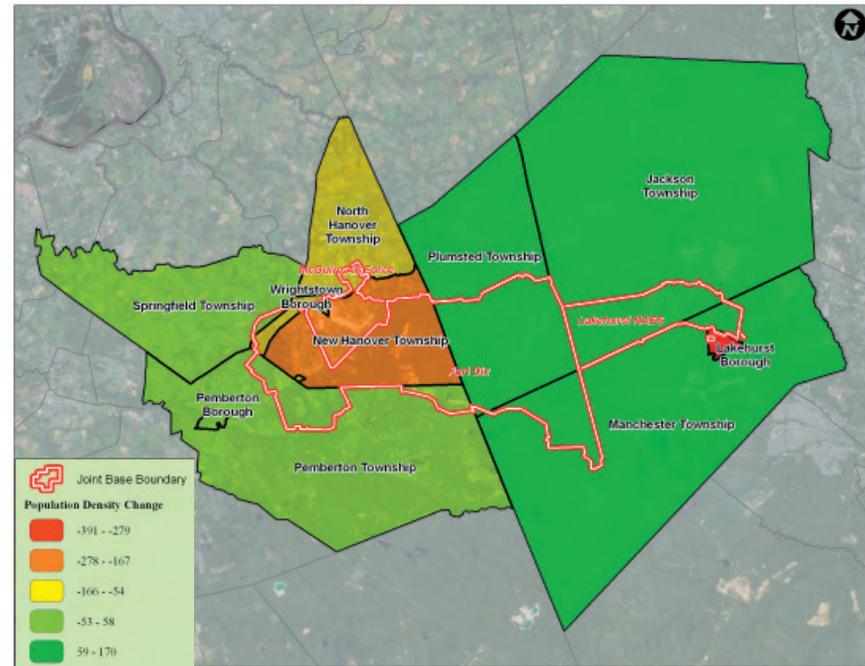
	Persons per household	Existing Households	Vacancy Rate (%)	Renter Occupied (%)
Ocean County JLUS Municipalities	2.5	38,244	6.5%	10%
Burlington County JLUS Municipalities	2.3	15,590	7.3%	32%

Source: U.S. Census 2000

According to the 2000 Census block group data, the JLUS municipalities in Ocean County had 2.5 persons per household, compared to 2.3 in Burlington County. In Ocean County the JLUS municipalities had 38,244 existing households. In Burlington County the JLUS municipalities had 15,590 existing households. Ocean County JLUS municipalities had a 6.5% vacancy rate and Burlington County JLUS municipalities were 7.3% while the state as a whole was 7.4%. Burlington County JLUS municipalities were 32% renter occupied and Ocean County JLUS municipalities were 10% renter occupied.

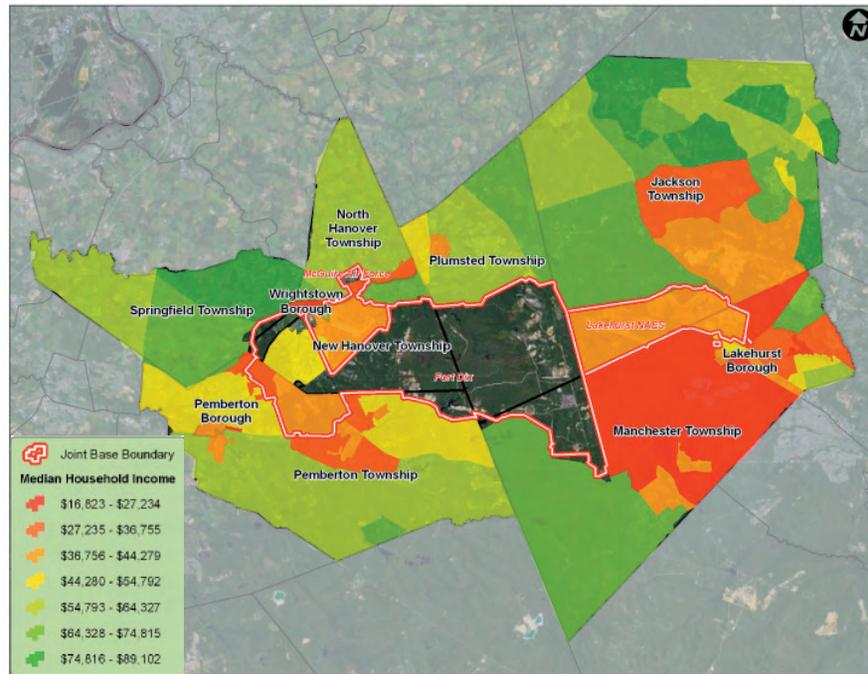
From 1980 to 2000, Jackson and Manchester Townships gained 170 and 132 persons per square mile (ppsm) respectively. During that same time period Plumsted Township (64 ppsm), Springfield Township (18 ppsm), and Pemberton Borough (18 ppsm) also saw an increase in

Figure 3.4 Summary of Population Density Change by JLUS Municipality (1980-2000)



their population density. The other five municipalities in the JLUS had decreasing population densities from 17 ppsm (Pemberton Township) to 385 ppsm (Lakehurst Borough). Overall from 1980 to 2000, the state of New Jersey gained an average 165 ppsm.

Figure 3.5 Median Income by JLUS Municipality (2000)



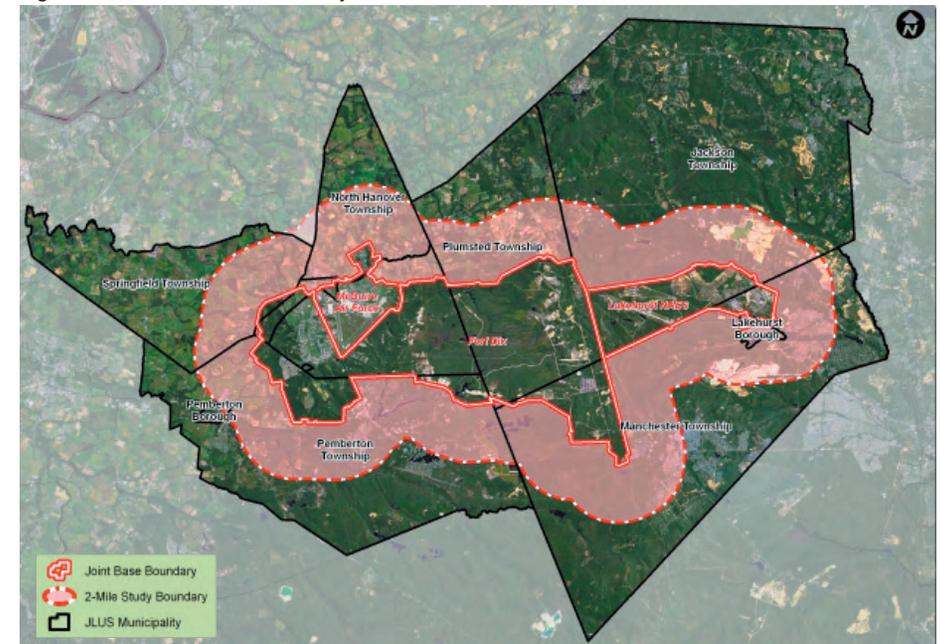
Aerial Background = No Income Data Available

Figure 3.5 shows the 2000 median household income for the JLUS municipalities. Median household income for the state of New Jersey was \$55,000 in 2000. Median income for the entire Ocean County was \$64,000 and the Ocean County JLUS municipalities had a \$48,476 median income. Median income for the entire Burlington County was \$68,000 and the Burlington County JLUS municipalities had a \$40,952 median income for the same time period.

Joint Base 2 Mile Study Area

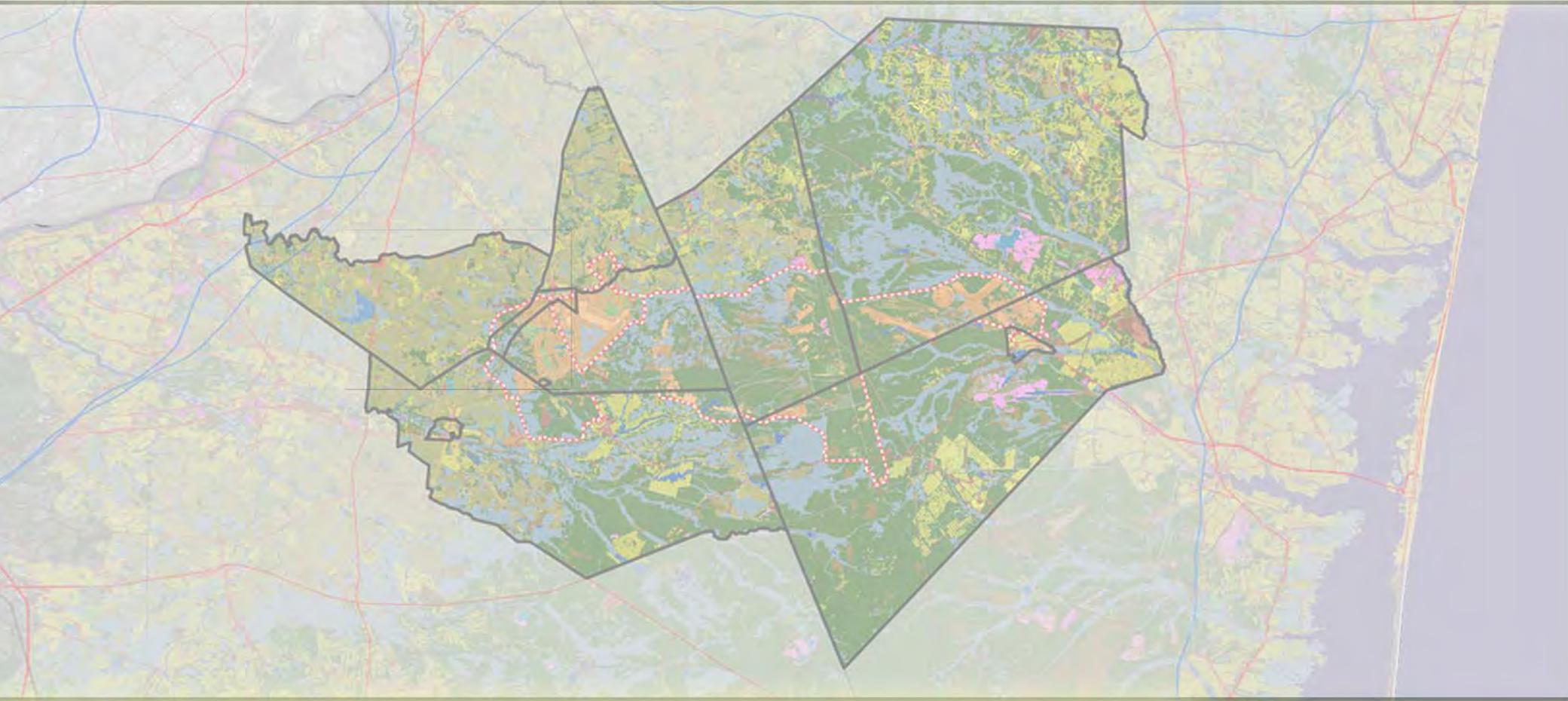
A study area has been defined and used within this JLUS document to discuss and evaluate land use topics. The JLUS study area is defined as a 2 mile zone around the Joint Base boundary. All ten JLUS municipalities have land area within this study area. The 2 mile study area was defined at the commencement of this JLUS because it was anticipated that such a zone would provide an appropriate area for the characterization of the Joint Base installation influences (Figure 3.6). This distance was also established to define areas within which it would be important to promote awareness of the major military facilities in Burlington and Ocean County. Future growth potential for the JLUS municipalities, as detailed in Section 7, was determined within the 2 mile study area.

Figure 3.6 Joint Base 2-Mile Study Area



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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 4 - JLUS Process

Fort Dix and McGuire AFB made a presentation for the local need for a JLUS to the DoD Office of Economic Adjustment (OEA) in the late 1990's but no JLUS was initiated, perhaps due to the non-availability of local funding or local interest. DoD OEA representatives visited the military commands and county government after dialogue began to include NAES Lakehurst in 2004.

In 2006, recognizing the imminent establishment of the Joint Base, Ocean County agreed to sponsor the JLUS and was awarded \$270,000 from the OEA and provided a matching \$30,000 to retain the services of a consultant to develop and implement a year-long Joint Land Use Study. Ocean County and Burlington County agreed to participate in the JLUS, intending to identify and mitigate possible land use conflicts with the Joint Base.

Planning for the Joint Base JLUS began in August of 2007. A meeting was held to give notice to interested officials that Ocean County had received the JLUS grant award from the DoD OEA. During this meeting, representatives of the counties, communities and military began the process of selecting policy committee members, determining strategies for the study process, and creating a draft request for proposal for the consultant selection process.

On February 21, 2008 Paulus, Sokolowski, and Sartor, LLC (PS&S) services were retained, along with their two sub-consultants, Sabre Systems and HR&A to perform the Joint Base McGuire-Dix-Lakehurst JLUS. The JLUS began for the consultant team in March of 2008, commencing with a kick-off meeting attended by representatives of Ocean and Burlington Counties and the OEA.

Policy Committee Meetings and Public Outreach

Policy and Technical Committees

Policy and Technical Committees were created to help guide the yearlong study and to provide feedback during the JLUS. The Policy Committee for the Joint Base McGuire-Dix-Lakehurst study comprised of military representation from NAES Lakehurst, Fort Dix, and McGuire Air Force Base, elected and appointed officials from each participating local government including the two counties and the ten surrounding municipalities, and senior representatives from the Pinelands Commission, the Office of Smart Growth, and the State Agriculture Development

Committee. Also in attendance at the JLUS Policy and Technical Committee meetings were the Department of Defense Office of Economic Adjustment JLUS Project Manager, and representatives of Congressman Saxton, Congressman Smith, and Congressman Adler.

The Policy Committee met with the consultant team six times throughout the study process. Each meeting detailed the progress of the study and included committee participation. Table 4.1 outlines the committee meeting dates and key discussion topics. Full accounts of the policy committee meeting minutes are included in this document's appendices (13.3).

The Technical Committee met twice during the study process. The first technical committee meeting was held on April 17, 2008. The first technical committee meeting had a large attendance, with over 32 committee members. At this meeting, many of the attendees requested individual meetings to thoroughly discuss their municipality's unique circumstances. Therefore, individual meetings with the ten participating towns were held to enable discernment of the timeline of development in the towns and summarize current planning issues. Municipal meetings and a meeting with the Pinelands Commission were held during May and June of 2008. Similarly, meetings were held with the leadership of all three military bases.

Section 4 - JLUS Process

Table 4.1 Municipal and Pinelands Commission Meeting Dates and Participants

Meeting Dates	Municipality	Meeting Participants
May 13, 2008	Pemberton Borough (Burlington County)	Mayor Lyman Simpkins, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S, Khara Ford - Burlington County Office of Economic Development and Regional Planning
May 13, 2008	North Hanover Township (Burlington County)	Mayor Mike Moscattello, Deputy Mayor Bill Tilton, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S, Mark Remsa and Dave Hojsak - Burlington County Office of Economic Development and Regional Planning
May 14, 2008	Wrightstown Borough (Burlington County)	Mayor Thomas Harper, Ellen Thorne – Township Clerk, Brian Sperling - Council President, Kathy Packowski - Triad Associates, Dave Hojsak - Burlington County Office of Economic Development and Regional Planning, Rick Ragan-Ragan Design Group, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
May 14, 2008	Plumsted Township (Ocean County)	Mayor Ron Dancer, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S, Erika Stahl – Ocean County Department of Planning
May 15, 2008	Pinelands Commission	Susan Grogan and Larry Liggett – Pinelands Commission, Erika Stahl and Stacy Perrine – Ocean County Department of Planning, Dave Hojsak - Burlington County Office of Economic Development and Regional Planning, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
May 15, 2008	Jackson Township (Ocean County)	Dan Burke – Township Engineer, Anna Wainright- Town Planner from Remington Vernick and Vena Engineers, Erika Stahl and Stacy Perrine – Ocean County Department of Planning, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
May 15, 2008	Pemberton Township (Burlington County)	Mayor David Patriarca, Michael R. Gorman - Superintendent of Schools, Dave Hojsak - Burlington County Office of Economic Development and Regional Planning, Rick Ragan and Owen McCabe-Ragan Design Group, Brett Ingram- Adams, Rehmann & Heggan Associates, Inc., Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
May 20, 2008	New Hanover Township (Burlington County)	Mayor Dennis Roohr, William Castner, Paul Peterla, Joseph Sulia, Ken Hopkins, Dave Frank, Adele Gianaris - New Hanover Land Use Board, Brandi Bartolomeo - PS&S
June 23, 2008	Manchester Township (Ocean County)	Mayor Michael Fressola, Ken Vanderziel, Council member, Tom Thomas – Thomas Associates, Al Yodakis – T&M Associates , Bill Chandler, Township Engineer-DPW, Erika Stahl and Stacy Perrine – Ocean County Department of Planning, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
June 23, 2008	Springfield Township (Burlington County)	Councilman Dick Toone, Dave Hojsak - Burlington County Office of Economic Development and Regional Planning, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S
June 23, 2008	Lakehurst Borough (Ocean County)	Mayor Tim Borsetti, Sid Hooper, Glenn McComas, Harry Robbins, James Davis, Pat Ford, Steven Oglesby - Lakehurst Borough Council, Erika Stahl and Stacy Perrine – Ocean County Department of Planning, Elizabeth McLoughlin and Brandi Bartolomeo - PS&S

Table 4.2 Military Meeting Dates and Participants

Meeting Dates	Activity	Meeting Participants
March 27 , 2008	Naval Air Engineering Station Lakehurst	Captain Philip Beachy, USN, CO, NAES; Captain J.C.Harding, USN, XO, NAES; Thomas Szallai, NAES Business Development Officer; Dennis Blazak, NAES Environmental Director; Eric Raaum NAES Planning Engineer; Charles Mink, Sabre Systems; Bret Gordon, Sabre Systems
June 2, 2008	Fort Dix	Colonel Ronald Thaxton, USAR, Installation Commander, Fort Dix; LTC Roger Cotton, USAR, Deputy Commander, Fort Dix; David Peckam, Fort Dix Director Public Works; Charles Mink, Sabre Systems; Bret Gordon, Sabre Systems
June 12, 2008	McGuire Air Force Base	Colonel Balan Aayar, USAF, Installation Commander, McGuire AFB; Colonel Michael Polhemus, USAF; Christopher Archer; Charles Mink, Sabre Systems; Bret Gordon, Sabre Systems
June 26, 2008	New Jersey Department of Military and Veterans Affairs	Edward Sain, Director of Installations; Major Tracy Phillips; Jill Ann Prior; Anthony Carlucci; Charles Mink, Sabre Systems; Bret Gordon, Sabre Systems

Table 4.3 Policy Meeting Dates and Topics

Meeting	Date	Key Discussion Topics
1st Policy Committee Meeting (Prior to Consultant Selection)	October, 2007	Study timeline and objectives
2nd Policy Committee Meeting (Prior to Consultant Selection)	January, 2008	Consultant Team Selection
3rd Policy Committee Meeting	March 31, 2008	Introduction and Request for Information
4th Policy Committee Meeting	May 29, 2008	Overview of Municipality and Base interviews and summary of data received
5th Policy Committee Meeting	July 29, 2008	JLUS website, review of developable lands, summary of further municipal and Base interviews
6th Policy Committee Meeting	October 29, 2008	Summary of Open Houses, results from public surveys, overview of economic analysis
7th Policy Committee Meeting	December 18, 2008	Overview of noise and accident potential zones analysis
8th Policy Committee Meeting	March 10, 2008	Presentation of draft report, review and discussion of findings and recommendations

Public Outreach

Public participation has been well-integrated into JLUS objectives, and several channels for public involvement and input were established for this study. The program included provision of information regarding the goals and objectives of the JLUS, and creation of communication channels that enabled members of the public to provide input regarding the JLUS, important issues and specific concerns. The public outreach mechanisms included creation of a JLUS website, fliers for hand out, advertising in local publications, cable television programming, a survey program, public open houses, and a public hearing.

From the beginning of the study, a website was created that had both public and committee member access. The public website was online from June 2008 and hosted information defining what a Joint Land Use Study was, a “JLUS in the News” element, an interactive public survey, and a dynamic Mapper. Throughout the course of the JLUS study documents were made available as they were released by the Policy Committee. The JLUS website address is www.jointbasenj.org and will host the entire final document and supporting materials for a period of two years.

In September of 2008, two public open houses were held with invitations to the public in Ocean and Burlington Counties. Save the Date ads were placed in the local newspapers and added to online community calendar events. Advertisement fliers were sent to the municipalities and the Pinelands Commission to handout to members of the public. A video presentation

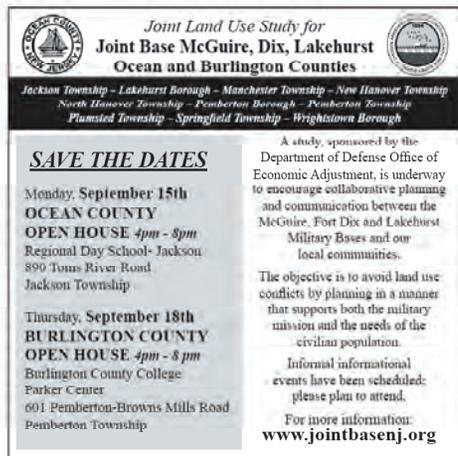
was created and was aired on local cable systems in August and September. The JLUS team implemented an open house program to allow for a longer period of time that people could stop by and would be able to review materials and ask questions of the consultant team and military base representatives. With an open house format, participants are invited to come and go any time during the meeting, review available materials, and ask questions. The September open houses were held at central locations in Ocean and Burlington County. The Ocean County Open House was held

on September 15th, 2008 at the Regional Day School in Jackson Township. The Burlington County Open House was held on September 18th, 2008 at the Parker Center of Burlington County College in Pemberton Township. An overview of the JLUS program was presented and each municipality had displays that included an overview map with roads and local neighborhoods, composite zoning, environmental constraints, and preserved lands within a two mile buffer from Base boundaries. A looping video of the “Base Next Door” was played at each event. The “Base Next Door” is a video montage of the JLUS program created by the Department of Defense, Office of Economic Adjustment. An introduction and a closing were added to the “Base Next Door” video by Ocean County Freeholder Kelly and Burlington County Freeholder Donnelly welcoming the public to the open houses and encouraging them to give feedback to the JLUS team. At each open house there was tri-base representation and displays. McGuire AFB, Fort Dix, and NAES Lakehurst each brought presentations and displays that explained their military missions. Personnel representing each base were in attendance and available for questions. This representation by each base allowed one-on-one communication with members of the public.

The members of the public were given an opportunity to complete JLUS surveys during the open houses. Hard Copy and online survey stations were available. Attendees were asked to fill out a survey to voice their opinion on the Bases, the JLUS, and their effects of the Bases on their community. An interactive online JLUS map station was available for the attendees’ use as well. The interactive map displayed the Base boundaries and municipality specific mapping layers overlain onto Google maps satellite imagery. An address search function was included so that a user could add in their address information and see their proximity to the Base boundaries. A measuring tool was included in the map to measure distance to mapped features.



Open House Flier



Save the Date Ad

By having Base representation and an informal atmosphere, attendees had direct access to add their comments or ask questions. Approximately 120 residents attended the open houses. Of the municipalities involved in the study, Pemberton and Jackson Township had the most attendees.

In March of 2009, a public hearing was held at the Primary School in New Egypt for interested members of the public. The consultant team presented the study elements and findings and held a question and answer session. The questions asked and the responses given were posted to the JLUS website for public viewing. Applicable comments and suggestions regarding the draft report were incorporated into the final version.

Public Surveys

The opportunity of residents within the JLUS area to participate was a key objective in the JLUS program. Public survey forms were accessible through the JLUS website, and were also available to attendees at the Open Houses. The survey forms could be completed online, as well as “hard copy” survey forms. The JLUS website survey function was active for a period of four months. Survey responses were tracked for the submission source (e.g., web-based or paper-based respondent). Most of the responses were received in association with an Open House event, with approximately 50 responses to the survey collected. Hard copy surveys that were filled out at the open houses were added into the web-based system by the JLUS consultant team. Of these responses received during the Open Houses, 55% were from residents of Pemberton Township in Burlington County. The survey was designed to solicit information and opinion and was not designed to produce statistically meaningful data that would be representative of the local populations. While the survey data cannot be considered representative of the JLUS study area population, the information and opinion gathered was rich in detail regarding those individuals that chose to participate in the survey.

The survey data indicates support for the presence of the military installation as an asset to the community (80% positive), and also identifies certain issues and concerns regarding the ongoing operation of the base. The issues include:

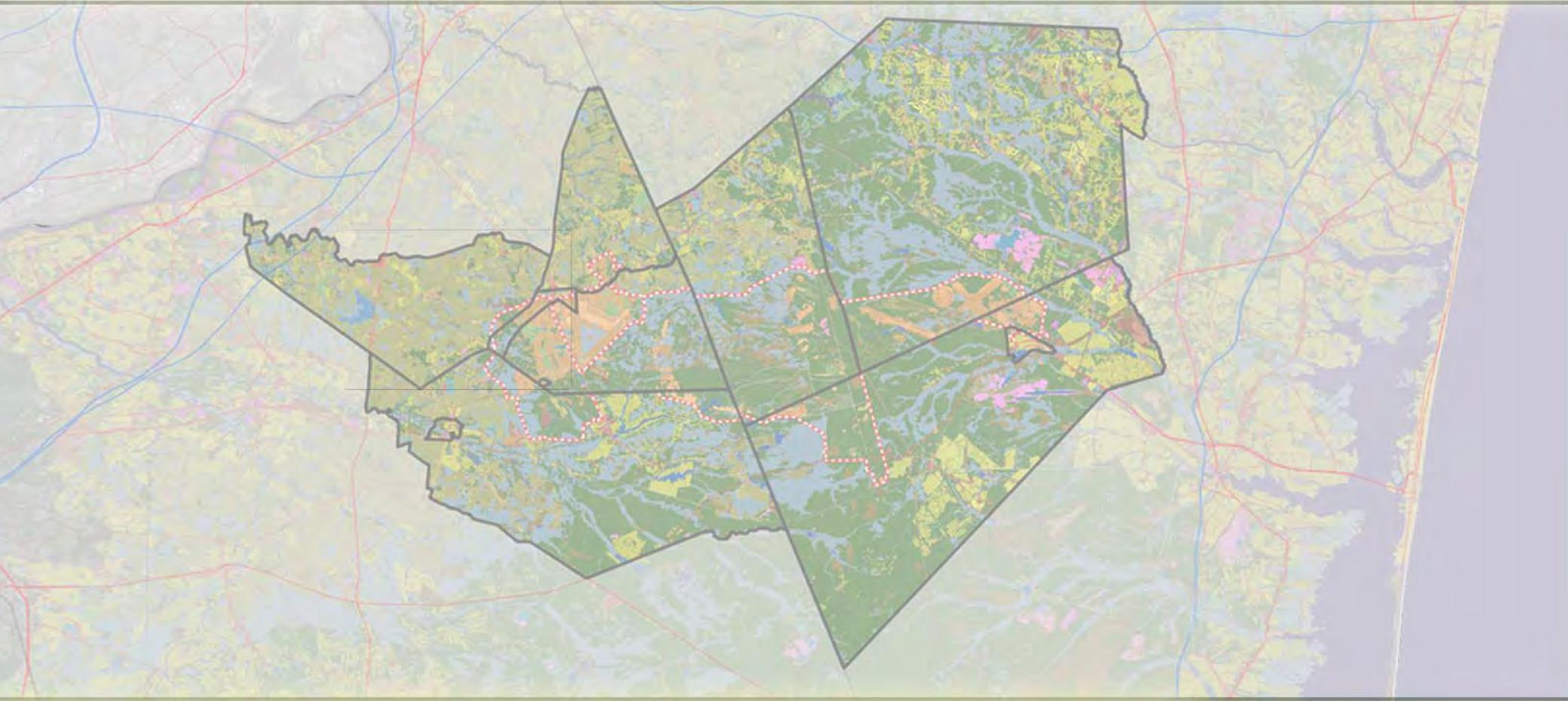
- Military aircraft operations, with greater concern for nighttime activities
- Military vehicles operating on local roads

- Road closure attributable to base security

Greater than 50% of the respondents indicated their communities were minimally-impacted to moderately-impacted by military planes overhead, military planes taking off and landing, military trucks and vehicles on local roads, road closures, and general and nighttime military noise. The survey data indicate that more respondents selected “No impact” for the survey issues than “Greatly impacted” by these issues for their own households and for their communities. The survey results are presented in charts contained in Appendix 13-3.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 5 - Base Mission Existing and Proposed Operations

Naval Air Engineering Station Lakehurst

Figure 5.1 NAES Lakehurst Base



Installation History

Naval Air Engineering Station Lakehurst (Figure 5.1) began as a remote ammunition proving ground for the Russian Imperial Government in 1915. Subsequent to the abdication of Czar Nicholas II in 1917, the facility was acquired by the US Army and named Camp Kendrick. The base continued in this role until 1921 when it was commissioned as Naval Air Station Lakehurst.

Between 1921 and 1961, NAS Lakehurst operated as a Lighter-than-Air Center for rigid airships and became the Nation's first trans-Atlantic international airport. All of the Navy's rigid airships, as well as Germany's two most famous airships, the Hindenburg and the Graf Zeppelin, were, at one time, housed in Hangar One, Lakehurst's most visible landmark. Today, Hangar One is a registered national historical landmark, and the home of the Carrier Aircraft Launch and Support Systems Equipment Simulator (CALASSES), a one-third scale model carrier deck used for training Navy personnel. The Hindenburg Memorial, which marks the site of the 1937 crash, is located to the west of Hangar One. Hangars 5 and 6, located

further west, are the largest freestanding single arch structures in the world, built entirely of wood. Each hangar has 241,000 square feet of floor space. In 1958 the Naval Air Test Facility (NATF) was established at the western end of the Naval Air Station. In April 1973 the decision was made to transfer the Naval Air Engineering Center (NAEC) from Philadelphia to Naval Air Station Lakehurst.

NAS Lakehurst and NATF were disestablished and consolidated with NAEC on March 10, 1977, and NAEC became the host command. In 1992, the Naval Air Warfare Center (NAWC) was established. NAEC becomes the Naval Air Warfare Center Aircraft Division Lakehurst (NAWCADLKE). In 1994, NAWCADLKE became the Naval Air Engineering Station for shore station management and the Aircraft Platform Interface (API) Group for technical mission support.

On October 1, 2003, installation management responsibilities were transferred from the Naval Air Systems Command to the newly established Commander, Navy Installations Command (CNIC). The intent of CNIC was to establish a single shore installation management organization that would focus on installation effectiveness and improve the shore installation management community's ability to support the fleet.

In February 2004, installation commanders from NAES Lakehurst, the Army's Fort Dix, and McGuire AFB formed a "Joint Installation Partnership" to generate joint solutions for common problems between the three contiguous bases and their tenant commands.

Naval Air Engineering Station Mission

The missions of the numerous tenants assigned to NAES Lakehurst are varied. Naval Air Systems Command (NAVAIR) is the largest tenant aboard the base and its primary mission assures that fixed and vertical wing aircraft operate safely and effectively from aircraft carriers, other air capable ships and expeditionary airfields worldwide.

The base provides the facilities and services necessary to permit fixed and rotary wing aircraft to operate safely and effectively from ships at sea and from austere expeditionary airfields. NAVAIR personnel design, develop prototypes, perform testing, and manage contracting to provide items such as catapults, arresting gear, visual landing aids, flight deck marking/lighting systems, aircraft and weapons handling equipment, aircraft servicing and maintenance equipment, unique avionics testing equipment, aircraft engine test equipment and shipboard aircraft fire trucks.

In July 1947, Fort Dix became a basic training center and the home of the 9th Infantry Division. In April 1954, the 9th Infantry Division was transferred to Europe and the 69th Infantry Division moved to Fort Dix. The 69th Infantry Division's stay was short-lived; it was deactivated in March 1956. On that date, Fort Dix became the United States Army Training Center, Infantry.

Fort Dix expanded rapidly during the Vietnam War. A mock Vietnam village was constructed and soldiers received Vietnam specific training before deploying. In July 1973, Fort Dix became a part of the newly formed US Army Training and Doctrine Command. In 1988 Fort Dix began to train Air Force Security Police in ground combat skills. Air Base Ground Defense Command trained enlisted, non-commissioned officer (NCO) and officer security police to better defend Air Force installations world-wide.

In August 1990, Fort Dix began around-the-clock operations deploying troops for Operation Desert Shield and Desert Storm. In January 1991, Fort Dix was chosen to train selected Kuwaiti civilians in basic military skills. After a brief course, they boarded planes to take part in the liberation of their country.

As a result of BRAC recommendations of 1988, Fort Dix again ended its active Army training mission and on October 1, 1992, Fort Dix transferred from Training and Doctrine Command to Forces Command. In December 1995, Fort Dix began mobilizing and deploying troops for the Bosnia Peace Missions. On October 1, 1997, Fort Dix transferred from Forces Command to the United States Army Reserve Command.

Fort Dix Mission

Fort Dix is currently an Installation Management Command, Army Reserve training, mobilization, and deployment center. Its primary mission is to provide training support to active and reserve component units of all services and licensed non-DoD activities. It also serves as a major power projection platform with the mission of receiving, training, equipping, and deploying military forces. As the largest Department of the Army installation in the New York Metropolitan- Delaware Valley Area, Fort Dix functions as a support base for contingency operations. Fort Dix also provides intra-area service support and services for off-Post active and reserve component units, as well as for personnel activities, such as health services, ID card issues, recreational support and exchange/commissary stores.

Range and impact areas comprising 13,765 acres are designed to accommodate small-arms (pistol and shoulder-mounted) weapons, artillery, armor, and rotary wing (helicopter) aircraft. The other training areas are used for tracked vehicle (armor) training, bivouac areas and training exercises of various kinds. The range complex for light arms, tank, Bradley fighting vehicle, artillery, and helicopter aerial gunnery training is located in the eastern section of the Post and consists of more than 50 live-fire ranges. The layout is circular in shape with a common impact area in the center at a slightly lower elevation. The bulk of the range areas are currently used for firing ranges comprising firing points, impact areas, and safety buffers adjacent to these areas. Due to weather limitations, National Guard summer training, and other conditions, summer is the highest-use season. Training and Maneuver Areas (14,118 acres) include target detection ranges and bivouac areas not included in the Range Area, as well as forestry management and wildlife conservation areas. These training, bivouac, and maneuver areas are located along the periphery of the Range and Cantonment Areas. Local, state, and Federal law enforcement agencies use the training facilities on a scheduled and unscheduled basis. The NJARNG has a major presence on Fort Dix. NJARNG activities are primarily training and administration and include:

- Joint Force Headquarters
- 150th AG Detachment
- 250th AG Detachment
- 50th AG Detachment
- 21st Civil Support Team
- Joint Training and Training Development Center
- Regional Training Site Maintenance
- US Property & Fiscal Office
- Unit Training Equipment Site (UTES)
- New Jersey National Guard (NJNG) Challenge Youth Program

Because of DoD realignment actions in 1990, Fort Dix is currently operated as a multi-purpose Installation Management Command activity. In addition to providing training facilities for active duty Army personnel, the installation is utilized by a number of tenants in addition to NJARNG including the New Jersey State Police, the New Jersey State Bureau of Prisons, the Federal Bureau of Investigation, the Federal Bureau of Prisons, the United States Coast Guard, the United States Navy, and the United States Air Force Air Mobility Warfare Center.

expeditionary combat support exercise where participants demonstrate the capability to open an airbase in a remote location. Joint Base partner NAES Lakehurst, provides the staging area for this critical mission.

As strategic units of AMC, the 305th Air Mobility Wing, and 514th Air Mobility Wing provide airlift and air refueling support as assigned by Headquarters, AMC and initiated by the Department of Defense. The 108th Air Refueling Wing represents one of the largest refueling wings in the Air National Guard. Supporting units dedicated to supporting AMC in both the air refueling and strategic airlift roles include:

- Civil Engineering Flight
- Communications Flight
- Consolidated Aircraft Maintenance Squadron
- Mission Support Flight
- Resource Management Squadron
- Security Police
- USAF Clinic

McGuire AFB maintains the C-17 Globemaster III, KC-10A Extender and KC-135 Stratotanker aircraft in a constant state of readiness. Mission responsibilities include the movement of troops, passengers, military equipment, cargo and mail. Aerial refueling capability is another important aspect of McGuire's mission. McGuire AFB's mission sends aircraft and crews, as well as ground support personnel to more than 50 countries on an around-the-clock basis. With combat and combat support experience in Operations Northern and Southern Watch, Enduring Freedom and Iraqi Freedom, along with numerous other tasks serving as training for wartime requirements, Team McGuire is continually postured in a state of preparedness.

Joint Base McGuire-Dix-Lakehurst

Origin of Joint Base McGuire-Dix-Lakehurst

Under BRAC 2005 the military service branches were directed to establish twelve "joint bases." This decision included direction to "Realign Fort Dix, NJ and Naval Air Engineering Lakehurst, NJ, by relocating the installation management functions to McGuire AFB, NJ establishing Joint Base McGuire-Dix-Lakehurst." The rationale for the decision was that since all three

installations performed common functions in support of installation facilities and personnel and shared common boundaries, there was "significant opportunity to reduce duplication of efforts with resulting reduction of overall manpower and facilities requirements capable of generating savings."

Joint Base McGuire-Dix-Lakehurst Mission

The mission of Joint Base McGuire-Dix-Lakehurst, under Air Force leadership, will be to provide installation management services to the mission tenant's at all three bases. These diverse base operating support (BOS) services include:

- Facility Operations
- Facility Engineering
- Facility Maintenance
- Utilities
- Environmental Management
- Transportation
- Air Traffic Control
- Force Protection and Security
- Fire and Emergency Services
- Installation Safety
- Food Services
- Fuel Services
- Contracting
- Supply Storage and Distribution
- Ammunition Storage and Issue
- Unaccompanied Housing
- Family Housing
- Temporary Lodging
- Civilian and Military Personnel Administration
- Public Affairs
- Legal Support
- Morale Welfare & Recreation
- Community and Family Services
- Child and Youth Programs

Section 5 - Base Mission Existing and Proposed Operations

- Postal Operations
- Information Technology Management and Telecommunications

Additionally, the Army and Navy will transfer all land and real property to the Air Force which will become the “landlord” for the entire joint base. This action will make McGuire Air Force Base the primary point of contact for land use, planning and environmental issues.

Joint Base McGuire-Dix-Lakehurst Demographics

The three elements of the Joint Base are major employers in Ocean and Burlington Counties. Employment by manning levels for 2008 is summarized in the following Table 5.1:

Table 5.1 Joint Base Employment by Manning Levels (2008)

	McGuire ¹	Fort Dix	NAES
Military	5272	17	275
Civilian ²	1274	1339	1839
Contractor	37	1295	302
Guard/Reservists	3306	1185	266
Students/Mobilization ³	0	2563	0
Total ⁴	9889	6399	2682

¹ McGuire numbers based on authorizations

² Civilian numbers include some non-DoD Tenants

³ Students/Mobilizing soldiers numbers will vary based on outside factors

⁴ Totals don't include private businesses/organizations that reside on JB MDL

Job security and competitive salaries and fringe benefits make base civilian employment highly desirable. While the majority of civilian employees reside in Ocean and Burlington Counties, daily commuters travel from points as distant as New York, Delaware and Pennsylvania. The civilian employment distribution of Burlington and Ocean County residents across the Joint Base is presented in the following Table 5.2:

Table 5.2 Joint Base Civilian Employment Distribution

	Burlington County	Ocean County
McGuire AFB	45%	3%
Fort Dix	71%	4%

The Naval Air Engineering Station draws a higher portion of its workforce from its neighboring county. This is probably explained by the fact that as a major DoD research and development activity it offers relatively higher paying engineering jobs. Additionally, the technical mission relocated to NAES Lakehurst from Philadelphia in 1977 and some of the original employees are still employed and have maintained residences in the Philadelphia suburbs.

Military Housing

Military housing—as part of the military quality of life—is a key component of military readiness. The National Defense Authorization Act for FY 1996 (Public Law 104-106), 110 Stat 186 Section 2801, supports this commitment by allowing DoD to work with the private sector to build and renovate military housing. Over the past several years family housing at McGuire/Dix and NAES Lakehurst has been privatized and is currently operated and maintained by private contractors performing under a 50 year lease.

Unlike their civilian counterparts, military personnel cannot unilaterally terminate their employment any time they choose during their period of service. On average, about once every 2 to 3 years, military personnel receive orders to relocate to a new assignment. Typically, the length of the assignment is known from the start; however, in a few rare instances, assignments are curtailed early due to the pressing needs of the military or certain types of unforeseen family emergencies.

Service members face demanding schedules—having to be available for work 24 hours per day, 7 days per week, 52 weeks per year. They are often called on to place the needs of the military above the needs of their families. Because of this contractual arrangement, military leaders understand their legal and ethical responsibility to care for Service members and their families.

DoD's long-standing policy is to rely first on the private sector for its housing, paying housing allowances to its Service members, where roughly 63% of military with families live. DoD provides military housing in areas where private-sector housing falls short, considering cost, commuting area, and other established criteria. In these cases, it operates barracks/dormitories for unaccompanied personnel, military family housing for members with dependents (2,084 units for McGuire/Dix personnel and 114 units for NAES Lakehurst personnel) and temporary lodging comprised of 57 suites and 76 guest rooms on Fort Dix for Service members changing

station or on temporary duty. Over time on-base family housing is becoming “right-sized” as the housing contractor demolishes, renovates and constructs new housing to meet demand. The occupancy rate for on base housing is typically 90% so the remaining families can be assumed to be living in private sector homes which they have either purchased or leased or are living in temporary lodging, either on or off-base as they transition in or out of the area.

Military housing tenants are protected by the same state and federal fair housing and consumer protection laws as civilian tenants. Due to the DoD’s authority to relocate military members to new assignments without their consent, Congress enacted legislation that permits military tenants to lawfully terminate rental contracts early without penalty when they receive military orders to relocate. In time of war, members may be deployed for extended periods without the worry of owing back rents on rental units that they could not occupy. For such contingencies, the landlord is afforded full protection. DoD housing privatization legislation provides safeguards against any disruption in the flow of rental payments in the event of base closure, downsizing, or deployment.

Military members are compensated for housing cost through tax free housing allowances. Compensation amounts vary and are calculated using duty location, number of dependents, military pay grade, and housing costs in the area. The Basic Allowance for Housing (BAH) is based on the assumption that military personnel should not pay out-of-pocket expenses for housing, even in civilian rentals. For the McGuire-Dix-Lakehurst area the housing allowance ranges from \$1,567-2,423 per month, depending on the member’s rank/pay grade. It should be noted that military personnel also receive a Basic Allowance for of \$223 or \$323 per month for officer or enlisted, respectively.

The military housing tenant exceeds the generally accepted eligibility criteria for multifamily rental markets. Experience and evolving concepts of good rental underwriting practice show that the military housing tenant has the required stability of income to support an uninterrupted flow of monthly mortgage or rental payments.

Other powerful incentives further safeguard against the likelihood of tenant defaults. Landlords may elect to contact base housing authorities directly if a military housing tenant is delinquent or in default on regular monthly rental payments.

Children of military members in base housing at NAES Lakehurst attend public school at Lakehurst Elementary School and Manchester High School. Children residing in Fort Dix and McGuire housing currently attend public schools in Pemberton Township and North Hanover, respectively. The McGuire AFB Commander recently requested that all Fort Dix and McGuire children attend North Hanover schools but, as discussed elsewhere, a decision has not been finalized.

Joint Base McGuire-Dix-Lakehurst Mission Changes

BRAC implementation will result in additional fixed-wing and rotary aircraft, additional full-time and part-time personnel, and a need to develop new facilities to support their various missions. With the exception of the NJARNG Consolidated Logistics and Training Facility (CLTF), the additional functions being relocated to Joint Base McGuire-Dix-Lakehurst are either aviation units, units that provide direct support to aviation units or units tasked with the training and administration of military personnel.

The NJARNG is currently constructing a CLTF at the western end of NAES Lakehurst, adjacent to County Road 539, in Plumsted Township. The CLTF will consolidate some operations from Fort Drum, NY, Bordentown, NJ, and Fort Dix. The state-of-the-art facility will provide parking and storage for the NJARNG’s tanks and armored vehicles, as well as equipment from neighboring states, and other equipment used by soldiers for weekend training and periods of active duty training. It will also incorporate maintenance facilities where soldiers can perform both high technology training and necessary repairs on vehicles and equipment. The 150 acre facility is close to the Fort Dix ranges where the tanks, artillery, and other weapons will be used. Training maneuvers will not be conducted by the NJARNG on NAES Lakehurst.

Anticipated full time staffing by National Guard technicians is summarized in the following Table 5.3:

Table 5.3 Projected Full Time National Guard Technician Staffing

	Projected Date	Full-time staff strength
Phase 1	March 2010	164
Phase 2	TBD	85

Section 5 - Base Mission Existing and Proposed Operations

This increased activity at the western end of NAES Lakehurst will result in added traffic and wear and tear on Ocean County Road 539. To mitigate the impact on traffic on County Route 539 the NJ Traffic Improvement Program includes a project to widen and resurface/reconstruct 1500 feet and to provide left turn lanes and right turn acceleration/deceleration lanes to the new entrance. This project received a Federal Appropriation in SAFETEA-LU (Public Lands Highway Discretionary Award) and is programmed for 2009.

The final BRAC 2005 decision included one mission change for NAES Lakehurst. The direction was to “Realign Fort Dix, NJ, by relocating Equipment Concentration Site 27 to the New Jersey Army National Guard Mobilization and Training Equipment Site joint facility at Lakehurst, NJ.” This will result in the relocation of heavy equipment to an area adjacent to the NJARNG CLTF. Personnel will simply work at a new, nearby location so family relocations will not be necessary.

An increase to the tempo of aviation operations will result from assignment of additional NJARNG aircraft to Lakehurst upon their return from deployment in 2010. These will be a combination of fixed and rotary wing aircraft. Units planned for relocation to NAES Lakehurst include:

- 150th Air Assault BN
- Co C 1-224 S&S
- Co A 2-204th GSAB
- Detachment B 628th DASB
- Army Aviation Support Facility (AASF)

NJARNG aircraft expected to relocate are summarized in the following Table 5.4:

Table 5.4 NJARNG Aircraft Expected to Relocate

Aircraft Type	Number of Aircraft
UH-60 Blackhawk Helicopter	18
UH-72A Lakota Helicopter	4
C-12	1

Finally, DoD’s new joint strike fighter (JSF) aircraft is scheduled to begin carrier certification testing on the test runway in 2010 or 2011.

BRAC 2005 also directed the following changes be implemented impacting Fort Dix prior to September 15, 2011:

- Northeast Regional Readiness Command Headquarters be established at Fort Dix and the HQ 78th Division be relocated from Camp Kilmer to Fort Dix. A Sustainment Brigade be established.
- The 244th Aviation Brigade be relocated from Fort Sheridan, IL to Fort Dix.
- Aberdeen Proving Ground, MD, Washington Navy Yard, DC, and Naval Submarine Base New London, CT, be realigned by relocating all mobilization functions to Fort Dix and redesignating Fort Dix as Joint Pre-Deployment/Mobilization Site.
- Equipment Concentration Site 27 be relocated from Fort Dix to NAES Lakehurst.
- The following reserve assets be relocated from Naval Air Station Joint Reserve Base (NASJRB) Willow Grove to Fort Dix.
 - o Company A/228th Aviation and Reserve Intelligence Area 16.
 - o Marine Air Group 49 (MAG-49) to newly constructed facilities on Fort Dix adjacent to McGuire AFB.
 - o Marine Heavy Helicopter Squadron 772 (HMH-772), with 11 CH-53 helicopters collocated with the MAG-49.
 - o Marine Wing Support Squadron (MWSS) 472 housed on Fort Dix in a newly constructed Training Center and Maintenance Facility.
 - o Naval Air Reserve assets transferred to an existing Naval Operations Support Center (NOSC) on Fort Dix.
- Marine Light Attack Helicopter Squadron 775 (HMLA-775), Detachment A, with seven AH-1W Cobra helicopters and four UH-1-Huey helicopters be relocated from Cambria Regional Airport to Fort Dix. This squadron will be united with its parent unit, MAG-49.
- Battery G 3rd Battalion, 14th Marines, be relocated from West Trenton Marine Reserve Center to Fort Dix and collocated with MWSS 472 in a newly constructed Training Center and Maintenance Facility.

Finally, BRAC 2005 directed the closure of NASJRB Willow Grove resulting in relocation of the following activities to McGuire AFB:

- Fleet Logistics Support Squadron 52 (VR-52), with one C-12 and four C-9B aircraft housed in new hangar space on the flightline of the 108 ARW
- Fleet Logistics Support Squadron 64 (VR-64), with four C-130T aircraft share hangar space with their sister unit.
- 244th Aviation Brigade and Company A/2-228th Aviation with six C-12 aircraft relocated to a renovated hangar on the main flightline.
- Aircraft Intermediate Maintenance Department (AIMD) / Aviation Supply Division (ASD) moved to newly constructed facilities in close proximity to the new Fleet Logistics Support Squadrons' hangar.

Additionally, eight KC-135R/T tanker aircraft from March Air Reserve Base (ARB) will be realigned to the 108 Air Refueling Wing (ARW) and replace 16 older model KC-135E aircraft resulting in a net loss of eight aircraft.

BRAC implementation will result in additional fixed-wing and rotary aircraft, additional full-time and part-time personnel, and a need to develop new facilities to support their various missions. As discussed above, the Commission also approved the establishment of Joint Base McGuire-Dix-Lakehurst.

With the exception of the CLTF, these units are either aviation units, units that provide direct support to aviation units or units tasked with the training and administration of military personnel. A summary of aircraft changes is presented in Table 5.5.

Table 5.5 Summary of Aircraft Changes

Originating Unit (Location)	Aircraft Name	Aircraft Type	No. of Aircraft
INCREASE IN AIRCRAFT			
Marine Heavy Helicopter Squadron 772 (Willow Grove)	CH-53E	helicopter	11
Marine Light Attack Helicopter Squadron 775, Detachment A (Cambria)	AH-1W	helicopter	7
Marine Light Attack Helicopter Squadron 775, Detachment A (Cambria)	UH-1	helicopter	4
Fleet Logistics Support Squadron 64 (Willow Grove)	C-130T	fixed wing	4
Fleet Logistics Support Squadron 52 (Willow Grove)	C-9B	fixed wing	4
Fleet Logistics Support Squadron 52 (Willow Grove)	C-12	fixed wing	1
244th Aviation Brigade and Company A /2-228th Aviation (Willow Grove)	C-12	fixed wing	6
REDUCTION IN AIRCRAFT			
108th Air Refueling Wing (NJANG)	KC-135R/T	fixed wing	* (8)

Note: * This number reflects a net reduction in aircraft for the 108 ARW, as the unit would receive 8 KC-135R/T aircraft but 16 older model KC-135 E aircraft are scheduled to be retired as part of the BRAC Action.

Section 5 - Base Mission Existing and Proposed Operations

Joint Base McGuire-Dix-Lakehurst Demographic Changes

As with all BRAC 2005 actions, full implementation is required prior to September 15, 2011. Current plans call for joint base Interim Operational Capability (IOC) on March 31, 2009 and Full Operational Capability by September 30, 2009. The direct BRAC 2005 population impact is shown in Table 5.6.

Table 5.6: BRAC 2005 Population Impact

Command/Unit	Active Military	Civilian	Total Full-time	Reservists
From Willow Grove, PA				
Marine Air Group 49	28	0	28	96
Marine Heavy Helicopter Squadron 772	106	0	106	61
Fleet Logistics Support Squadron 52	137	0	137	224
Fleet Logistics Support Squadron 64	111	0	111	111
Marine Wing Support Squadron 472	25	0	25	321
244th Aviation Brigade & Company A/2-228th Aviation	21	3	24	0
Aircraft Intermediate Maintenance Dept	38	3	41	0
Naval Air Reserve	67	15	82	604
From Cambria, Johnstown, PA				
Marine Light Attack Helicopter Squadron 775, Det A.	80	4	84	57
From West Trenton, NJ				
Battery G 3rd Battalion, 14th Marines	12	0	12	142
TOTAL	625	25	650	1616

The 2000 Census determined the average household size at Fort Dix was 3.06. This household size is anticipated to be typical of all service branches at the Joint Base. The Fort Dix household size is slightly greater than the 2000 census observed in Ocean and Burlington Counties (2.8 persons). The demographics of today's all-volunteer military explain this larger household size. Although the active duty force is older now than it was two decades ago, it is younger than the adult civilian population. Nearly 80% of active duty personnel are below age 35. Currently, 53% of both the active force and reserve component is married. 56% of the active duty married population is between the ages of 22 and 29. Women make up 14.5% of the active force and 17% of the Guard and Reserve components. Studies show that military

members tend to marry younger, begin to have children at a younger age, and have larger families than their civilian peers. More than 45% of military members have children. Nearly 73% of all military children in active duty families are under age 11; 39% are five years of age or younger. Six% of active duty members have family members with special needs.

This demographic distribution applied to BRAC-induced inbound Joint Base military personnel is summarized in the following Table 5.7:

Table 5.7 Inbound Joint Base Military Personnel

Direct Military	Projected Married Military	Projected Family Members	Estimated Number of Children	Estimated Children Under Age 11	Estimated Children Under Age 5
625	331	682	351	256	137

Additional personnel changes may occur as BRAC implementation is finalized. The establishment of the Northeast Regional Readiness Command Headquarters and its personnel may have a larger impact than anticipated. The BRAC report forecast a gain of approximately 400 direct personnel for that action but additional details are not currently available. County planners are encouraged to stay in close contact with the base housing office and military planning professionals to determine population/demographic changes over time. It is especially important during the initial influx of personnel as a result of the 2005 BRAC initiative. It is difficult to state with certainty that adequate private sector housing is available to support base growth but it appears so. Today's extremely volatile housing market has resulted in increased availability of home for sale or rent. As discussed previously, military families are usually desirable tenants.

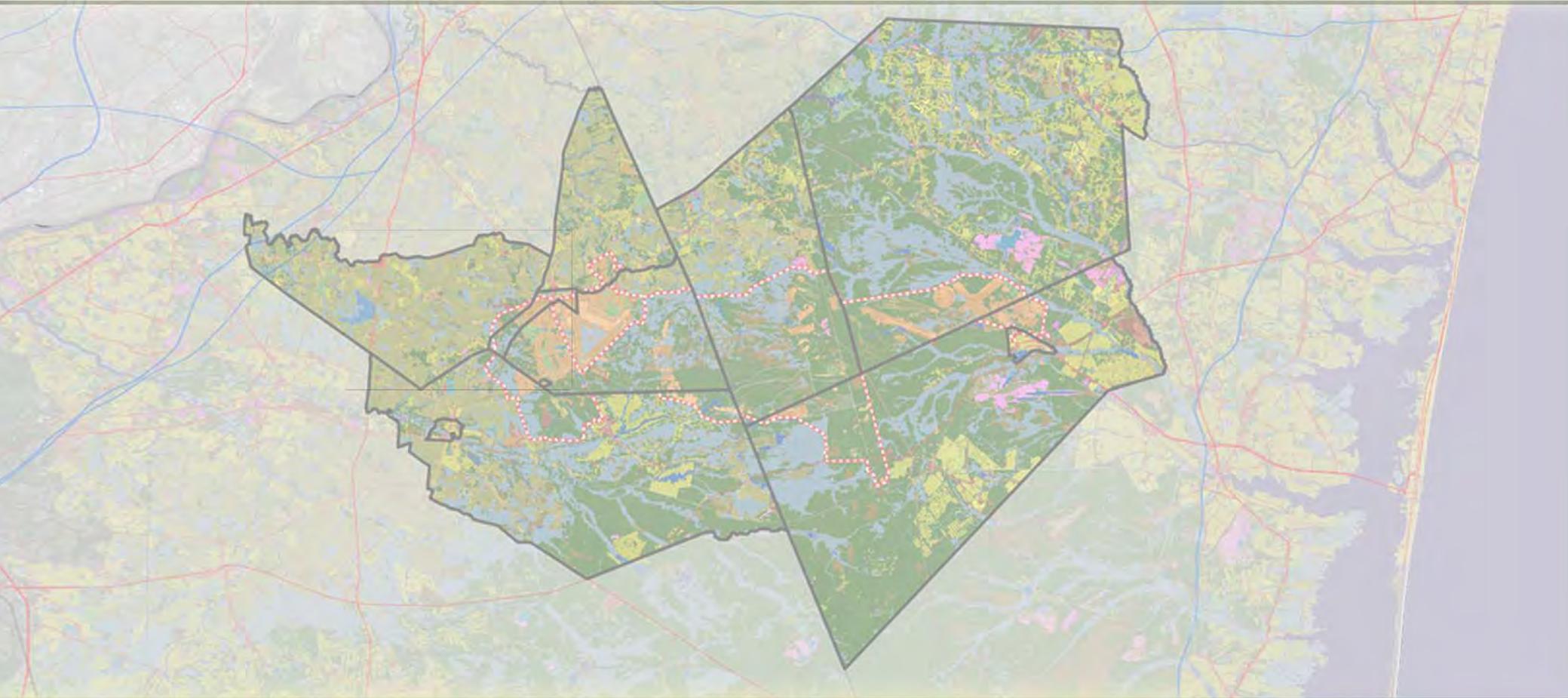
While the direct personnel increase may be nominal, it should be noted that the increase in reserve personnel is substantial. However this change will not induce a requirement for additional housing or impact local schools as these personnel will remain in their existing homes. Personnel currently assigned to distant units (e.g. Cambria, PA) may elect to travel to the joint base for weekend drills or they may be replaced by reservists who reside closer. Weekend reserve travelers will have an impact on roads in the area of the Joint Base, particularly early Saturday mornings and late Sunday afternoons. Impacted roads will be

Burlington County Routes 545, 530 and 616, and NJ Route 68. Wear and tear on these roads should be monitored by county and state highway department personnel.

Joint Base personnel changes will be triggered by the return of deployed Army National Guard aviation personnel when they return from deployment and establish their base of operations at NAES Lakehurst. Returning personnel are expected to include 100 full-time guardsmen and 430 part-time guardsmen. As in the case of the reservists discussed above, their return will not impact housing or local schools as their families are already resident. As with the reservists, weekend traffic is expected to increase. These increases are anticipated on Ocean County Road 547, County Road 571 and NJ Route 70.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 6 - Technical Information Noise and Safety Zones

Technical information on base operational noise, aircraft noise, and air operations safety is presented in this section. This section forms the basis of the JLUS noise and safety analysis and presents military installation operations after the proposed BRAC action mission changes (post-2008).

BRAC actions associated with Joint Base have the potential to create different operational impacts related to noise and air safety. This JLUS provides guidance and recommendations to both the military installation and local municipalities to identify incompatibilities between potential operational impacts associated with the Joint Base installation and the land use decisions of neighboring municipalities.

Ongoing DoD programs provide for studies to assess potential noise levels generated and air safety concerns associated with various training operations and to identify off-base land areas around military installations (i.e., airfields, ranges), with zoning and/or land use that may be incompatible with the noise levels and aircraft accident potential. This information provides a basis to develop recommendations for the land lying within these areas that are compatible with the needs of the community and the Joint Base missions.

This technical analysis is based on the following data sources:

- 2005 Department of the Army, Fort Dix Installation Operational Noise Management Report,
- 2005 Department of the Air Force Air Mobility Command Environmental Assessment East Coast Basing of C-17 Aircraft,
- 2008 Department of the Air Force Air Mobility Command Environmental Assessment Addressing BRAC 2005 Actions at McGuire Air Force Base and Fort Dix, New Jersey,
- 1986 baseline AICUZ noise source data from NAES Lakehurst, and;
- information compiled by the Department of the Navy at NAES Lakehurst.

Noise

The terms “sound” and “noise” are often used synonymously. Noise is unwanted sound usually composed of a spectrum of many single frequency components, each having its own amplitude. The disturbing effects of noise depend both on the intensity and the frequency of the tones. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying.

Noise can have negative affects upon an individual or community in a variety of ways. Noise can cause stress on the human body and affect ones health (i.e., produce elevated blood pressure). Noise can affect the quantity and quality of sleep that a person may get which in turn can affect an individual's work efficiency. Noise can disrupt the educational process in schools near excessive noise sources. Noise can interfere with conversation and disrupt the peaceable enjoyment of one's private property. Nuisance noise is usually defined as a loud, unnecessary or unusual noise, or a noise which either annoys, disturbs, injures, or endangers the comfort, repose, health, peace or safety of others.

The standard metric for noise is the decibel (dB). The decibel is used as a unit of sound amplitude or loudness and is derived from a comparison sound pressure, in air, with a reference pressure. Broadband sound covers the whole of the audible frequency range and is made up of many tones. Figure 6.1 displays general guidelines of common sounds and noise levels by decibel ranges.

The following are common noise level measurement parameters:

A-Weighting (dBA) - Noise measurements are often taken using the “A-weighted” frequency response function. The A-weighted frequency or dBA scale simulates the response of the human ear to sound levels (particularly low-level sound) and has been given prominence as a means for estimating annoyance caused by noise, for estimating the magnitude of noise-induced hearing damage, in hearing conservation criteria, for speech interference measurements, and in procedures for estimating community reaction to (general broad band) noise (Clayton, et al. 1978; Cheremisinoff, et al. 1977). Sound measurements are often made using the “A” frequency weighting when assessing environmental noise. A-weighting measures noise that

Section 6 - Technical Information – Noise and Safety Zones

Figure 6.1 Common Sounds and Noise Levels, A-Weighted

Common Sounds and Noise Levels (A-weighted)

Noise Source (at a given distance)	Typical Reaction	
	140	
Civil Defense Siren (100 ft)	Pain	
		130
Jackhammer (50 ft)	Maximum Vocal Effort	
Pile Driver (50 ft)		120
		110
Ambulance Siren (100 ft)	Very Annoying/ Discomfort	
Motorcycle (25 ft)		100
Power Lawnmower		90
Garbage Disposal (3 ft) Alarm Clock		80
Vacuum Cleaner (3 ft)	Intrusive	
		70
Normal Conversation (5 ft) Dishwasher	Normal Speech	
Light Traffic (100ft)		60
		50
Bird Calls (Distant)	Quiet	
Soft Whisper (5 ft)		40
		30
	Just Audible	
		20
Human Breathing	10	
	0	

closely resembles the frequency response of human hearing, including response to high-frequency noise. A-weighting, expressed as dBA, is a good descriptor of higher frequency noise caused by small arms firing, aircraft use, and vehicle operations. Further, small arms are also characterized in terms of peak un-weighted dB level.

C-Weighting (dBC) - C-weighting measures the low-frequency component of noise. C-weighted sound level measurement (dBC) correlates well with physical vibration response of buildings and other structures to airborne sound. Impulsive noises resulting from armor, artillery, and demolition activities are assessed in terms of dBC; C-weighting represents the low frequency noise and vibration associated with the firing of larger weapons systems. When measuring sound with a large low-frequency component, values measured using the C-scale are usually higher than values measured using the A-scale.

Day/Night Equivalent Sound Level (DNL) - The day/night equivalent sound level (DNL) or (Ldn) is the equivalent energy-averaged sound level for a 24-hour period (U.S. EPA 1974). The Ldn is estimated from the equivalent daytime Ld (7:00 a.m. to 10:00 p.m.) and nighttime Ln (10:00 p.m. and 7:00 a.m.) levels with an additional 10 dBA weighting imposed on the equivalent sound levels occurring during nighttime (10:00 p.m. and 7:00 a.m.). The 10-decibel increase at night is because people are more sensitive to noise during normal sleeping hours, when ambient noise levels are lower. The DNL provides a single measure of overall noise impact and represents total sound exposure. Although DNL does provide a single measure of overall noise impact, it does not provide specific information on the number of noise events or specific individual sound levels that occur. For example, a DNL of 65 dB could result from a small number of very loud events or from a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent total sound exposure. Scientific studies and social surveys have found DNL to be the best measure for assessing levels of annoyance associated with all types of environmental noise. Therefore, the scientific community and governmental agencies, such as US EPA, the Federal Interagency Committee on Urban Noise (FICUN), and the Federal Interagency Committee on Noise (FICON), endorse its use. DNL is the preferred noise metric of the US EPA, HUD, FAA, and DoD. DNL can be assessed using the A-weighted scale or C-weighted scale. The A-weighted Day-Night Average Sound Level (ADNL) noise descriptor is used to describe the noise environment around airfields; DNL has been determined to be a reliable measure of community sensitivity to aircraft noise and has become the standard metric used in the U.S. to quantify aircraft noise. The C-weighted Day-Night Average Sound Level (CDNL) is used for intense noise containing low frequency sound energy (near or below the threshold of human hearing) like that from large gun blasts and sonic booms that tend to elicit annoyance through building rattles.

Federal, State and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise.

Please see Appendix 13.4 for more detail on the basics of sound/noise, statistical descriptors (A-weighting, Equivalent Sound Level, and Residual Sound Level), noise guidelines and standards, regulations and sensitive receptors.

Noise Compatibility Criteria

This section presents information on the use of noise zones and noise compatibility criteria. A discussion of the studies used to identify potential off-base noise associated with military operations is presented in Appendix 13.4. Noise levels are taken into account in the form of noise zone contour maps to provide guidance on noise-sensitive land uses. Noise contours are developed to reflect the normalized operating conditions of any new rotary and fixed-wing aircraft to accommodate the safe co-location of the military installation and the surrounding community development. Noise contours are developed by a computerized simulation model of munitions and/or aircraft activity at an installation that reflects noise from site-specific operational data. Noise levels from various operations are represented by noise contours.

The contours around the installation reflect either the peak sound level, or an average day-night sound level (DNL) that converts noise varying from peak bursts to relative quiet into a steady measure of acoustic energy over a 24 hour period. The DNL can be assessed using the A-weighted scale or C-weighted scale. The A-weighted Day-Night Average Sound Level (ADNL) noise descriptor is used to describe the noise environment around airfields or for small arms munitions use. The C-weighted Day-Night Average Sound Level (CDNL) is used for intense noise containing low frequency sound energy like that from large arms munitions use.

Noise levels (Peak or DNL) are depicted as contours connecting points of equal value, usually in 5-decibel increments. Calculated noise contours do not represent exact scientific noise measurements; noise levels inside a contour may be similar to those outside a contour line. The area between two specific sets of contours is known as a noise zone. Contours that define noise zones should be viewed as a planning tool, not as a series of discrete lines that sharply divide noise-affected land from non-noise affected areas.

This information provides criteria to identify and assess the compatibility of land use and zoning of surrounding communities with operations associated with the primary missions of the Joint Base.

Noise Zones The Federal Interagency Committee on Urban Noise developed guidelines for considering noise in land use planning in terms of a DNL sound level (FICUN, 1980). These guidelines provide for assessing land uses related to noise zones based on USAF, FAA and HUD criteria.

The guidelines set forth by FICUN for considering noise in land use planning provide for assessing land uses related to noise zones. There are three noise zones, Noise Zone III (NZ III), Noise Zone II (NZ II) and Noise Zone I (NZ I), and a Land Use Planning Zone (LUPZ). The zones are developed using computer models.

The operational data used as input to these computer models is discussed in the referenced reports used as a basis for this study. Noise-sensitive land uses include, but are not limited to, residences, schools, medical facilities, and churches.

The noise zones and compatibility guidelines are presented in Table 6.1. The following provides a description of each noise zone (as set forth in AR 200-1, Section 7-3):

Noise Zone I – All areas around a noise source where the ADNL is less than 65 dBA, the C-weighted average Day/Night sound Level (CDNL) is less than 62 decibels C-weighted (dBC), or the un-weighted peak sound level (Peak) is less than 87 decibels un-weighted (dBP). Residential and other noise sensitive land uses are often considered “compatible” with the noise environment in this zone. Typically, less than 15% of the population is expected to be “highly annoyed” by the noise in this zone. Since the noise exposure in this zone is low enough that it does not trigger incompatibility with FICUN guidelines for sensitive land uses, NZ I contours are not discussed in this analysis.

Noise Zone II – An area where the DNL is between 65 and 75 dBA and between 62 and 70 dBC, or where the Peak is between 87 and 104 dBP. Guidance deems noise exposure within this NZ area to be significant and recommends limiting use of land to non-sensitive activities. Development within this noise zone should be normally limited to activities such as industrial, manufacturing, transportation, agriculture and resource production. Residential and other noise-sensitive land uses are considered “normally incompatible” with the noise environment in this zone; and between 15% and 39% of the affected population is typically expected to be “highly annoyed.” However, if the community determines that land in NZ II areas must be used for residential purposes, guidance suggests that the design and construction of the buildings incorporate noise level reduction (NLR) features to minimize the annoyance experienced by residents.

Section 6 - Technical Information – Noise and Safety Zones

Noise Zone III – An area around a noise source where the DNL is greater than 75 dBA or 70 dBC, or where the Peak is greater than 104 dBP. Residential and other noise-sensitive land uses are deemed “incompatible” with the noise environment in Noise Zone III, and noise-sensitive activities should not be conducted therein. Guidance indicates that noise in this zone is severe enough to cause conflicts with almost all activities, particularly sensitive land uses, such as housing, schools, medical facilities, and places of worship. Typically, more than 39% of the population in this zone is expected to be “highly annoyed” by the noise.

The noise zones, presented in Table 6.1, provide guidance on whether noise-sensitive

typically associated with Noise Zone II. In order to provide a planning tool that can offer a better prediction of noise conditions/impacts during periods of heightened activity, the Land Use Planning Zone (LUPZ) contour is being included within the noise assessment.

It should be noted that there is no LUPZ associated with peak sound levels. The peak (un-weighted) sound level metric represents the instantaneous peak sound of an activity and does not take into account the duration or frequency associated with that activity (e.g., it is not averaged). In contrast with the DNL, peak sound levels are not increased by periods of heightened activity. Therefore, no LUPZ contour is associated with Peak sound levels.

Table 6.1 Noise Zone Guidelines

Noise Zone	Population Highly Annoyed	Acceptability for Noise Sensitive Land Use	Small Arms and Transportation ADNL (dBA)	Large Arms CDNL (dBC)	Small Arms Peak (dBP)
Zone I	<15%	Acceptable	<65	<62	<87
Zone II	15%-39%	Normally Unacceptable	65-75	63-70	87-104
Zone III	>39%	Unacceptable	>75	>70	>104
LUPZ	9%-15%	N/A	60-65	57-62	N/A

land uses, such as residential housing, schools, hospitals, and churches, would be “compatible” or “incompatible” land uses in those areas considering the levels of noise. Noise zones also provide a useful framework for identifying those off-base areas in which noise exposure may be high enough to generate annoyance among a certain percentage of people and provide general guidance on what proportion of the existing population in that zone might be “highly annoyed” by the noise generated.

The Land Use Planning Zone (LUPZ) is the area where the DNL is between 60 and 65 dBA and between 57 and 62 dBC; the LUPZ separates Noise Zone II, which has compatibility issues, from the compatible NZ I.

Because the noise environment at each installation varies daily and seasonally, the Land Use Planning Zone (LUPZ) contour more broadly encompasses off-post lands, where on particularly active days, noise and the resulting community annoyance can approach levels

The noise contours, 65 ADNL and 62 CDNL, represent an annual average that separates the Noise Zone II, which has compatibility issues, from the fully compatible NZ I. Boundaries of AICUZ studies are usually based on the existing community planning or jurisdictional boundaries of local municipalities located nearby. The study area has been defined to reflect those areas identified within surrounding communities affected by military operations.

These compatibility zones are used for land use planning to prevent conflicts with noise-sensitive land uses, such as housing, schools, and medical facilities. As listed above, noise-sensitive land uses are “compatible” with the noise environment in Noise Zone I, “normally incompatible” with the environment in Noise Zone II, and “incompatible” with Noise Zone III. Sensitive land use areas within Noise Zone II are considered normally incompatible. While the incompatibility can be reviewed on a case by case basis, no new incompatible land use areas should be constructed within Noise Zone II. Land uses such as commercial (except hotels and motels), industrial, and agricultural (except livestock), are compatible with most noise environments.

Joint Base Operational Considerations

Analyses of current and future military operational impacts were performed including review of previous studies related to operations and analyses of potential environmental impact assessments compiled for the three military installations. The technical information presented in this section has been compiled, reviewed, extracted, summarized and otherwise utilized from available previously prepared documents, and other available information as identified in the list of references.

Operational-related impacts considered in this study are focused on operations that have potential for noise and air safety issues in adjoining communities. These operational-related impacts include those of aircraft operations from McGuire AFB and Lakehurst NAES, and artillery training at Fort Dix. These potential operational impacts associated with the individual bases are all elements of the combined Joint Base operations.

Fort Dix Military Installation Noise Sources Major noise-producing activities that take place at Fort Dix include tracked vehicles, rotary-wing aircraft, trucks, small arms, and large arms. The training areas, located throughout the installation, are equally divided between range areas and other training areas. The ranges are designed to accommodate small arms (pistol and shoulder-fired weapons), artillery, armor, and rotary-wing (helicopter) aircraft. The other training areas are used for tracked vehicle (armor) training, bivouac (temporary camp) areas and training exercises of various kinds.

Most of the noise associated with Fort Dix results from the following activities:

- Small arms weapon firing
 - o M-16 rifle, the M-60 machine gun, the 9-mm/.45-caliber pistol, and the .50-caliber machine gun
- Large arms weapons firing
 - o Mortars, howitzers, Tank Cannons, Multi-Launch Rocket System, rockets and missiles
- Demolitions
- Rotary-wing aircraft
 - o UH-1, UH-60, and OH-58, and, to a lesser extent, CH-46 and CH-47 rotary-wing aircraft use range facilities

- o Rotary-wing aircraft access to the Fort Dix Aviation Ramp occurs directly by air via McGuire AFB runways
- o Rotary-wing aircraft aviation units across the northeastern United States
 - utilize aviation support functions at Fort Dix
 - utilize ranges for aerial gunnery training
- Vehicles (Tracked vehicles and Trucks)
 - o Passenger vehicles, delivery trucks (tractor semi-trailers)
 - o Military off- and on-road vehicles (wheeled and tracked troop transport, fighting vehicles, and tanks)

McGuire Air Force Base (AFB) Noise Sources McGuire AFB has two runways, designated 06/24 and 18/36, which are located near the southern end of the base. Runway 06/24 is 10,000 feet long and 200 feet wide, while Runway 18/36 is 7,140 feet long and 150 feet wide. Traffic patterns are flown to the north of Runway 06/24 and the west of Runway 18/36.

Noise-producing activities that take place at McGuire AFB include fixed-wing and rotary-wing aircraft operations. The primary source of noise associated with McGuire AFB is airfield operations. The majority of these operations occur as training operations at McGuire AFB.

McGuire AFB's two active runways, 06/24 and 18/36, support approximately 60,000 annual aircraft operations. McGuire AFB operated approximately 32 'KC-10', 20 'KC-135' and 12 'C-17' aircraft at the base prior to the BRAC action. Under the BRAC action, 29 additional aircraft were stationed at McGuire AFB. The number of sorties flown with the aircraft previously stationed at the base did not increase. The BRAC action resulted in a decrease in KC-135 aircraft and related daily sorties, and resulted in the addition of C-12, C130T, C-9, CH-53, UH-1 and AH-1W aircraft and related daily sorties. The additional aircraft and helicopters increased the number of daily sorties.

There was also a change in aircraft operations allocated on two runways, 06/24 and 18/36, to an increase in use of runway 06/24 (aligned SW to NE) and a reduction in operations on runway 18/36 (aligned NNW to SSE). This has a significant impact on the post-2008 noise contours presented in this analysis.

Naval Air Engineering Station (NAES) Lakehurst Noise Sources The primary source of noise in the vicinity of NAES Lakehurst is airfield operations. Major noise-producing activities that take place at NAES Lakehurst include fixed-wing and rotary-wing aircraft. Aviation related noise includes noise from take-offs, landings, landing zone training and flyovers.

NAES Lakehurst facilities include two 5,000-foot operational runways, a 12,000-foot Test and Evaluation runway equipped with catapult and arresting gear and five test tracks. Aircraft operations at NAES Lakehurst are generated by Army, Army National Guard, and Department of Justice aircraft based at NAES and from transient aircraft, and aircraft from USAF installations, including McGuire AFB, that use the airfield for practice approaches and landings.

Prior to the BRAC action, fixed-wing aircraft at NAES Lakehurst included approximately one 'C-12', two 'C-130', an occasional C-17 and ten turboprops (SH-33 Sherpa, Carravan, Aerostar, Cessna). Current operations include the Assault Landing Zone (ALZ) for C-17 training operations, additional aircraft operations (total operations are approximately double), additional fixed-wing aircraft operations, increased nighttime operations, and additional rotary-wing aircraft operations (eleven CH-53, eleven UH-60A Blackhawk, five US-1H Huey and eleven OH-58A/C Kiowa helicopters). The nature of air operations has changed from an airfield that served predominantly helicopters to one with both fixed wing and helicopter operations. The Army National Guard Aviation projections will not be realized until the aircraft are reassigned in 2009-2010. The current state of NAES Lakehurst has not reached full projected operational capacity as predicted in the September 2005 EA. At present there has been a significant increase in C-17 aircraft operations, and future aircraft operations are anticipated to increase from current conditions. Based on 2008 data, NAES Lakehurst is currently at 12,000 annual operations and at a fully operational tempo is anticipated to reach 80,000 yearly operations.

Baseline Noise Conditions (Pre-2008)

Analyses of the military baseline operational impacts were performed including review of previous studies related to operations and analyses of potential environmental impact assessments compiled for the three military installations. The technical information presented in this JLUS has been compiled, reviewed, extracted, summarized and otherwise utilized from available previously prepared documents, and other available information as identified in the list of references. The baseline condition is represented by information from previous studies (AICUZ, ICUZ, etc.) that describe noise levels associated with base operations prior to 2008.

The baseline noise contours are presented in the following Figures for the three military bases:

- Figure 6.2 - Baseline Noise Conditions: Small Arms Peak (No Aviation)
- Figure 6.3 - Baseline Noise Conditions: Small Arms ADNL (No Aviation)
- Figure 6.4 - Baseline Noise Conditions: Large Arms CDNL (No Aviation)
- Figure 6.5 - Baseline Noise Conditions: Small Arms ADNL, Large Arms CDNL and Aviation

Figure 6.2 - Baseline Noise Conditions: Small Arms Peak (No Aviation)

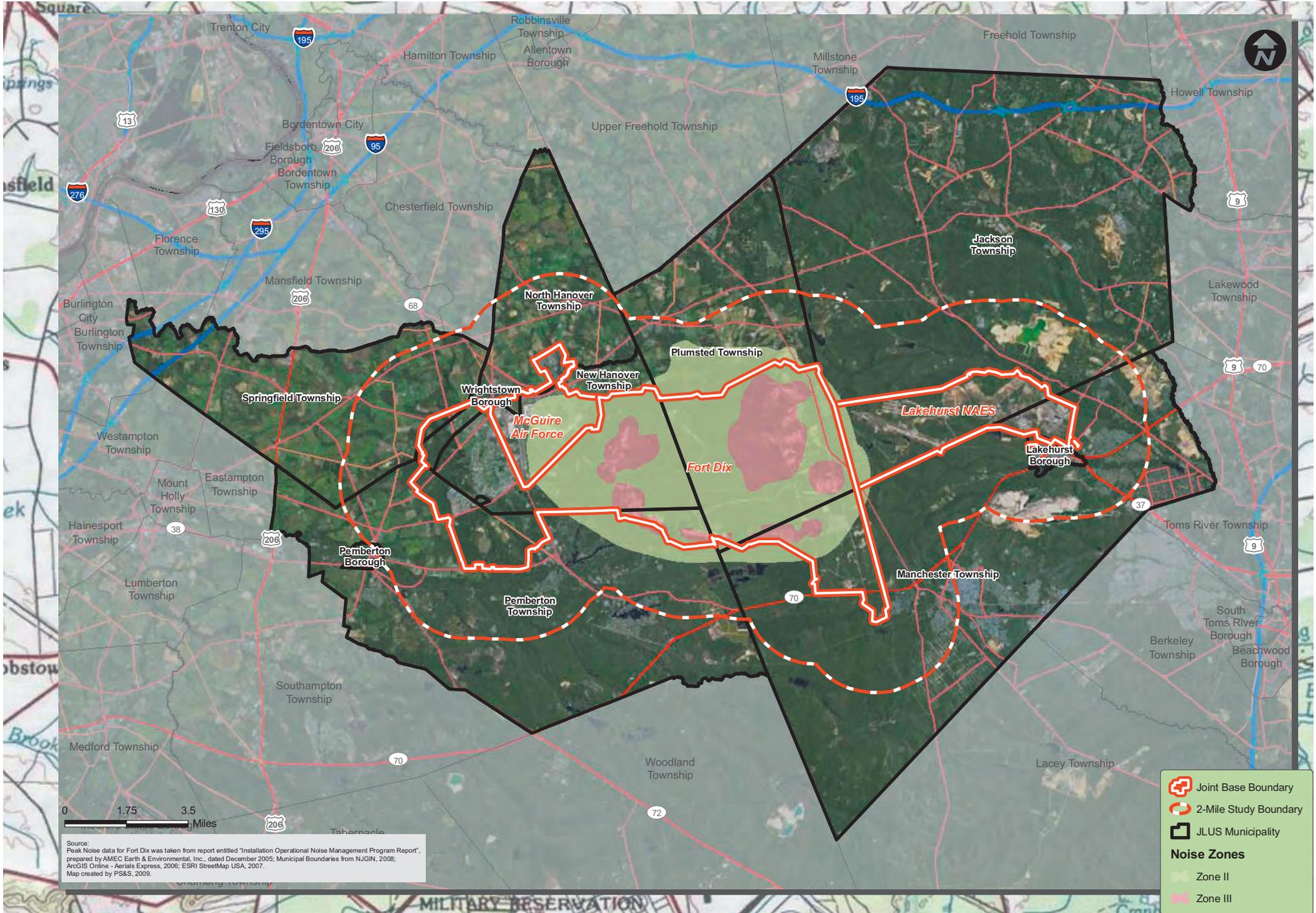


Figure 6.3 - Baseline Noise Conditions: Small Arms ADNL (No Aviation)

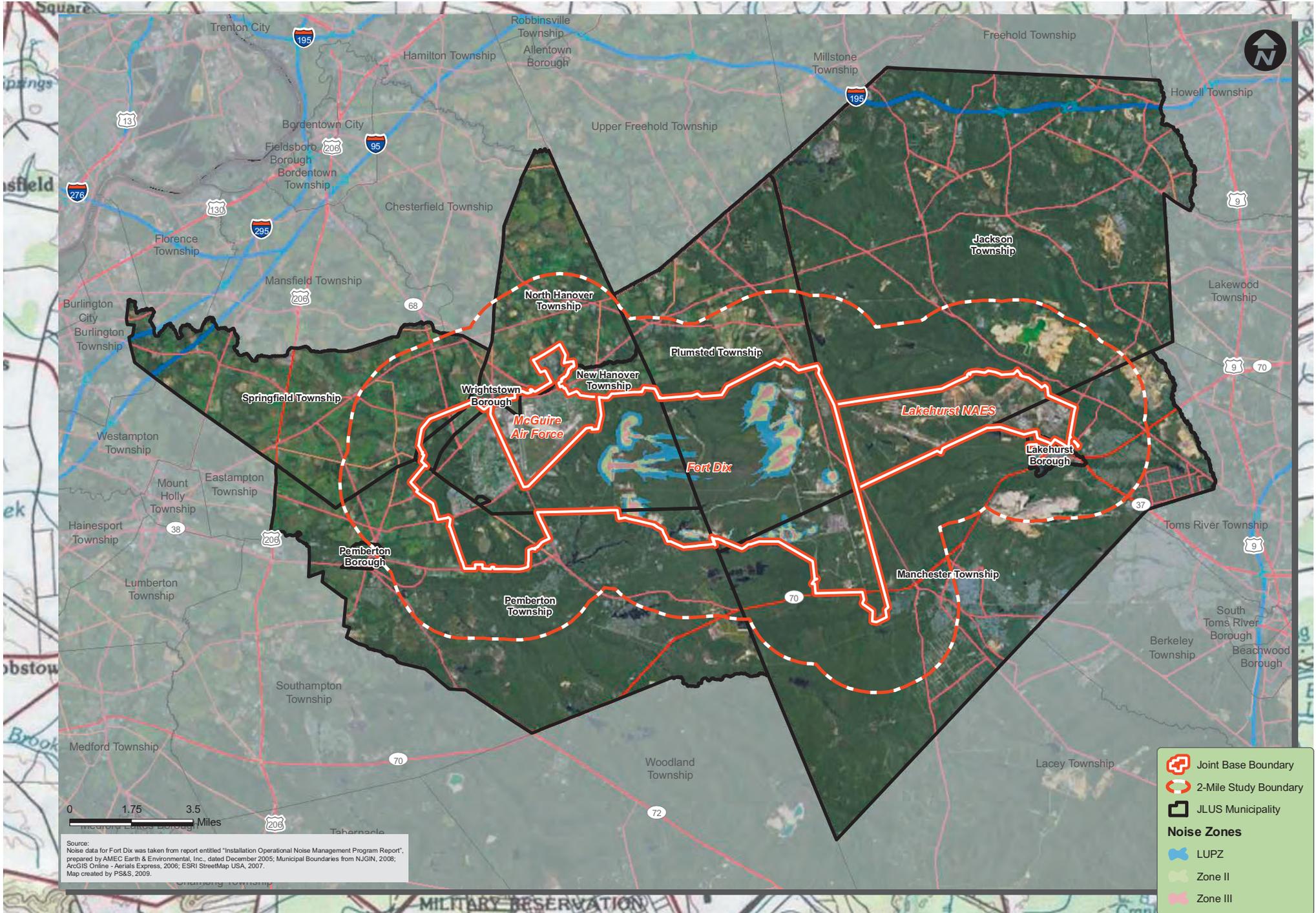


Figure 6.4 - Baseline Noise Conditions: Large Arms CDNL (No Aviation)

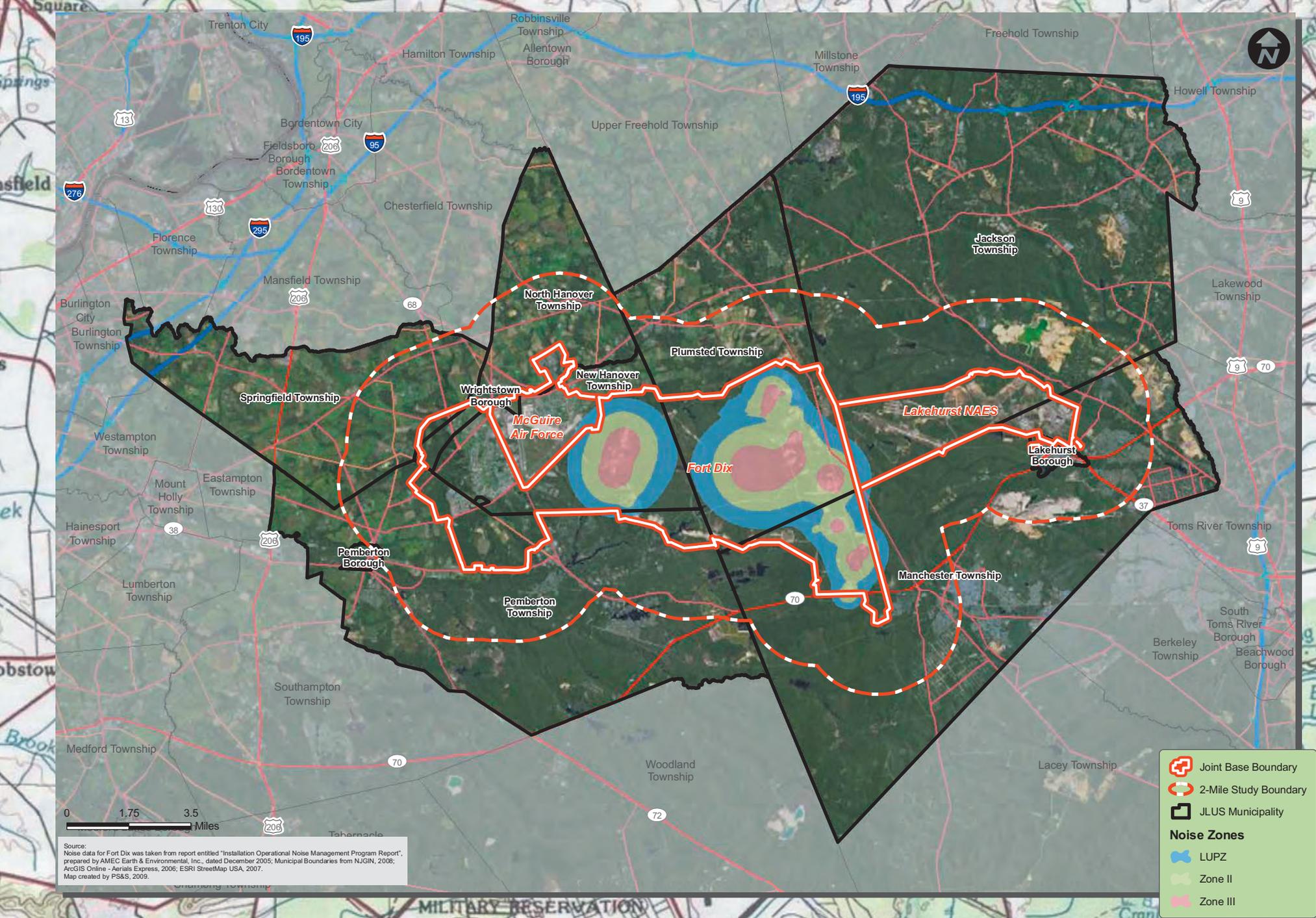
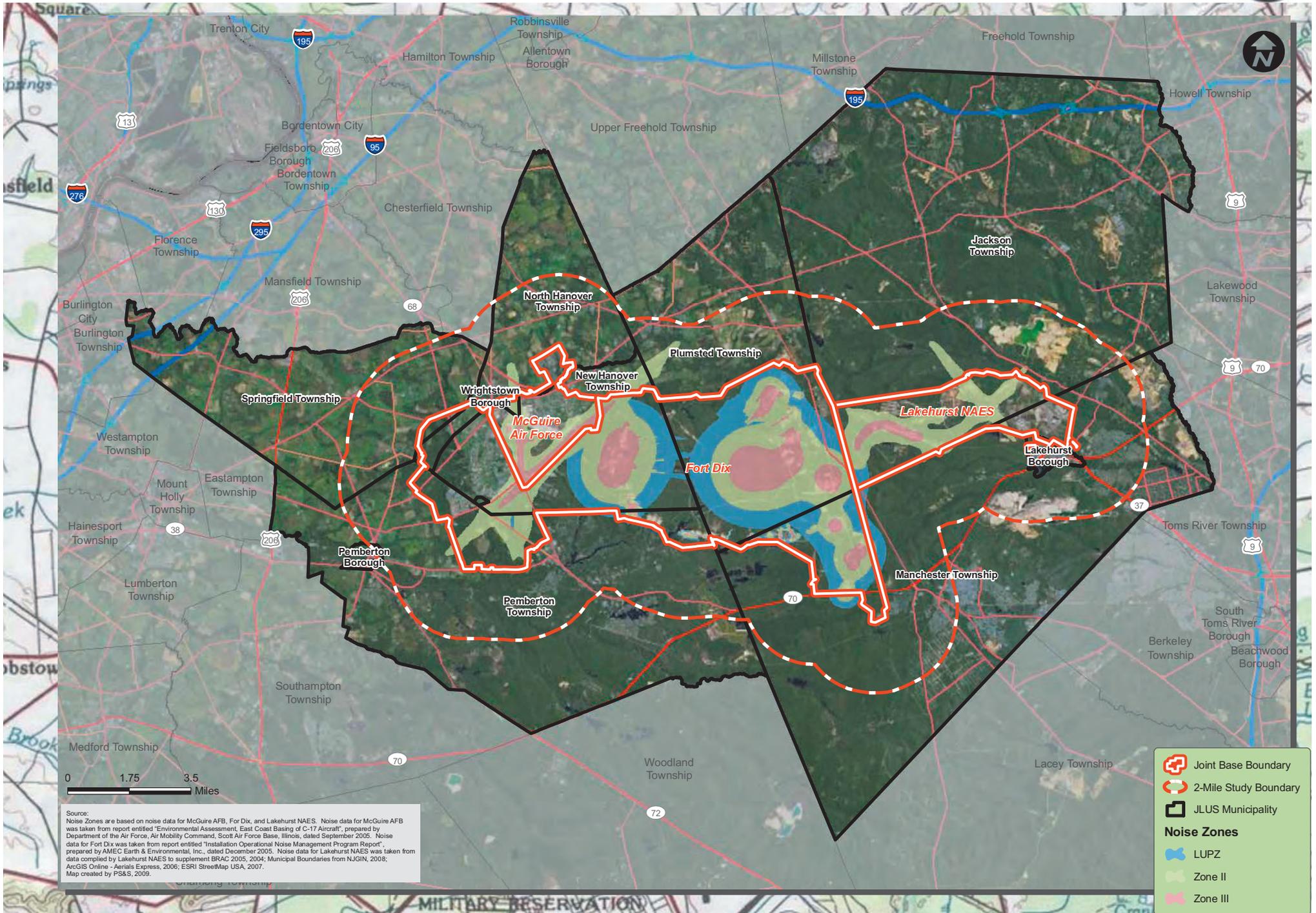


Figure 6.5 - Baseline Noise Conditions: Small Arms ADNL, Large Arms CDNL, and Aviation



Post-2008 Noise Conditions

The post-2008 operations at the three military installations have increased from the baseline conditions. The Fort Dix “Installation Operational Noise Management Program” report, the “Environmental Assessment addressing BRAC 2005 actions at McGuire AFB and Fort Dix, New Jersey” and the “Environmental Assessment East Coast Basing of C-17 Aircraft” reports addressed potential noise associated with post BRAC operations and post-2008 conditions. The post-2008 operations included increases in small and large arms training, basing of C-17 aircraft, increased rotary aircraft activity and increased aircraft operations. This data is the most up-to-date information currently available and forms the basis of this study. Analyses of the post-2008 military operational impacts were performed including review of previous studies related to operations and analyses of potential environmental impact assessments compiled for the three military installations. The technical information presented in this JLUS has been compiled, reviewed, extracted, summarized and otherwise utilized from available

Table 6.2 Land Area and Zoning Outside of Joint Base Boundary Exposed to Noise Zones from Projected (2008 Peak) Small Arms Munitions Use at Fort Dix (Area in Acres)

Municipality	Zoning Categories	Zone II	Zone III	Grand Total
Jackson Township	Preservation	40.2		40.2
Jackson Township Total		40.2		40.2
Manchester Township	Preservation	705.7	18.7	724.5
Manchester Township Total		705.7	18.7	724.5
New Hanover Township	Agriculture	93.7		93.7
	Medium Density Residential (1-4 units per acre)	78.6		78.6
New Hanover Township Total		172.3		172.3
Pemberton Township	High Density Residential (more than 4 units per acre)	805.1		805.1
	Low Density Residential (less than 1 unit per acre)	98.1		98.1
	Medium Density Residential (1-4 units per acre)	541.2	93.5	634.7
	Preservation	332.0		332.0
Pemberton Township Total		1,776.4	93.5	1,869.9
Plumsted Township	Agriculture	2,001.8		2,001.8
	Low Density Residential (less than 1 unit per acre)	29.5		29.5
	Preservation	379.0		379.0
Plumsted Township Total		2,410.3		2,410.3
		Zone II	Zone III	Grand Total
Total Area (acreage) Outside of Joint Base Boundary:		5,105	112	5,217

Table 6.3 Estimated Population in Fort Dix Small Arms Peak Noise Zones for Projected Condition (Outside of Joint Base Boundary)

Municipality	Noise Zones		
	Zone II Population	Zone III Population	Pop Total
Jackson Township	-	-	-
Manchester Township	-	-	-
New Hanover Township	72	-	72
Pemberton Township	3,312	112	3,424
Plumsted Township	805	-	805
Total Population	4,189	112	4,301

Source: Census 2004 Projected Population by Block Group

previously prepared documents, and other available information as identified in the list of references. Further information is not anticipated to be available until the completion of the Joint Base AICUZ study, anticipated in 2011.

Peak Noise Levels

Fort Dix Small Arms Peak The peak sound level is the maximum instantaneous sound level of an event measured with a sound level meter or analyzer set for un-weighted (or linear weighting). Time integrating is not used when peak levels are measured.

The acreage associated with small-arm munitions projected peak noise levels outside of the Joint Base boundary, categorized by municipality and zoning designation is presented in Table 6.2. The total acreage outside of the Joint Base for the projected condition that is within Noise Zone II is approximately 5,105 acres and within Noise Zone III is approximately 112 acres.

The population outside of the Joint Base boundary within each Noise Zone for the 2008 scenario is summarized in Table 6.3. The total population outside of the Joint Base that is within Noise Zones II and III is approximately 4,301 people; approximately 4,189 people within Noise Zone II and approximately 112 people within Noise Zone III. Seventy-eight percent of the population within Noise Zones II and III is in Pemberton Township.

Section 6 - Technical Information – Noise and Safety Zones

The projected peak noise zone contours associated with small arms munitions use at Fort Dix are depicted in Figure 6.6. As shown in this Figure, small arms peak noise levels associated with Noise Zone III are contained within the boundaries of Fort Dix; the exception being some off-base impacts in Pemberton and Manchester Townships similar to the baseline condition.

Off-base impacts associated with post-2008 Noise Zone II small arms peak sound levels are similar to pre-BRAC conditions. Off-base impacts extend further into New Hanover Township, are similar in Plumsted Township, and show a decrease in Jackson Township when compared to the pre-BRAC condition. Noise Zone II peak noise levels associated with small arms munitions encroach on the Collier Mills Wildlife Management Area to the northeast of the base. Off-base impacts are similar to pre-BRAC conditions in Manchester and Pemberton Townships to the south. The northern-most sections of the Browns Mills community, along Trenton Avenue and Range Road, are exposed to noise levels within Noise Zone II. Noise Zone II is also present in the northwestern section of Manchester Township, within the Brendan T. Byrne State Forest. The extent of Noise Zone II sound impacts are similar to the pre-BRAC condition for McGuire AFB to the east and show a slight decrease from the pre-BRAC condition for Lakehurst NAES to the west of Fort Dix.

Joint Base DNL The following includes an assessment of Joint Base small arms, large arms, aircraft and vehicle noise. Joint Base noise levels are assessed using the DNL for small arms, large arms, aircraft noise. The DNL provides a single measure of overall noise impact and represents total sound exposure. The DNL is found to be the best measure for assessing levels of annoyance associated with all types of environmental noise.

DNL can be assessed using the A-weighted scale or C-weighted scale. The A-weighted Day-Night Average Sound Level (ADNL) noise descriptor is used to describe the noise environment around airfields and the firing of small arms. The C-weighted Day-Night Average Sound Level (CDNL) is used for intense noise containing low frequency sound energy (near or below the threshold of human hearing) like that from large gun blasts and sonic booms.

The acreage associated with post-2008 Joint Base operational noise levels outside of the Joint Base boundary is discussed by each Base and encapsulated in the Joint Base Summary.

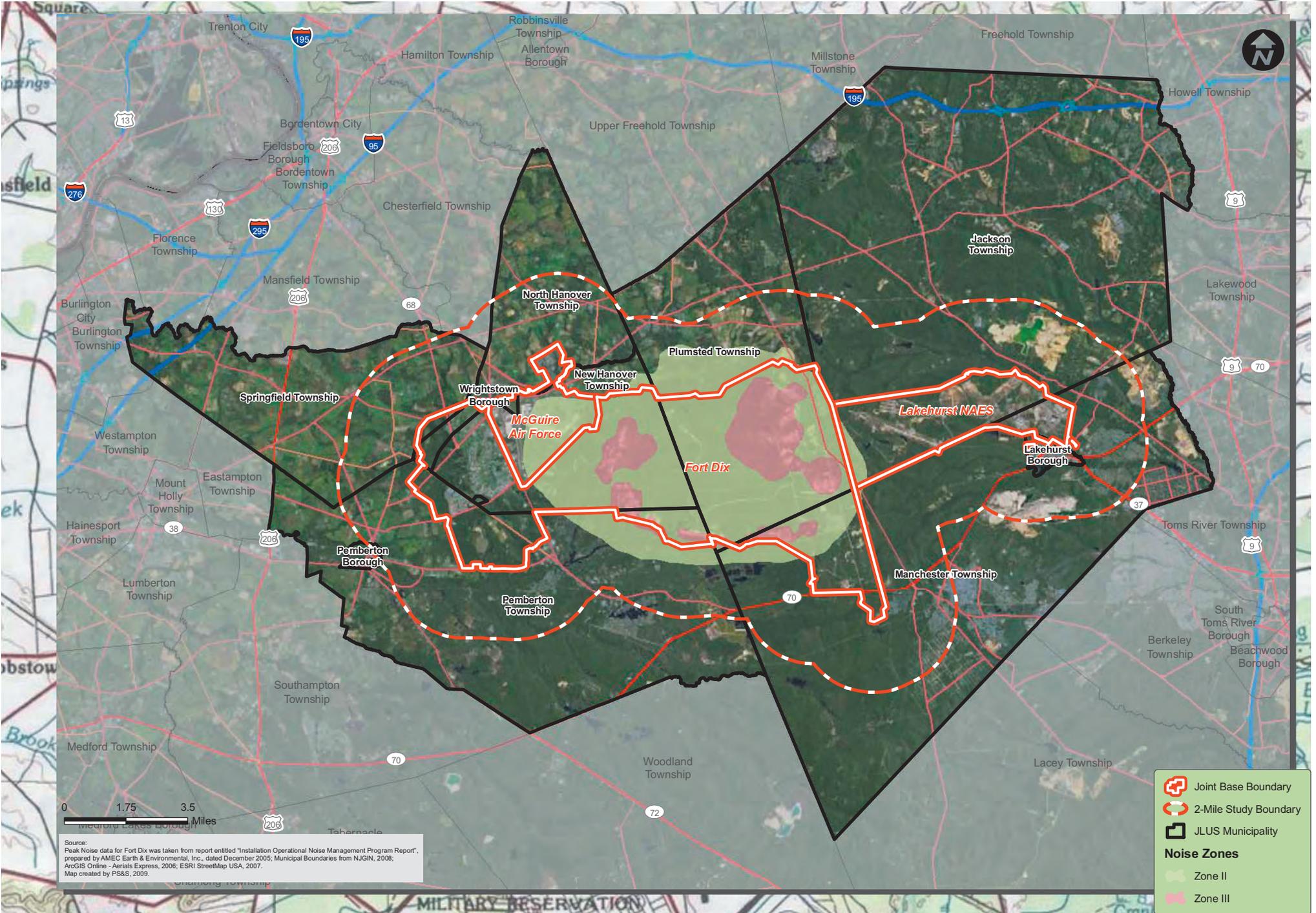
Fort Dix Small Arms ADNL The projected ADNL noise zone contours associated with small arms munitions use at Fort Dix are depicted in Figure 6.7. Off-base impacts associated with Noise Zone II small arms ADNL sound levels are similar to the pre-BRAC condition and include Manchester and Pemberton Townships to the south. As shown in Figure 6.7, Noise Zone III ADNL noise levels associated with small arms munitions use at Fort Dix are mostly contained on base lands and range areas within the boundaries of Fort Dix, and generally do not pose compatibility issues with surrounding civilian uses. However, Noise Zones II and III associated with Fort Dix small arms operations expand further into Pemberton and Manchester townships. The areas of incompatible land use associated with small arms munitions operations at Fort Dix are located outside the southern sections of the base boundary in Pemberton and Manchester townships. Within Pemberton Township, Noise Zone II (65 to 75 ADNL) encroaches on areas zoned High-Density Single Family Residential. The noise produced is primarily associated with munitions ranges. Noise Zone II and III are present in the northwestern section of Manchester Township, within the Brendan T. Byrne State Forest. This area is zoned as Pinelands Preservation Area (PPA).

As with the pre-BRAC condition, the LUPZ contours extend slightly further into Manchester and Pemberton Townships to the south. However, the noise environment has not changed significantly and any existing land uses would experience a similar sound environment.

Fort Dix Large Arms CDNL The CDNL noise zone contours associated with large arms munitions use at Fort Dix are depicted in Figure 6.7. As shown in this Figure, Noise Zone III CDNL noise levels associated with large arms munitions use at Fort Dix are mostly contained on range areas within the boundaries of Fort Dix and, therefore, generally do not pose compatibility issues with surrounding civilian uses. However, there are off-base impacts in Manchester Township, at the very southern end of the base, associated with noise levels in Noise Zone III that show a slight increase from the baseline condition.

Noise Zone II CDNL noise levels associated with large arms munitions use at Fort Dix show an increase compared to the pre-BRAC condition. Off-base impacts associated with Noise Zone II large arms CDNL sound levels include portions of Manchester Township to the south and east of the installation and Plumsted Township to the north. While Noise Zone II contours do encroach on Plumsted Township, this section of the township is zoned rural agricultural and rural development.

Figure 6.6 - Projected Noise Conditions: Small Arms Peak (No Aviation)

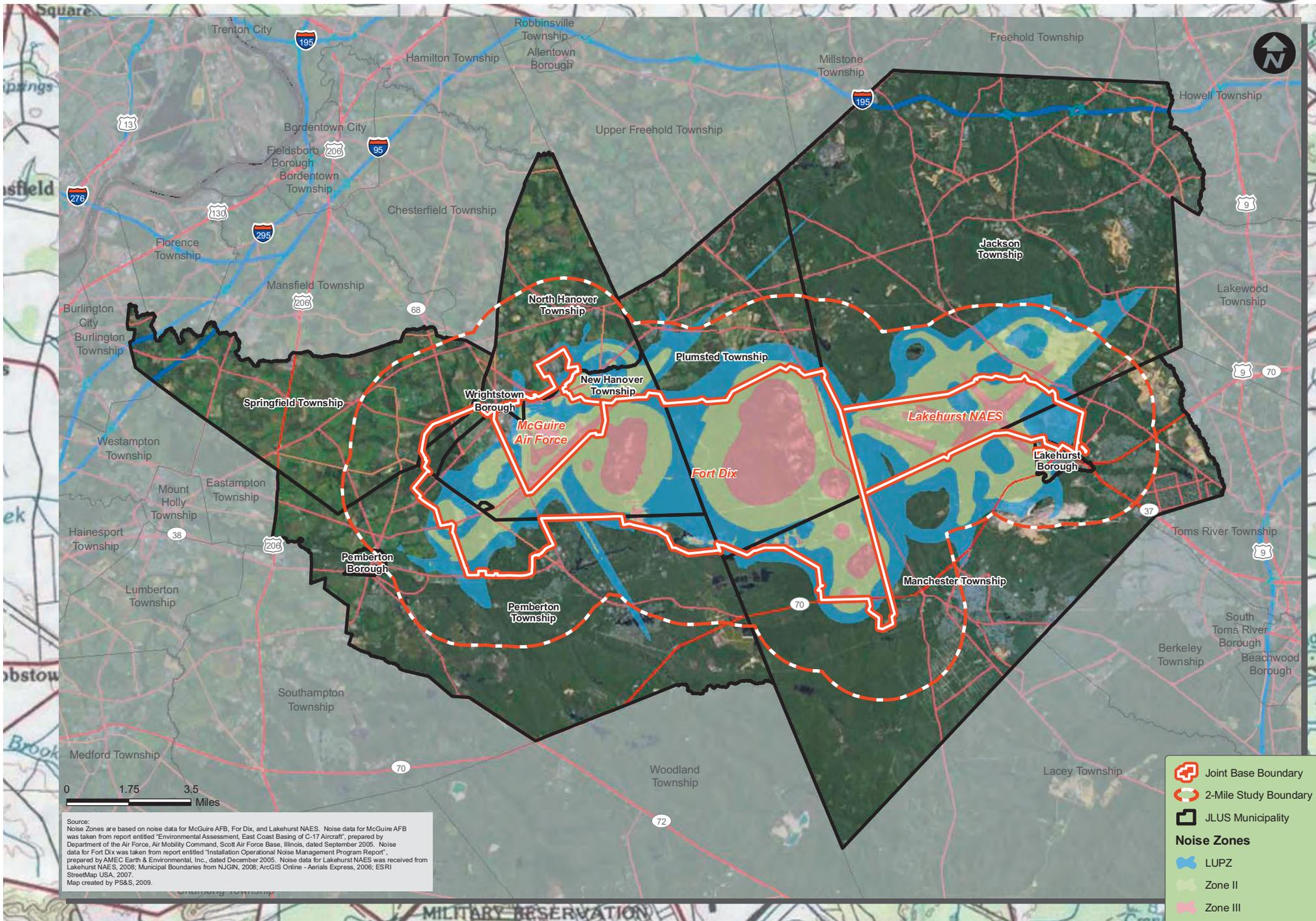


Source:
 Peak Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Legend

- Joint Base Boundary
- 2-Mile Study Boundary
- JLUS Municipality
- Noise Zones**
- Zone II
- Zone III

Figure 6.7 - Projected Noise Conditions: Small Arms ADNL, Large Arms CDNL, and Aviation



The LUPZ shows a large increase compared to the baseline condition and extends beyond the installation boundary affecting Pemberton Township to the south, Plumsted and New Hanover Townships to the north, and further into Manchester Township to the south and east. Both Noise Zone II and the LUPZ extend into McGuire AFB to the west and NAES Lakehurst to the east.

Aircraft Noise

Fort Dix Aircraft Operations Fixed-wing noise levels associated with the Fort Dix Aviation Ramp have been captured in McGuire AFB's AICUZ Study. Projected 2008 noise levels generated by rotary-wing aircraft activity within Fort Dix Airspace do not exceed 65 DNMR (a monthly DNL) beyond Fort Dix boundaries according to the 2005 Fort Dix IONMP.

McGuire AFB Aircraft Noise (ADNL Noise Contours) The BRAC Commission approved specific recommendations for McGuire AFB. As previously discussed, the Commission approved the closure of Willow Grove NASJRB and the realignment of Cambria Regional Airport and relocation of all Navy and Marine Corps squadrons, their aircraft and necessary personnel, equipment and support to McGuire AFB. (See Section 5 for more detail.)

Pre-BRAC noise contours were obtained from the 2005 Department of the Air Force, Air Mobility Command, Environmental Assessment East Coast Basing of C-17 Aircraft. The 2008 projected noise contours were provided by military personnel from a preliminary noise dataset "McGuire AFB NJ 2008 AICUZ Update."

Figure 6.7 shows the projected conditions (post-2008) ADNL noise contours. As shown in this figure, Noise Zone III ADNL associated with aircraft are mostly contained on the base. However, noise levels in the range of 65 to 80 ADNL (Noise Zone III) that are associated with aircraft operations encroach on Fort Dix property.

Noise levels associated with Noise Zone II is mainly contained within the boundaries of McGuire AFB and Fort Dix military bases. The largest increase in acreage consists of McGuire AFB property. Due to the decrease in airfield operations associated with runway 18/36 (aligned NNW to SSE) the off-base impacts are significantly reduced in Wrightstown Borough from the baseline condition and include a small section of Wrightstown Borough (directly adjacent to the Fort Dix).

Off-base impacts associated with Noise Zone II ADNL sound levels (beyond the boundaries of the Joint Base) increase to the northeast and southwest into New Hanover and Plumsted Townships (to the northeast) and Pemberton Township (to the southwest). The majority of the area beyond the Joint Base boundary within Noise Zone II is in undeveloped agricultural and forested areas. However, within Pemberton Township, Noise Zone II (65 to 75 ADNL) encroaches on areas zoned low, medium and high-density residential.

The LUPZ extends beyond the installation boundary affecting Pemberton Township to the south, and Plumsted and New Hanover Townships to the north. Both Noise Zone II and the LUPZ extend into Fort Dix.

NAES Lakehurst Aircraft Noise (ADNL Noise Contours) Future operations at NAES Lakehurst are dramatically changing in the near term. New and expanded operations are increasing aviation-related operations, both during the day and nighttime hours. Additionally, expansions of other facilities and operations near the flight-line will provide an enhanced presence of aviation research and maintenance functions.

Air operations have changed dramatically, primarily due to increases in C-17 and helicopter operations. This analysis is based on the modeling of predicted impacts at the time of the referenced studies; however, specific operational impacts are still unknown. The completion of a Joint Base AICUZ, planned for 2011, will help quantify and specify impacts.

The post-2008 noise contours were obtained from the 2005 Department of the Air Force Air Mobility Command Environmental Assessment East Coast Basing of C-17 Aircraft. The projected condition (post-2008) ADNL noise contours is shown in Figure 6.7. As a result of the increased operations, the noise contours increase in all directions from the airfield.

As shown in Figure 6.7, Noise Zone III ADNL noise levels associated with aircraft are mostly contained on the base, however, noise levels associated with aircraft operations that are in the range of 65 to 80 ADNL (Noise Zone III) extend off-base into Jackson and Manchester Townships. The area zoned residential near the end of the primary runway (Runway 15/33) lie in what is modeled to be a high noise zone with an average range of 75 to 85 dB.

Section 6 - Technical Information – Noise and Safety Zones

As a result of the increased operations, the noise contours associated with Noise Zone II increase in all directions from the airfield. Noise levels associated with Noise Zone II are mostly off-base. Off-base impacts associated with Noise Zone II ADNL sound levels have incompatibilities in Jackson and Manchester Townships and Lakehurst Borough. A large portion of Noise Zone II extends into residentially-zoned land in Jackson Township. Aircraft flying at low elevations in approach to McGuire AFB have generated complaints from some Jackson residents.

The LUPZ extends beyond the installation boundary affecting Jackson Township to the north and Manchester Township and Lakehurst Borough to the south. Overall, the NAES Lakehurst Landing Zone Alternative noise contours increase in all directions from the airfield (see Figure 6.7). The shift in noise contours could result in long-term adverse effects, depending on future land use compatibility. The areas in which the noise exposure extends the farthest from the airfield are to the north, northeast, south, and southwest of NAES. The exposed area to the north includes the Colliers Mills Wildlife Management Area, while the area south and southwest of NAES would primarily encompass the Manchester Fish and Wildlife Management Area. Except for a strip of land along Highway 571, most of the additionally exposed area northeast of NAES across the highway is industrial land that includes activities such as sand and gravel mining.

The apparent increase in the area covered by noise contours is from increased operations. Operations have not only increased, but the increase of fixed-wing operations has increased from 20% of total operations to 50% of total operations. In addition, fixed-wing operations have changed from a few C12 and C130 aircraft along with turbo-props to the addition of C-17 aircraft and an assault landing zone.

Vehicle Noise The additional full-time personnel and reservists as defined by the BRAC Commission will cause an increase in vehicle traffic. However, the reservists would typically drive to the base on only one weekend per month. In addition, future vehicle operations at Fort Dix could include an increase in or introduction of numerous types of off- and on-road vehicles. Given the anticipated increase in range use in the future, it is likely that an increase in vehicles accessing ranges would increase. Although the personnel changes under BRAC would cause an increase in vehicle traffic and as such, an increase in ambient noise levels, this increase is not likely to be significant to the noise environment given the dominance of military aircraft and weapons training in the area.

Joint Base DNL Projected Summary (Acreage, Zoning and Population) The DNL noise contours associated with small arms munitions and aviation use for the 2008 condition at Joint Base McGuire-Dix-Lakehurst are depicted in Figure 6.7. Table 6.4 presents the acreage outside of the Joint Base boundary within each Noise Zone for the projected DNL noise contours associated with small arms, large arms and aviation (McGuire and Lakehurst), categorized by municipality and zoning designation. The total acreage outside of the Joint Base for the post-2008 condition that is within Noise Zone II is approximately 7,801 acres and within Noise Zone III is approximately 232 acres. The total acreage outside of the Joint Base for the projected condition that is within the LUPZ is approximately 15,788 acres. The increase in total acreage from the baseline to the projected condition is an increase of 2,696 acres in Noise Zone II and an increase of 120 acres in Noise Zone III.

The total acreage outside of the Joint Base boundary that is zoned residential and within Noise Zone II increases from 110 acres to 2,283 acres, a 2,173 acre increase over the pre-BRAC condition. The total acreage outside of the Joint Base boundary that is zoned residential and within Noise Zone III increases from 0 acres to 84 acres over the pre-BRAC condition. The greatest increase in area, due to the increased operations, that is within Noise Zones II and III and is zoned residential is within Jackson Township. The total acreage outside of the Joint Base boundary that is zoned residential and falls within the LUPZ is approximately 5,076 acres for the post-2008 condition, an increase of 4,994 acres over the pre BRAC condition. Figure 6.8 shows the projected DNL noise contours for the Joint Base and the zoning classifications for the surrounding municipalities.

The estimated population outside of the Joint Base boundary within each Noise Zone for the projected scenario is presented in Table 6.5. The total population outside of the Joint Base that is within Noise Zones II and III is approximately 2,976 people; approximately 2,941 people within Noise Zone II and approximately 35 people within Noise Zone III. The greatest population that may be affected by noise levels within Noise Zones II and III is in Jackson Township and Lakehurst Borough.

Table 6.4 Land Area and Zoning Exposed to Noise Zones from Projected (2008 DNL) Small Arms, Large Arms, and Aviation Operations at Fort Dix, McGuire, and Lakehurst (Area in Acres)

Municipality	Zoning Categories	LUPZ	Zone II	Zone III	Grand Total
Jackson Township	Conservation, Recreation, and Open Space	14.6			14.6
	Low Density Residential (less than 1 unit per acre)	2,592.5	1,692.4	83.5	4,368.5
	Preservation	2,266.8	1,559.9	70.1	3,896.9
Jackson Township Total		4,874.0	3,2542.4	153.7	8,280
Lakehurst Borough	Business and Commercial	17.0	25.8		42.8
	High Density Residential (more than 4 units per acre)	84.4	82.8		167.2
	Industrial and Utilities	27.9	29.7		57.5
Lakehurst Borough Total		129.2	138.3		267.6
Manchester Township	Business and Commercial	4.0			4.0
	Low Density Residential (less than 1 unit per acre)	522.3	330.8		853.1
	Medium Density Residential (1-4 units per acre)	127.6			127.6
	Preservation	4,289.3	2,131.3	77.1	6,497.7
Manchester Township Total		4,943.2	2,462.1	77.1	7,482.5
New Hanover Township	Agriculture	192.0	502.5	0.4	694.9
	Business and Commercial	19.6	79.6		99.2
	Conservation, Recreation, and Open Space	16.6	13.3		30.0
	Medium Density Residential (1-4 units per acre)	250.0	110.6	0.8	361.5
	Preservation	19.3	85.6		104.9
New Hanover Township Total		497.5	791.7	1.2	1,290.4
North Hanover Township	Agriculture	784.5	229.9		1,014.3
	Business and Commercial	63.4	29.2		92.6
	Industrial and Utilities	53.8	8.7		62.5
	Low Density Residential (less than 1 unit per acre)	29.3			29.3
	Medium Density Residential (1-4 units per acre)	35.1	6.7		41.9
North Hanover Township Total		966.0	274.6		1,240.6
Pemberton Township	Agriculture	482.3	232.9		715.2
	Business and Commercial	11.7			11.7
	Conservation, Recreation, and Open Space	259.4	5.5		265.0
	High Density Residential (more than 4 units per acre)	493.9	39.9		533.9
	Low Density Residential (less than 1 unit per acre)	202.5			202.5
	Medium Density Residential (1-4 units per acre)	349.0	19.1		368.1
Pemberton Township Total		1,798.9	297.5		2096.3
Plumsted Township	Agriculture	1,653.7	429.9		2,083.6
	Business and Commercial	26.1			26.1
	Conservation, Recreation, and Open Space	29.1			29.1
	Low Density Residential (less than 1 unit per acre)	121.9			121.9
	Medium Density Residential (1-4 units per acre)	249.0	2.9		251.9
	Preservation	473.7	149.3		623.0
Plumsted Township Total		2,553.5	582.0		3,135.5
Wrightstown Borough	Business and Commercial	7.9			7.9
	Medium Density Residential (1-4 units per acre)	18.1	2.0		20.1
Wrightstown Borough Total		26.0	2.0		28.0
		LUPZ	Zone II	Zone III	Grand Total
Total Area (acreage) Outside of Joint Base Boundary:		15,788	7,801	232	23,821

Source: Noise Contours and GIS Data

Figure 6.8 - Projected Noise Conditions: Small Arms Peak and ADNL, Large Arms CDNL, and Aviation with Surrounding Zoning

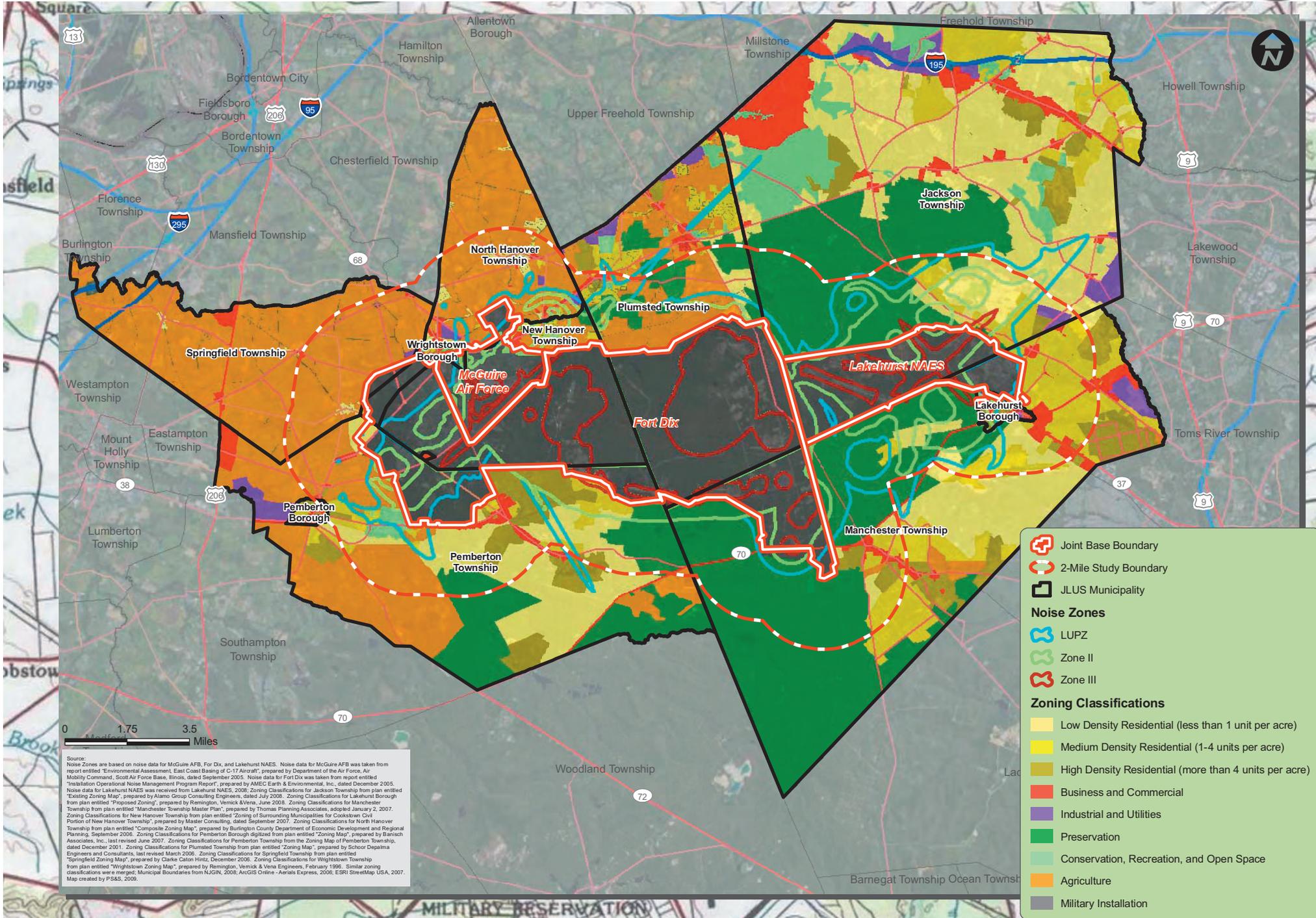


Table 6.5 Estimated Population in Joint Base DNL Noise Zones for Projected Conditions (Outside of Joint Base Boundary)

Municipality	Noise Zones			
	LUPZ population	Zone II population	Zone III population	Pop Total
Jackson Township	1,219	620	29	1,868
Lakehurst Borough	729	792	-	1,521
Manchester Township	331	159	5	495
New Hanover Township	314	418	1	733
North Hanover Township	1,024	375	-	1,399
Pemberton Township	2,408	309	-	2,717
Plumsted Township	1,487	267	-	1,754
Wrightstown Borough	40	1	-	41
Total Population	7,552	2,941	35	10,528

Source: Census 2004 Projected Population by Block Group

The most significant acreage and population increases are associated with the LUPZ. Approximately 7,552 people are located within the LUPZ, an increase of 7,361 people from the baseline (pre-BRAC) condition. It should be noted that there are no incompatible land uses in the LUPZ and people residing in this zone may not perceive any impact. The LUPZ is presented for illustrative purposes as an additional buffer zone for future land use planning.

Noise Compatibility Concerns

Land Use Planning and Compatibility Guidelines The Joint Base noise effects were evaluated to assess compatibility with zoning designations on land surrounding the installation. The following analysis assesses the compatibility of existing zoning around the installation. Incompatibilities discussed below may have existed under the baseline condition, however for planning purposes these incompatible areas are discussed for the projected (post-2008) condition since these areas can be accounted for in future land use planning and zoning decisions.

Compatible land uses can exist next to each other without causing interference or exposing

people to undue safety risks or nuisance. In this JLUS context, military training activities create compatibility issues when the activity occurs in the proximity of following land uses:

- Noise sensitive uses, such as housing, schools, medical facilities or places of worship; and
- Uses that tend to concentrate people (certain higher residential densities, schools, churches, hospitals)

For purposes of evaluating compatibility regarding noise, this JLUS draws guidance from the Federal Interagency Committee on Urban Noise (FICUN) land use guidelines (FICUN 1980). These compatibility guidelines are standards only and do not determine acceptable uses of land within communities. Local governments have the authority to establish permissible land uses and to define the relationship between specific properties and noise (see Appendix 13-5 for a full listing of land use compatibility guidelines).

Projected noise zone contours for the Joint Base and the zoning classifications for the surrounding municipalities are shown in Figure 6.8. This figure presents the collective noise zones from the Peak (refer to Figure 6.6) and DNL (refer to Figure 6.7) noise conditions along with the municipal zoning designations.

As previously mentioned, noise zones provide a useful framework for identifying those off-base areas in which noise exposure may be high enough to generate annoyance among a certain percentage of people and provide general guidance on what proportion of the existing population in that zone might be “highly annoyed” by the noise generated. One key element of the DOD environmental noise policy used in this JLUS study is setting acceptability limits for different kinds of military noise. The noise levels that define each noise zone, for each type of noise exposure (ADNL, CDNL and Peak noise), result in the same percentage of people determined to be “highly annoyed”. The various noise metrics are related through the use of noise zones as presented in Table 6.1 ‘Noise Zone Guidelines’. After the conclusion of this technical section (Section 6.0), the use of noise zones throughout the remainder of the document no longer distinguishes between the various noise metrics, but focuses on incompatibility issues between zoning/land use and noise (based on the FICUN noise zone and land use compatibility guidelines).

All lands in the vicinity of Fort Dix, McGuire and NAES Lakehurst are zoned by their respective municipalities. Jurisdictions responsible for zoning designations, maps, and associated

Section 6 - Technical Information – Noise and Safety Zones

ordinances adjacent to the Joint Base include New Hanover Township, North Hanover Township, Pemberton Township, Springfield Township, and Wrightstown Borough in Burlington County; and Jackson Township, Manchester Township, Lakehurst Borough and Plumsted Township in Ocean County. Because of the extensive land coverage and vast differences among the zoning designations of different jurisdictions, composite or generalized zoning designations for all lands surrounding the military installations were created and are provided in Section 7.

Compatible land uses/zoning relative to levels of noise exposure associated with the military installation are shown in Table 6.6. The guidelines below are based on the A-weighting function, which evaluates noise from transportation (vehicle and aircraft), small arms, and continuous noise sources. However, these compatibility guidelines also apply to CDNL and Peak noise as outlined in Table 6.1 “Noise Zone Guidelines” set forth by FICUN for considering noise in land use planning (see section 6.1.1).

In general, guidance states that housing is compatible with outdoor noise exposure up to DNL 55 dB. The noise range from 55 to 65 dB, which is within Noise Zone I and incorporates the LUPZ, is considered to have low to moderate noise exposure and is generally compatible to residential development. Municipalities may wish to tailor evaluations of future residential development within this noise range given local circumstances. Standards indicate that with exposure between DNL 65 to 75 dB, additional protective measures, such as indoor noise reduction, for residential uses may be warranted. For conditionally compatible residential land uses, guidelines suggest consideration of the following factors:

- A demonstrated community need for residential uses that would not be met if development were prohibited in these zones
- Where the community determines that residential uses are desired, structures should incorporate noise level reduction measures of at least 25 dB (65 to 70 ADNL) and 30 dB (70 to 75 ADNL)
- Noise level reduction criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level transportation sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces

Guidelines deem noise exposure that exceeds DNL 75 dB to be “incompatible” with all residential uses. Many uses, such as manufacturing, retail, government facilities, and agriculture, however, can be suitable even within a relatively high noise setting.

Noise Impact The focus of this discussion is on incompatible land use with the goal of identifying potential land areas/uses to be addressed by the JLUS team. Incompatibilities discussed below may have existed under the baseline condition, however for planning purposes these incompatible areas are discussed for the current condition since these areas can be accounted for in future land use planning and zoning decisions. There are currently over 16,600 acres located within the boundary of the noise zones that are considered compatible land area. Land area that is either compatible with military operations, or outside of the area of potential noise impact and is compatible with development, is discussed in the following land use sections.

Peak Noise Levels Land area and zoning (outside of Joint Base Boundary) exposed to noise from projected (2008) peak small arms munitions use at Fort Dix are shown in Table 6.2. Areas that are zoned residential and are considered incompatible for the 2008 condition with peak small arms munitions use include:

- New Hanover Township: 79 acres in Noise Zone II
- Pemberton Township: 1,444 acres in Noise Zone II and 94 acres in Noise Zone III
- Plumsted Township: 30 acres in Noise Zone II

New Hanover, Pemberton and Plumsted townships all have areas zoned residential that fall within Noise Zone II (87 to 104 dBP) associated with peak noise levels. Typically, residential areas within Noise Zone II are considered incompatible unless noise level reduction methods have been incorporated during construction or would be incorporated in the future. Further, within Pemberton Township, Noise Zone III (> 104 dBP) levels encroach on high-density single family residential areas. Residential areas are considered incompatible with Noise Zone III. Within Manchester Township, Noise Zone III exists within Brendan T. Byrne State Forest. In Jackson Township, a small area of Noise Zone II encroaches on Collier Mills Wildlife Management Area.

DNL Noise Levels Land area and zoning (outside of Joint Base Boundary) exposed to noise zones from projected (2008) DNL small arms, large arms and aviation operations at Joint Base McGuire-Dix-Lakehurst are shown in Table 6.4. Areas that are zoned residential and are considered incompatible for the 2008 condition include:

- Jackson Township: 1,692 acres in Noise Zone II and 84 acres in Noise Zone III (2,593 acres in the LUPZ)
- Lakehurst Borough: 83 acres in Noise Zone II (84 acres in the LUPZ)
- Manchester Township: 331 acres in Noise Zone II (650 acres in the LUPZ)
- New Hanover Township: 111 acres in Noise Zone II and 1 acre in Noise Zone III (250 acres in the LUPZ)
- North Hanover Township: 6.7 acres in Noise Zone II (64 acres in the LUPZ)
- Pemberton Township: 59 acres in Noise Zone II (1,046 acres in the LUPZ)
- Plumsted Township: 3 acres in Noise Zone II (371 acres in the LUPZ)
- Wrightstown Borough: 2 acres in Noise Zone II (18 acres in the LUPZ)

Noise Zone II is normally incompatible with residential areas but could be considered compatible if noise level reduction methods had been incorporated during construction or would be incorporated in the future. Residential areas are considered incompatible with Noise Zone III. Any proposed future development should consider noise levels in the LUPZ. It is expected that as more people move to the area who are unfamiliar with current Joint Base operations, complaints will continue or intensify. Therefore, development proposed in these areas should be evaluated with regard to the potential noise levels.

Any residential buildings on land zoned as agriculture, forest, preservation or military and within Noise Zone II should be required to meet a noise level reduction standard of 25 to 30 dBA. Agriculture, conservation, recreation and open space, and park land are acceptable within the LUPZ and Noise Zone II. Applicable guidelines for planned conservation, recreation or open space and park land within the LUPZ and Noise Zone II should be evaluated on a case specific basis and be evaluated based on the goals of the municipality. Recreational and park areas are incompatible within Noise Zone III.

Areas that are zoned for business and commercial, that should be assessed for compatibility within the Noise Zones, include:

- Lakehurst Borough: 26 acres in Noise Zone II
- New Hanover Township: 80 acres in Noise Zone II
- North Hanover Township: 29 acres in Noise Zone II

Lakehurst Borough, New Hanover, and North Hanover Townships all have areas zoned business and commercial that should be assessed for compatibility within Noise Zone II. Areas zoned business and commercial are normally considered acceptable within areas of 70 dBA or less. However, areas zoned as business and commercial in Noise Zone II that have sound levels greater than 70 dBA are recommended to incorporate noise level reduction methods during any future construction.

Conclusions Zoning patterns around the installation in Ocean County include zones of existing and potential new residential development in areas that are subject to high noise levels from Joint Base operations (see Figure 6.8). The Townships of Jackson and Manchester have areas zoned for residential use, including medium density residential, near noise impacts associated with NAES Lakehurst. The western part of Lakehurst Borough is subject to potentially elevated noise levels and is zoned for business and commercial activity and high density residential; these are potentially “non-compatible” zoning designations in this area.

Zoning patterns around the installation in Burlington County have zoned land mainly for agricultural purposes, requiring a relatively large tract size for each residence resulting in lower residential density. A few residentially-zoned tracts are located in New Hanover and North Hanover Townships in areas that are near noise zones associated with the Joint Base. The exception is the Browns Mills area of Pemberton Township, which has areas zoned for high density residential (according to JLUS composite zoning) and commercial activity that are within Noise Zone II. Land use and zoning decisions within Noise Zones II and III should be assessed for compatibility.

Section 6 - Technical Information – Noise and Safety Zones

Table 6.6 Noise Zone and Land Use Compatibility Guidelines, A-Weighting

	FICUN	NZ I	NZ II		NZ III	
	< 55 DB	55 to 65 DB	65 to 70 DB	70 to 75 DB	75 to 80 DB	80 to 85 DB
Households	Y	C	C	C	N	N
Manufacturing	Y	Y	Y	C	C	C
Retail – General	Y	Y	Y	C	C	N
Restaurants	Y	Y	Y	C	C	N
Personal Services	Y	Y	Y	C	C	N
Hospitals	Y	C	C	C	N	N
Government	Y	C	C	C	C	N
Education	Y	C	C	C	N	N
Public Assembly	Y	Y	Y	N	N	N
Parks	Y	C	C	C	N	N
Agriculture	Y	Y	C	C	C	C

Notes:

Table is a summary of the Guidelines for considering noise in Land Use Planning and Control (FICUN, 1980).

See Appendix for complete Table and suggested compatibility restrictions.

Y = Compatible use

C = Conditionally compatible use (see Appendix 13.5)

N = Non-compatible use

Air Safety

This section presents information on the use of Air Safety Zones. Please see Appendix 13.4 and 13.6 for more detail on accident potential and safety zones, and studies used to identify potential off-base accident impact areas associated with military operations. This information provides criteria to identify and assess the compatibility of land use, zoning and air safety of surrounding communities with operations associated with the primary missions of the Joint Base.

Air Safety Zones (Accident Potential Zone (APZ)) Defined Areas around military airfields are exposed to the possibility of aircraft accidents. Military flights at McGuire AFB and NAES Lakehurst are primarily for training purposes but even with rigorous maintenance of aircraft and training of aircrews the potential for accidents exists.

The DoD approaches aircraft safety issues from a land use planning perspective. Designation of safety zones around airfields and restriction of incompatible land uses can reduce the potential for public exposure to aircraft safety hazards.

The DoD has determined that the areas immediately beyond the ends of runways along the approach and departure flight paths have significant potential for impacts associated with aircraft accidents. The DoD has developed three zones that have relative potential for aircraft related accidents. The accident potential criteria used to define these Safety Zones are based on statistical analyses of past military aircraft accidents. These zones are used for planning land use and zoning to foster compatibility and prevent conflicts with sensitive land uses, such as housing, schools, and medical facilities etc. The air safety and compatibility guidelines are presented in Table 6.7 and are presented with greater detail in Appendix 13.6.

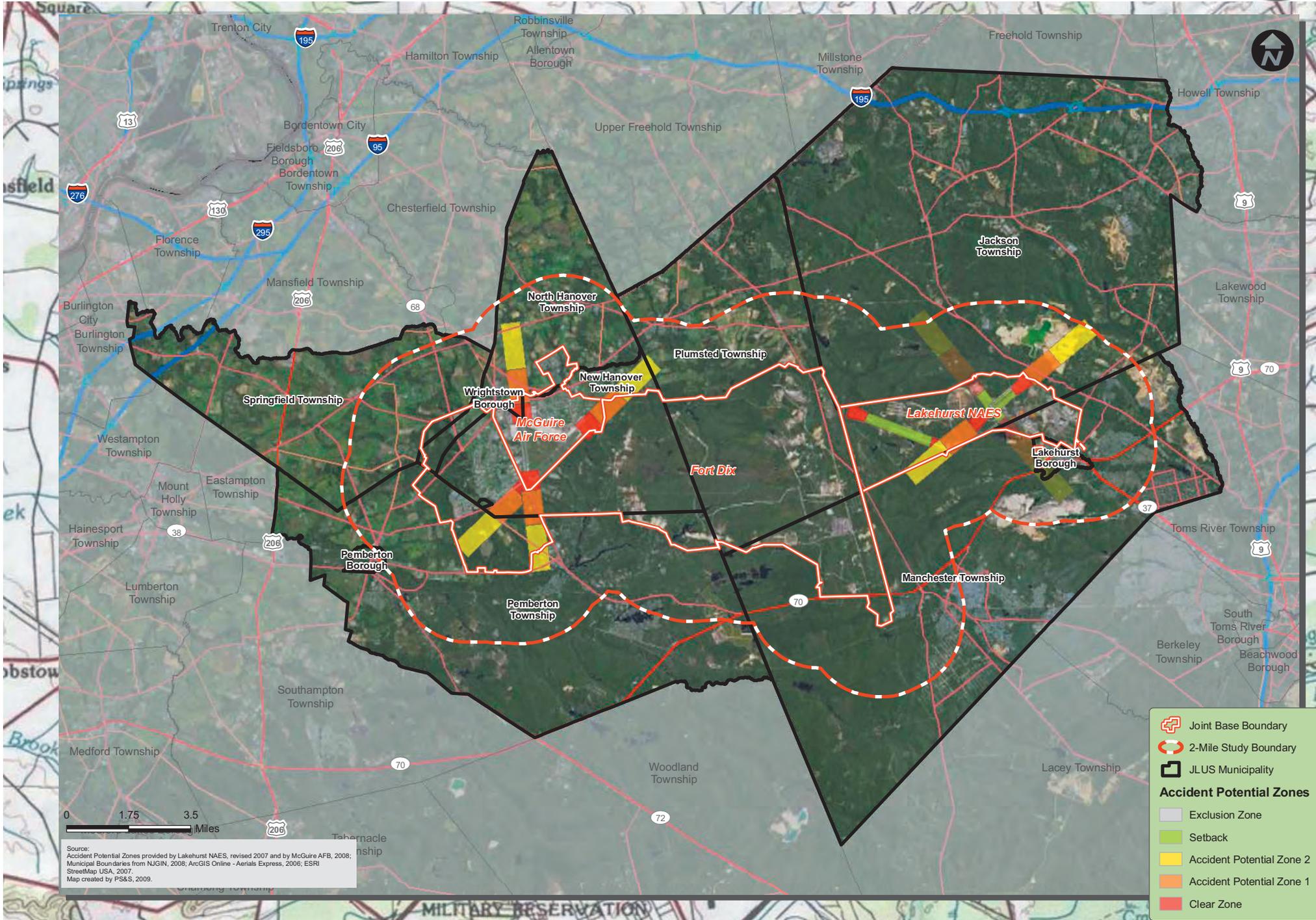
Three planning zones (CZ, APZ 1, and APZ 2) have been established that are related to runway configuration and aircraft missions. These three zones are described below.

CZ - Clear Zone - These zones are the areas closest to the ends of the runway, which are considered to have the highest potential for accidents (approximately 27% of the total accidents studied occurred in this zone). Runways typically have two CZs that start at each end of the runway and extend outward along the runway centerline 3,000 feet with a width of 3,000 feet. The DOD has a general policy of acquiring property rights through purchase or easement in CZs to prevent development in these areas; because of the relatively high aircraft accident potential for CZs.

APZ 1 - Accident Potential Zone 1 – These zones are areas beyond the CZs that have significant though reduced potential for aircraft related accidents (10% of the total accidents studied occurred in this zone). APZ 1 areas extend outward from the CZs an additional 5,000 feet along the runway centerline with a width of 3,000 feet.

APZ 2 - Accident Potential Zone 2 - These zones extend beyond APZ 1 areas and have lesser, but still significant potential for aircraft related accidents (5% of the accidents studied occurred in this zone). APZ 2 areas extend from the outer end of each APZ 1 an additional 7,000 feet along the runway centerline with a width of 3,000 feet.

Figure 6.9 - Accident Potential Zones



Section 6 - Technical Information – Noise and Safety Zones

Overall these safety zones make up an area that extends outward from each end of the runway, along the runway centerline, approximately 2.8 miles with a width of 3,000 feet. The aircraft accident potential in APZs 1 and 2 is much less than that of CZs and usually does not warrant land acquisition by the DoD. Instead, land use planning and controls are strongly encouraged in these areas to reduce exposure of the public to potential aircraft accidents. Clear Zones (CZs) and Accident Potential Zones (APZs) for Joint Base (McGuire and Lakehurst) runways are shown on Figure 6.9.

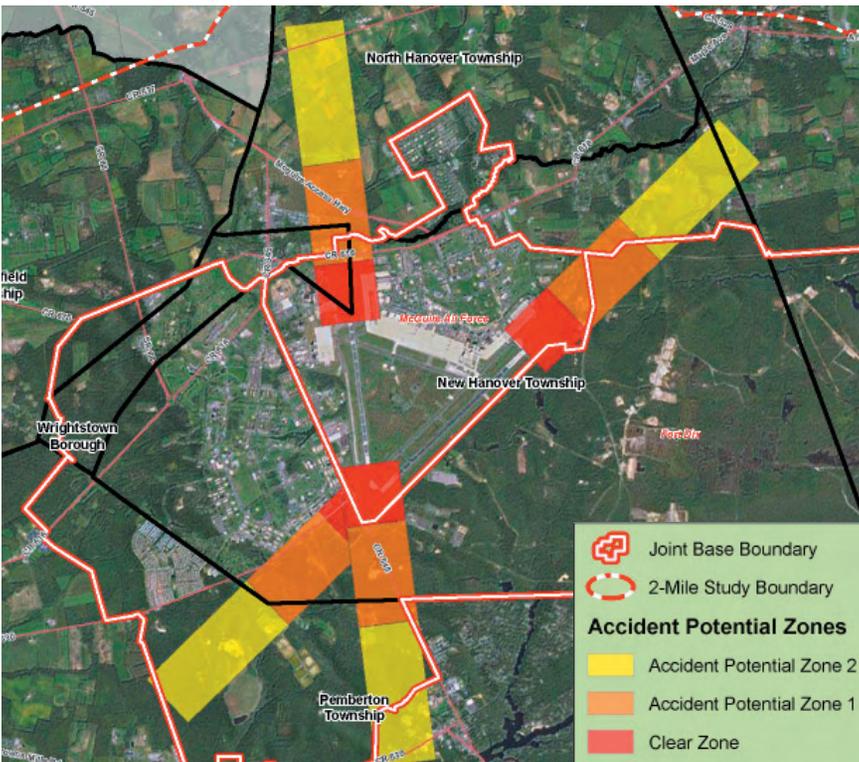
McGuire Air Safety Zones

The CZs and APZs for McGuire runways are shown on Figures 6.10.

The following runways are located at McGuire:

- Runway 06/24 (southwest-northeast)
- Runway 18/36 (north-south)

Figure 6.10 Accident Potential Zones for McGuire Runways (Southern End)



Areas extending beyond the base boundaries are related to aircraft departure (taking off) and approach (landing). The CZ and APZs for McGuire Runway 06/24 and 18/36 are shown on Figure 6.11 for southern runway ends and Figure 6.12 for northern runway ends. The CZs are contained within the boundaries of the base for both runway 06/24 and runway 18/36.

APZ 1 areas at the southern ends of the runways are primarily within the base boundaries with the exception of a very small area of APZ 1 for the southern end of runway 18/36 which is outside the base boundaries. The APZ 1 area at the northern end of runway 06/24 is primarily beyond the base boundary with a small area within the base boundaries. The APZ 1 area at the northern end of runway 18/36 is primarily within the base boundary with a small area beyond the base boundaries.

Figure 6.11 Accident Potential Zones for McGuire Runways 06/24 and 18/36 (Southern End)

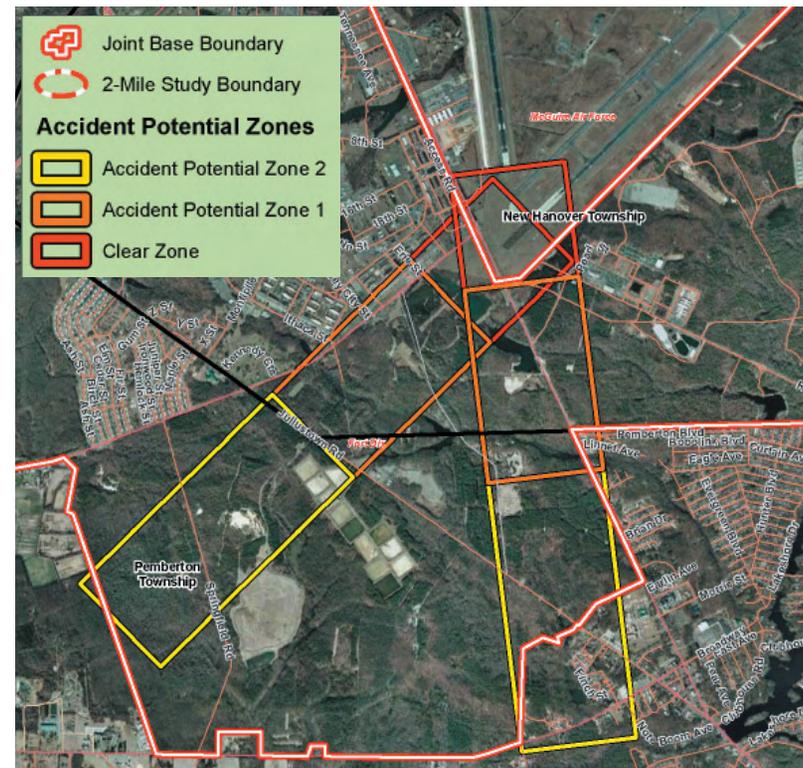
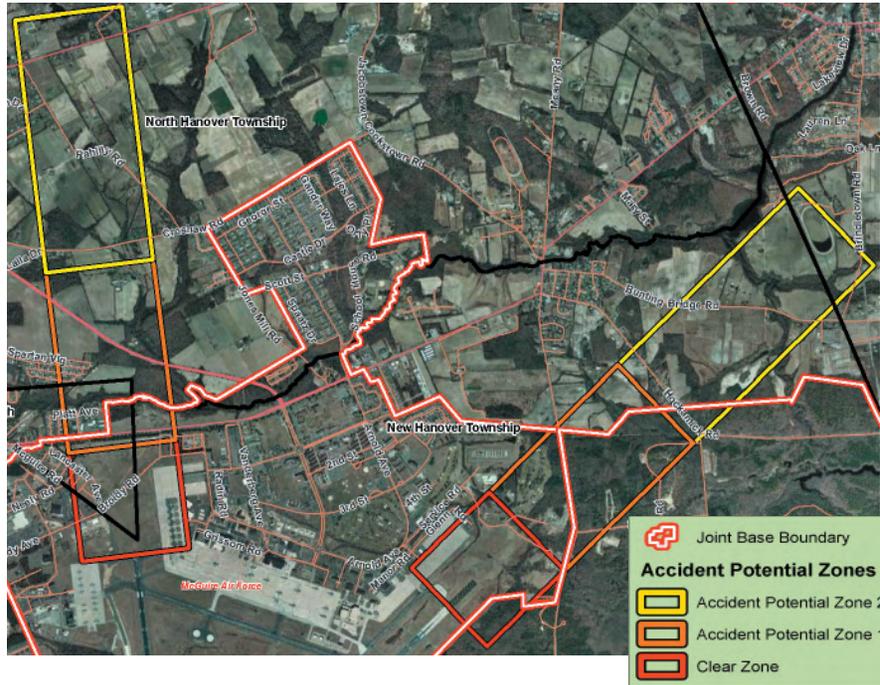


Figure 6.12 Accident Potential Zones for McGuire Runways 06/24 and 18/36 (Northern End)



APZ 2 areas at the northern ends of the runways are primarily off-base with the exception of a very small area of APZ 2 for runway 18/36. The APZ 2 area at the southern end of the runway 06/24 is almost completely on the base. A major portion of the APZ 2 area at the southern end of the runway 18/36 is on the base with a large area extending off-base.

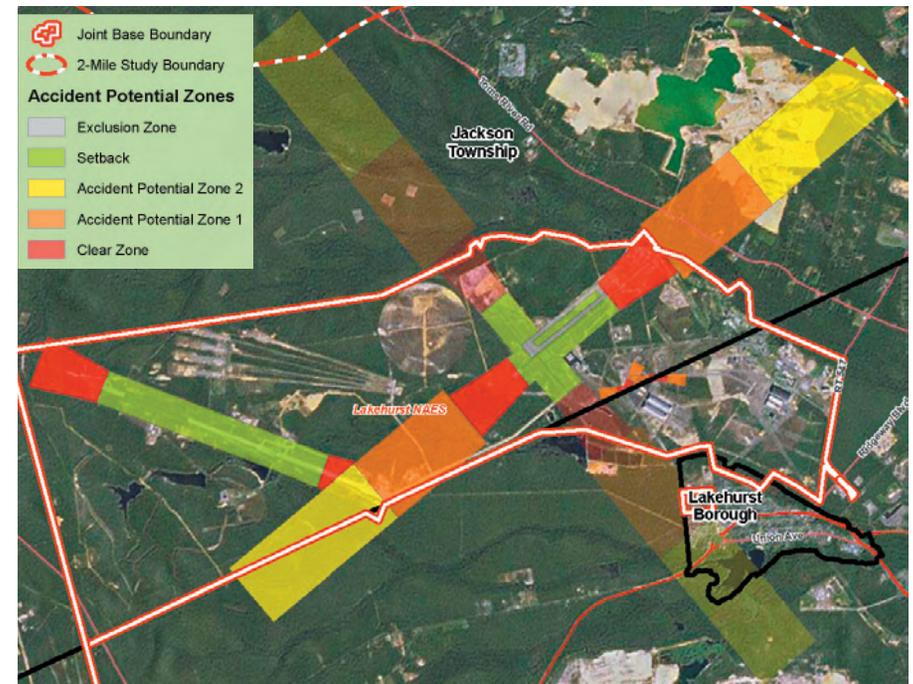
NAES Lakehurst Safety Zones

The CZs and APZs for NAES Lakehurst runways are shown on Figures 6.13

The following runways are located at NAES Lakehurst:

- Runway 06/24 (northeast-southwest)
- Runway 15/33 (northwest-southeast)
- Runway 12/30 (west-east)

Figure 6.13 Accident Potential Zones for Lakehurst Runways



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Figure 6.14 Unrestricted Accident Potential Zones for Lakehurst Runway 15/33 (Southern End)

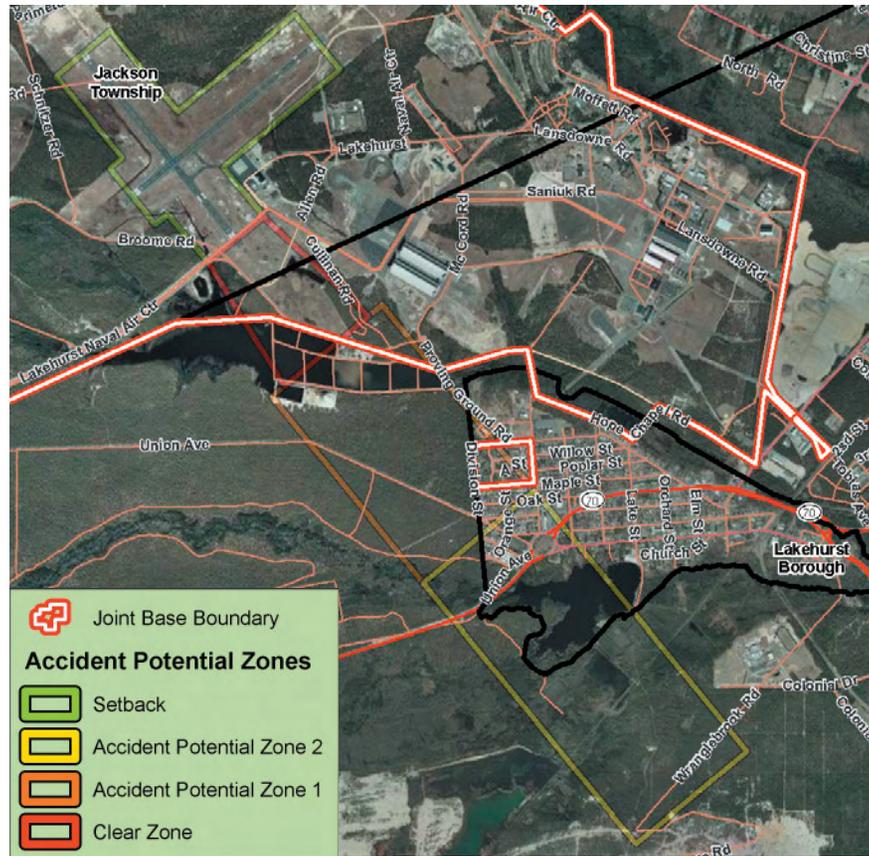
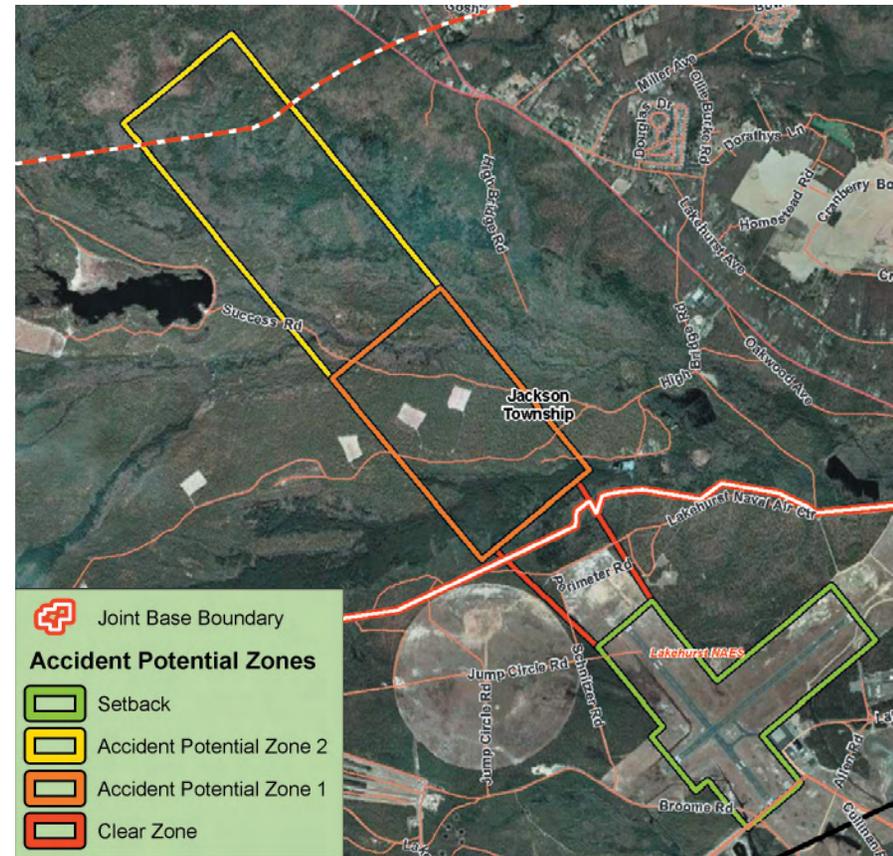


Figure 6.15 Unrestricted Accident Potential Zones for Lakehurst Runway 15/33 (Northern End)



Areas extending beyond the base boundaries are related to aircraft departure (taking off) and approach (landing). The unrestricted APZs for Lakehurst Runway 15/33 are shown on Figures 6.14 and 6.15. While shown in the above figures, data from 2008 confirms that there are no active APZs for this runway. Navy guidance on the designation of APZs says that they are only required on runways from which more than 5,000 flight operations occur a year. It should be noted that the 15/33 runway is not currently utilized and not anticipated to be utilized more than 5,000 flight operations per year. (A flight operation is defined as either a landing or a takeoff.) This APZ is shown for guidance purposes only.

Figure 6.16 Accident Potential Zones for Lakehurst Runway 06/24 (Southern End)

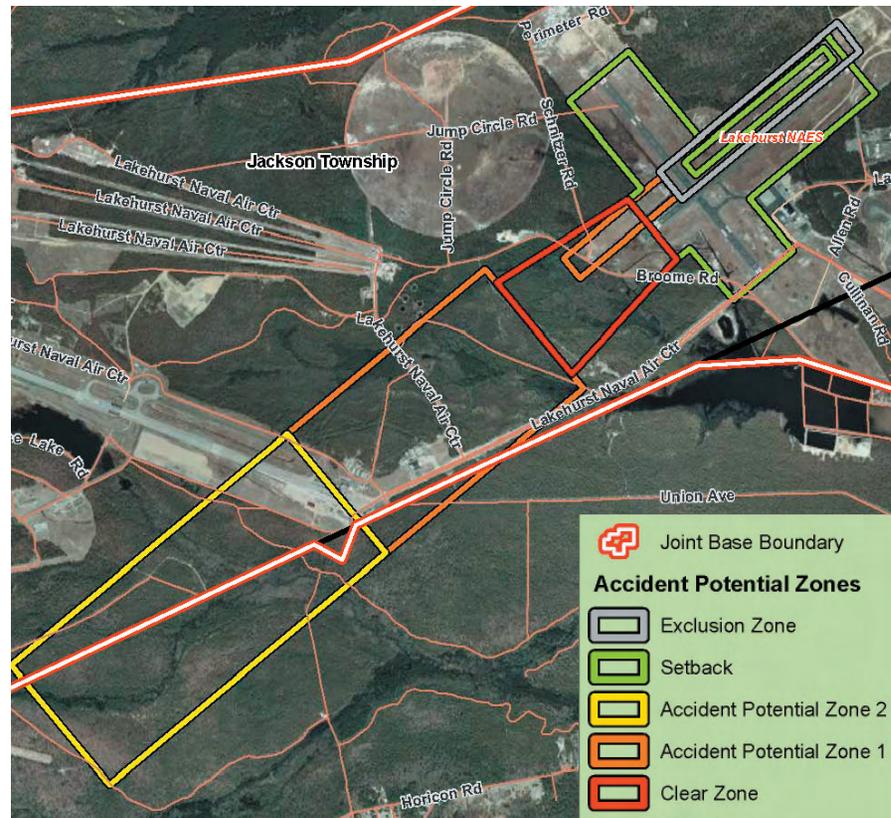
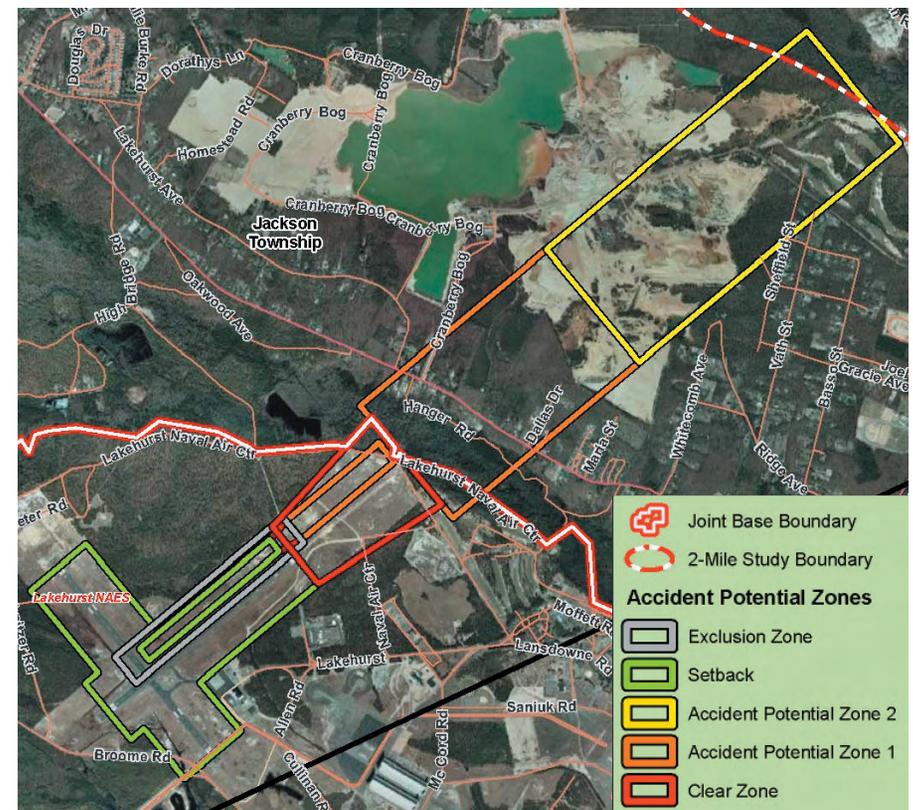


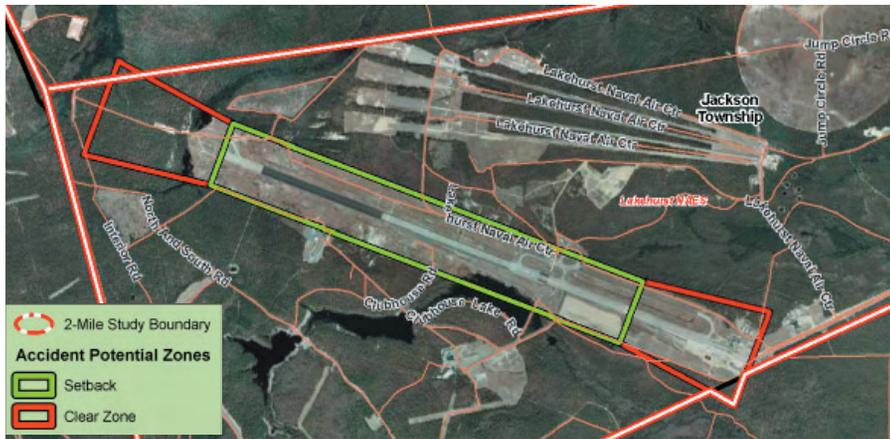
Figure 6.17 Accident Potential Zones for Lakehurst Runway 06/24 (Northern End)



The CZ and APZs for NAES Lakehurst Runway 06/24 are shown on Figures 6.16 and 6.17. Runway 06/24 is the primary runway for NAES Lakehurst. The CZs are contained within the boundaries of the Base. APZ 1 areas mostly extend beyond the base boundaries to the northeast of the runway and a small area at the southwest end. APZ 2 areas for runway 06/24 in the northeast quadrant are entirely off-base and partially extend beyond the 2 mile JLUS study area. APZ 2 areas for runway 06/24 in the southwest quadrant are partly off-base.

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Figure 6.18 Accident Potential Zones for Lakehurst Runway 12/30



Lakehurst Runway 12/30 is shown on Figure 6.18. This runway is used primarily for testing. The CZs for runway 12/30 are primarily contained within the boundaries of the base with a very small area just beyond the base boundaries to the northwest end of the runway. APZ 1 and APZ 2 areas are not shown for Runway 12/30 as this runway is used for testing purposes and is not an operational runway.

Air Safety Compatibility Concerns

Land Use Planning and Compatibility Guidelines The Joint Base air safety zones were evaluated to assess compatibility with zoning designations on land surrounding the installation. The following analysis assesses the compatibility of existing zoning around the installation. Incompatibilities discussed below may have existed under the baseline condition, however for planning purposes these incompatible areas are discussed for the current condition since these areas can be accounted for in future land use planning and zoning decisions.

Compatible land uses can exist next to each other without causing interference or exposing people to undue safety risks or nuisance. In this JLUS context, military training activities create compatibility issues when the activity occurs in the proximity of following land uses:

- Noise sensitive uses, such as housing, schools, medical facilities or places of worship

- Uses that tend to concentrate people (certain higher residential densities, schools, churches, hospitals)

For purposes of evaluating compatibility, the JLUS draws guidance from the DoD guidelines for compatible land use for clear zones and accident potential zones (U.S. Army 1981). These compatibility guidelines are standards only and do not determine acceptable uses of land within communities. Local governments have the authority to establish permissible land uses and to define the relationship between specific properties and air safety contours (see Appendix 13-6 for a full listing of land use compatibility guidelines).

All lands in the vicinity of Fort Dix, McGuire and Lakehurst are zoned by their respective townships and boroughs. Jurisdictions responsible for zoning designations, maps, and associated ordinances adjacent to the Joint Base include New Hanover Township, North Hanover Township, Pemberton Township, Springfield Township, and Wrightstown Borough in Burlington County; and Jackson Township, Manchester Township, Lakehurst Borough and Plumsted Township in Ocean County. Because of the extensive land coverage and vast differences among the zoning designations of different jurisdictions, composite or generalized zoning designations for all lands surrounding the military installations were created and are provided in Section 7.

Accident Potential Zone Impact Compatible land uses/zoning within the various air safety zones around the Joint Base, specifically, McGuire AFB and NAES Lakehurst are presented in Table 6.7. Guidelines strongly discourage any uses within the Clear Zone around airfields due to the risk of an aircraft mishap. However, certain non-residential activities can maintain compatibility with designated Accidental Potential Zones.

These compatibility guidelines are standards only and do not determine acceptable uses of land within communities. Only local governments have the authority to establish permissible land uses and to define the relationship between specific properties and noise or safety contours (see Appendix 13-6 for a full listing of land use compatibility guidelines).

The APZ for the Joint Base and the zoning classifications for the surrounding municipalities is shown in Figure 6.19. Joint Base APZs have not changed from the baseline condition; residential uses presently exist within and adjacent to the APZs. Residential uses and certain business types are typically not recommended as compatible in the APZ, with some exceptions

Table 6.7 Air Safety Compatibility Guidelines

LAND USE	APZ 2	APZ 1	CLEAR ZONE
Households	C	N	N
Industrial	Y	Y	N
Retail	Y	N	N
Personal Services	Y	N	N
Public Services	C	N	N
Outdoor Recreation	C	C	N
Agriculture	Y	Y	C

Table is a summary of the DOD Compatible Land Use Guidelines for Clear Zones and APZ. (U.S. Army, 1981). See Appendix for complete Table and suggested compatibility restrictions.
 Y = Compatible use
 C = Conditionally compatible use (see Appendix 13.6)
 N = Non-compatible use

in APZ Zone 2. The suggested maximum density is one to 2 dwelling units per acre, possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.

APZ 1 for McGuire AFB extends northward into Wrightstown Borough, North Hanover Township and New Hanover Township. The majority of land in this zone is agricultural and forest. Wrightstown Borough and North Hanover Township both have areas zoned residential within APZ 1. APZ 2 extends further into North Hanover and New Hanover Townships. The majority of land in APZ 2 is agricultural, however there are several areas zoned residential.

The APZ 1 for McGuire AFB extends south into a small portion of Pemberton Township zoned high-density residential. The APZ 2 for McGuire AFB extends into the Browns Mills portion of Pemberton Township and encompasses an area zoned medium to high-density residential and commercial and business. Further development in these areas surrounding McGuire AFB should be evaluated with regard to the existing and projected APZ.

The APZ 1 and 2 for NAES Lakehurst extend northwest into an area of Jackson Township zoned as preservation; an area that is compatible with these zones. APZ 1 and 2 for NAES Lakehurst extend northeast into an area of Jackson Township zoned as residential; an area that is suggested as non-compatible. Further development in these APZ zones surrounding NAES Lakehurst should be evaluated with regard to the existing and projected APZ.

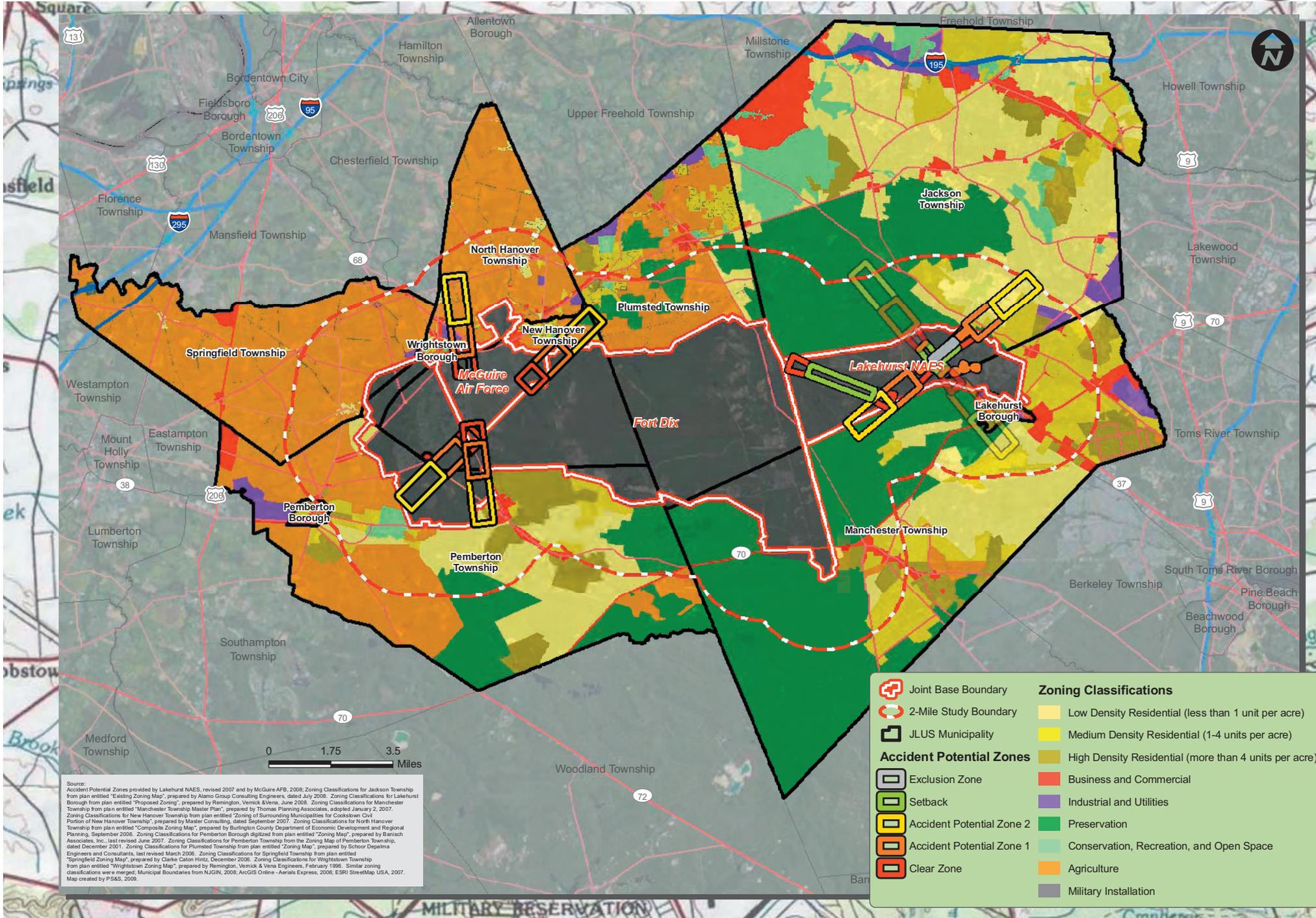
The APZ 1 and 2 for NAES Lakehurst extend southwest into an area of Manchester Township zoned as preservation; an area that is compatible with these zones. NAES Lakehurst APZ 1 extends southeast into Manchester Township and Lakehurst Borough. The area within APZ 1 and Manchester Township is zoned as preservation and is compatible in this APZ zone. The area within Lakehurst Borough is zoned as high-density residential and industrial. A portion of APZ 1 within Lakehurst Borough falls within Joint Base boundaries and is used for Navy housing. APZ 2 extends southeast of Lakehurst NAES further into Lakehurst Borough and Manchester Township. Lakehurst Borough zoning within APZ 2 is mostly high-density residential and business and commercial. The APZ for NAES Lakehurst Runway 15/33 is not currently active, as the number of air operations on the crosswind runway is <5,000 annually. Further development in these APZ zones surrounding NAES Lakehurst should be evaluated with regard to the existing and projected APZ.

The area of the APZ zone within Jackson Township falling within the Pinelands Area is subject to the Pinelands CMP. Both the Pinelands Commission and the township encourage, and in certain cases mandate, cluster development. Increased residential density around the Joint Base, especially in APZ, may result in safety concerns by placing additional residents in areas susceptible to adverse impacts, and may create additional operational challenges and concerns.

Conclusions The Townships of Jackson and Manchester have areas zoned for residential use, including medium density residential, near safety impacts associated with NAES Lakehurst. The western part of Lakehurst Borough is subject to air safety risks should flight patterns increase from Runway 15/33; however this is not currently anticipated.

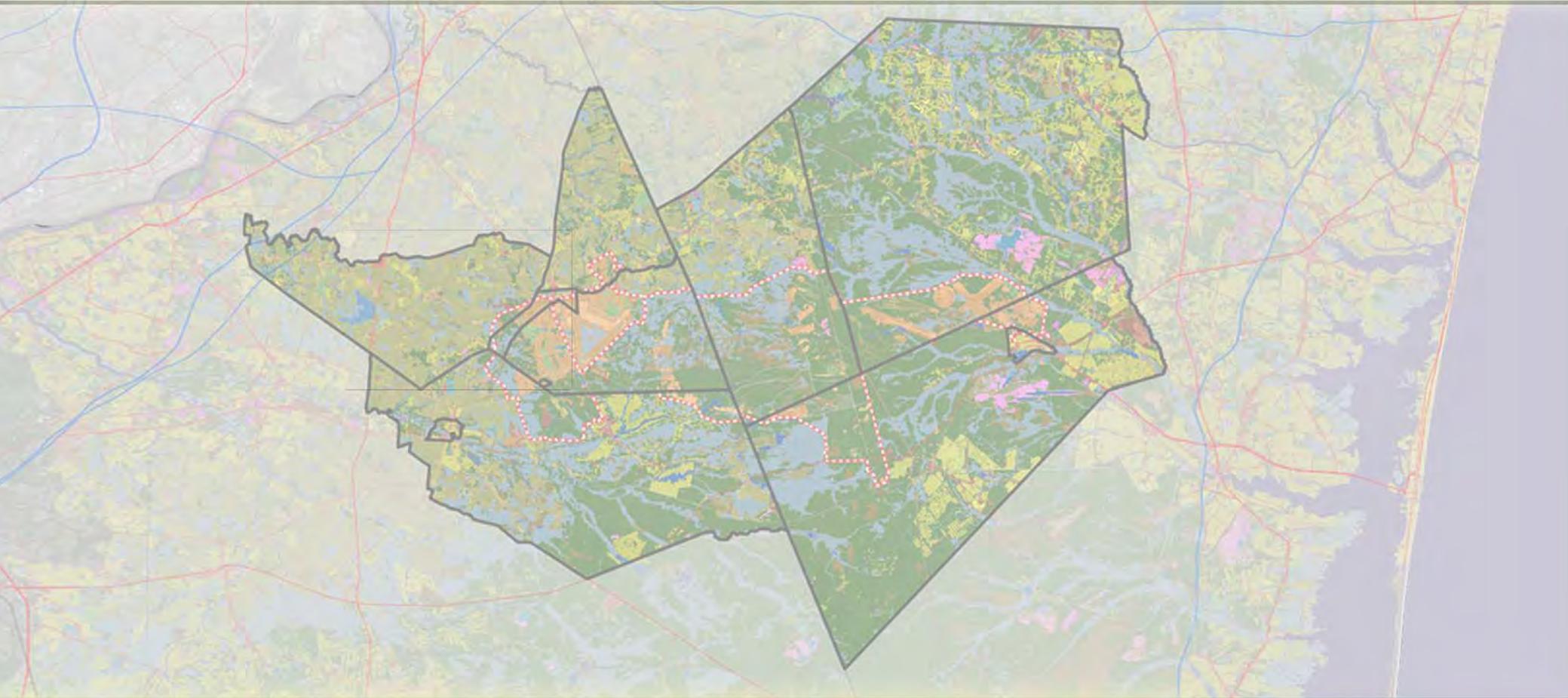
Zoning patterns around the installation in Burlington County have zoned land mainly for agricultural purposes, requiring a relatively large tract size for each residence resulting in lower residential density. A few residentially-zoned tracts are located in New Hanover and North Hanover Townships in areas that are near the safety impacts associated with the Joint Base. The exception is the Browns Mills area of Pemberton Township, which has areas zoned for high density residential (according to JLUS composite zoning) and commercial activity in areas that are near the APZ zone for McGuire AFB. Land use and zoning decisions within the Air Safety Zones should be assessed for compatibility.

Figure 6.19 - Accident Potential Zones with Surrounding Zoning



Source:
 Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008. Zoning Classifications for Jackson Township from plan entitled "Existing Zoning Map", prepared by Alamo Group Consulting Engineers, dated July 2008. Zoning Classifications for Lakehurst Borough from plan entitled "Proposed Zoning", prepared by Remington, Venick & Vena, June 2008. Zoning Classifications for Manchester Township from plan entitled "Manchester Township Master Plan", prepared by Thomas Planning Associates, adopted January 2, 2007. Zoning Classifications for New Hanover Township from plan entitled "Zoning of Surrounding Municipalities for Cookstown Civil Portion of New Hanover Township", prepared by Master Consulting, dated September 2007. Zoning Classifications for North Hanover Township from plan entitled "Composite Zoning Map", prepared by Burlington County Department of Economic Development and Regional Planning, September 2006. Zoning Classifications for Pemberton Borough digitized from plan entitled "Zoning Map", prepared by Bensch Associates, Inc., last revised June 2007. Zoning Classifications for Pemberton Township from the Zoning Map of Pemberton Township, dated December 2007. Zoning Classifications for Plumsted Township from plan entitled "Zoning Map", prepared by Schorr Depalma Engineers and Consultants, last revised March 2006. Zoning Classifications for Springfield Township from plan entitled "Springfield Zoning Map", prepared by Clarke Cation Hintz, December 2006. Zoning Classifications for Wrightstown Township from plan entitled "Wrightstown Zoning Map", prepared by Remington, Venick & Vena Engineers, February 1996. Similar zoning classifications were merged. Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.1 - Build Out Methodology

This community analysis section evaluates the current landscape condition of the JLUS study area and highlights areas that may be developable in the future through a build out analysis. A build out analysis is used to estimate the amount of future development within a specified area under current development regulations. When generating a build-out analysis, a number of different future development scenarios can be prepared utilizing a variety of data sources. Through a series of maps and tables, this build-out analysis will provide an estimate of the total number of houses (development units) and land acreage of non-residential development that is possible on unprotected, buildable lands within the JLUS study area. This information is instrumental for planning future development in desired growth areas and discouraging it in areas of high noise population and accident potential zones.

The focus of the build out analysis concentrated on potential development for residential development with the 2-mile study area. Secondary to the analysis was the potential for non-residential development. Non-residential development is summarized by acreage within zoning district; a summary by buildable square-footage was not calculated. Unlike non-residential uses, residential development has a higher compatibility concern to the military mission.

The JLUS team analyzed a multitude of data sources to determine areas that are subject to future development and areas that are currently built or protected. The build out analysis was executed in four basic stages; inventory undeveloped lands, remove protected lands and identify environmental constraints, research zoning regulations, and calculate development potential.

The first step taken was to define potential development areas; undeveloped lands within the JLUS study area that could be developed in the future. The JLUS team utilized tax assessor ownership information, land use classification data, and aerial imagery to delineate undeveloped lands.

Tax assessor information, provided by Burlington and Ocean counties was used to determine potential development areas. Both classified vacant parcels and classified farmland parcels were used. Parcels that were classified as vacant but were identified as having development

approvals were removed from the potential development areas. Classified farmland parcels were included because farmland often occupies a large land area and the use of these farmlands could change in the future, including the potential for development. Agriculture is the largest industry for many of the municipalities in the JLUS; master plans indicate the intent to support the current rural agricultural townscapes. By including these parcels we see how important the preservation of these farms is to maintain the rural sense of community and also to maintain a compatible land use in proximity to the Joint Base.

Land Use classification data for each town was analyzed to supplement tax assessor information. The JLUS team used the 2002 Land Use/Land Cover datasets available from the NJDEP, Office of Information Resources Management, Bureau of Geographic Information Systems. This data displays the types of land uses that are present in the municipalities. It indicates the existing neighborhoods, retail clusters, and areas of undeveloped lands, and represents the developed condition of the study area as it currently exists.

Lastly, 2006 aerial imagery was analyzed to verify lands that were classified as being undeveloped from tax assessor and land use information. Aerial imagery revealed lands that contained existing structures, were under construction, or within deed restricted open space areas and utility easements and were removed from consideration.

Due to the large extent of the study area, under-utilized parcels, e.g. parcels that have land area that could be subdivided and developed under existing zoning, were not included in the potential development analysis stage.

The second stage of the build out analysis weeded out undeveloped lands that are restricted from future development. After all the undeveloped lands were mapped, it was necessary to research which of these areas are protected under federal, state, and county jurisdictions and delineate areas subject to environmental constraints.

Preserved land data received from Ocean and Burlington Counties, the NJ Department of Agriculture and the NJDEP were mapped to indicate areas of preserved farmland, open space, and parkland within the JLUS study area. Undeveloped lands that were found to be preserved were removed from developable land summaries.

Section 7.1 - Build Out Methodology

Known environmental constraints were researched and mapped to identify where development would be precluded by specific environmental land use regulations. Mapped constraints include 100-year FEMA floodplains, NJDEP freshwater wetlands, steep slopes (greater than 10%) as calculated from the U. S. State Department of Agriculture Soil Survey geographic database of soils, state and federally threatened and endangered species from the NJDEP Division of Fish and Wildlife's Landscape Project dataset, and the Toms River Corridor Wildlife Buffer. Even though environmentally constrained areas were calculated and shown within the build out analysis tables, they were not removed from developable land summaries. These constraints should be used as a guideline for where such resources and features may be located; site-specific resource delineations and studies are required to determine development potential on a site-by-site basis.

During the third stage of the analysis, current zoning regulations for the municipalities in the JLUS study area were researched. Zoning maps and zoning ordinances provide insight with regard to intensity of future development. Permitted intensity of development is based on minimum lot areas and zoning density values. The varying development intensities were researched for each zoning district, recorded into a database, and spatially linked to each unprotected, undeveloped parcel.

Zoning is the set of standards that controls permissible type of land use, the intensity of use, and the location of development. To gather a broad understanding of the zoning within the study area, composite zoning types were used for mapping and development summary tables.

These composite zones are:

- Low Density Residential (less than 1 unit per acre)
- Medium Density Residential (1-4 units per acre)
- High Density Residential (greater than 4 units per acre)
- Business and Commercial
- Industrial and Utilities
- Agriculture
- Conservation, Recreation, and Open Space
- Preservation
- Military Installation

Residential zones are divided into low, medium, and high density. For the purposes of this study, low, medium, and high density categories were based on the overall density of the study area, i.e., high density residential is most often categorized for multi-family dwellings or the residential denseness that one would see in a city landscape. The JLUS study area is much more rural in character and therefore the high density designation is used as a classification for areas where there is higher density residential development allowed, as compared to the overall study area.

The last stage of the build out analysis involved calculating potential residential development units and non-residential land areas. Using a GIS, development units were calculated by summing up all potential development lands and dividing the total acreage by the maximum density set forth by the zoning districts. Non-conforming lots; lots that do not meet the minimum lot area requirements by zone and have a potential development unit of less than 1 were included in the summation of total potential development lands. After all the calculations were made, the data was organized into developable land summary tables. Each municipality contains four tables that evaluate the amount of potential development within composite zoning districts. Potential development areas are categorized between vacant and farm assessed parcels within zoning districts that permit residential and non-residential development.

The build out analysis assumes access to water and wastewater infrastructure. There are many instances of the JLUS study area lacking infrastructure services but the goal of the build out analysis is to anticipate possible land use scenarios. Inclusion of lands that do not have water and wastewater infrastructure in this analysis is predicated on an assumption that development could be possible on these lands. This development analysis assumes that existing zoning takes into consideration the growth capacity based on the existing infrastructure (see Section 9 for further discussion).

The build out analysis is not an absolute determinant; rather it is a planning tool for guiding future municipal growth. The following is a town-by-town summary of the results of the development analysis.

Section 7.2 - Ocean County

Ocean County was the fastest growing county in the state 1950 to 2000.

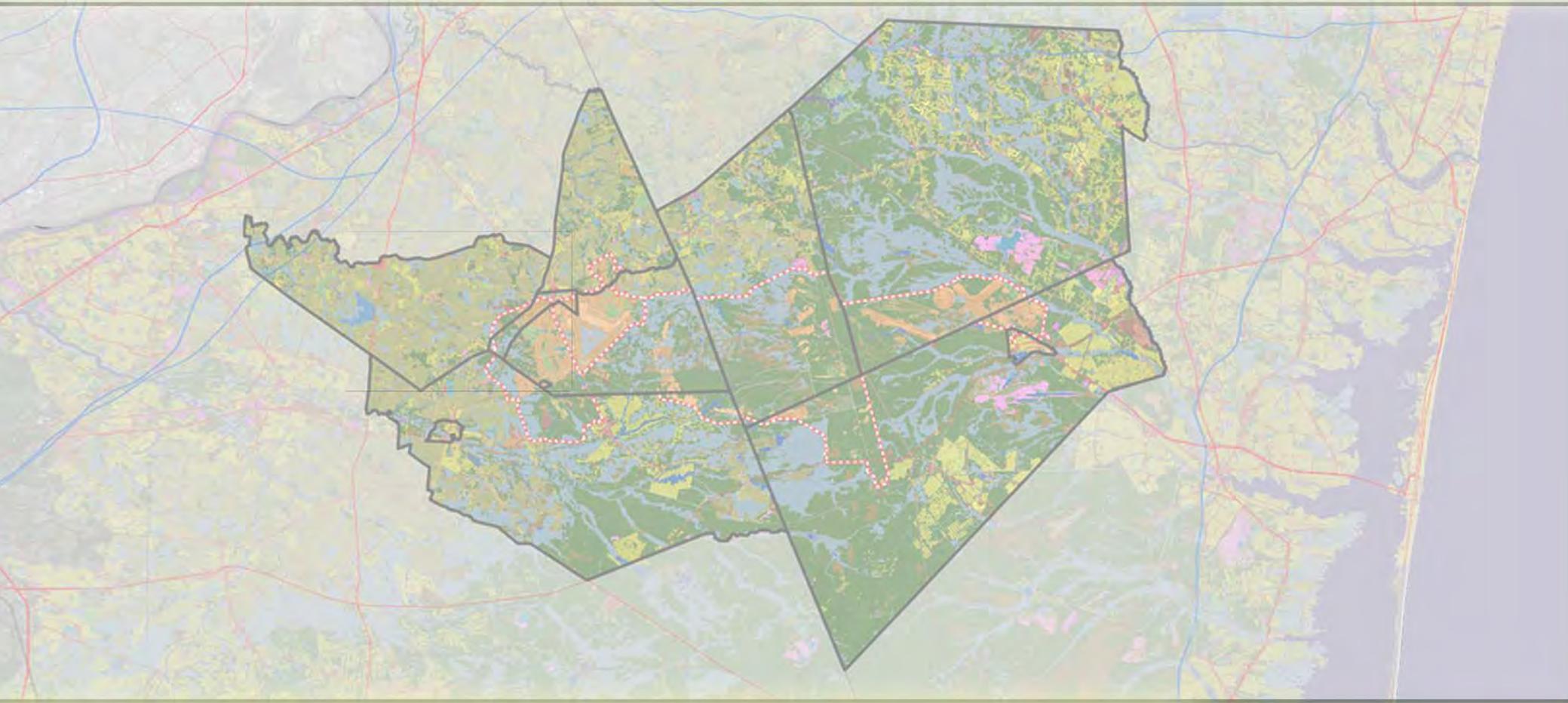
The Ocean County municipalities involved in the JLUS are:

- Jackson Township, located to the North of NAES Lakehurst
- Manchester Township located to the south of NAES Lakehurst
- Lakehurst Borough located to the south of NAES Lakehurst
- Plumsted Township located to the north of Fort Dix

There has historically been a large amount of vacant lands and preservation in the land area around NAES Lakehurst. In recent years, there has been an influx of population moving into the Central Jersey area. Jackson Township's population alone has grown significantly in the last ten years. After the 2005 BRAC determination, it is important to look at the areas surrounding the Bases and to make sure that all parties are aware of potential growth and potential for incompatible use.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.3 - Jackson Township

Existing Land Use

Jackson Township is the largest municipality in Ocean County (100.4 square mile). Almost 50% of Jackson's land area is governed by the Pinelands Commission. The State of New Jersey has preserved 30% of Jackson's lands for wildlife management conservation. The Township has actively implemented environmental regulations relating to flood plain management, freshwater wetlands preservation and tree preservation. The Township's land use planning goals include encouraging growth near existing sewer and water service areas, encouraging industrial and commercial growth near regional circulation systems and planned infrastructure improvements, providing an opportunity for a variety and choice of housing, and discouraging development in environmentally-sensitive areas. Over 42% of the housing stock was built after 1980. Much of this development was outside of the Pinelands management area and outside of the JLUS study area.

Approximately 18% percent of Jackson Township falls within the 2-Mile JLUS study area, which intersects 11,700 acres in the southwestern portion of the Township. The study area within Jackson Township is divided into two diverse land use regions. The western half of the study area is heavily traversed by environmentally sensitive lands including protected forest, state endangered specie habitats, floodplains, and wetland areas. The eastern half contains the Clayton Sands site; a large active mining business, and low-density residential development areas. Table 7.3.1 displays land use areas of Jackson Township that are located within the 2-Mile JLUS Study Area.

Table 7.3.1 highlights the majority of preserved forest and wetlands areas located within the 2-Mile JLUS Study Area. The Clayton Sands mining industry and residential development areas encompass the third and fourth largest land use areas within the study area.

Table 7.3.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	121 acres	1.0%
Barren or Altered Lands	8 acres	0.1%
Brushland and Scrubland	500 acres	4.3%
Commercial Services	24 acres	0.2%
Deciduous, Coniferous, or Mixed Forest	4,997 acres	42.6%
Extractive Mining	877 acres	7.5%
Industrial Lands	14 acres	0.1%
Other Urban Lands	34 acres	0.3%
Recreational and Parkland	148 acres	1.3%
Reservoirs	488 acres	4.2%
Residential Lands	600 acres	5.1%
River Channel, Lake, or Pond	13 acres	0.1%
Transportation/Communication/Utilities	41 acres	0.3%
Wetland	3,871 acres	33.0%
Total (excluding Lakehurst lands)	11,736 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Zoning

Jackson Township was involved in the Master Plan process during the JLUS. The zoning data that is presented is the existing zoning for the Township, dated July 2008. The Township has a new proposed zoning map that is in the early stage of Pinelands Commission review. Some of the proposed zoning changes that affect the JLUS study area are discussed in more detail in the Section 8, Compatible Land Use Planning Considerations. Table 7.3.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.3.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Business and Commercial	6 acres	0.1%
Industrial and Utilities	229 acres	1.9%
Low Density Residential (less than 1 unit per acre)	2,596 acres	22.1%
Medium Density Residential (1-4 units per acre)	1,465 acres	12.5%
High Density Residential (more than 4 units per acre)	138 acres	1.2%
Preservation	7,313 acres	62.3%

Section 7.3 - Jackson Township

The composite preservation zone consists of Pinelands preservation and Pinelands forest area designated zones. The low density residential composite zone includes the Pinelands Rural Development Area, Pinelands Planned Rural Development, and Pinelands Regional Growth Areas. The Industrial and Utilities composite zone includes the Pinelands manufacturing zone.

Build Out Analysis for 2-Mile JLUS Study Area

Table 7.3.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
High Density Residential	RG-3	Regional Growth	9,680	32.6	147	0.0
Low Density Residential	PED-9	Pinelands Environmental Development	392,040	38.4	4	0.0
	RD	Rural Development	165,528	86.4	23	44.0
	RD-9	Rural Development	392,040	806.3	90	234.2
Medium Density Residential	PV	Pinelands Village	43,560	63.3	63	22.8
	RD-1	Rural Development	43,560	227.1	227	38.0
Preservation	FA-1	Forest Area	3,049,200	85.5	1	85.5
	FA-2	Forest Area	1,393,920	127.5	4	127.5
	FA-6	Forest Area	261,360	43.6	7	42.7
				1,510.5	566	594.4

Table 7.3.3 shows the vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 1,511 acres of vacant assessed lands within the JLUS study area, of which 594 are considered to be environmentally constrained. According to the existing zoning regulations, 553 residential units are possible on vacant assessed lands within residential zoning districts and 12 units within preservation zoning districts.

Table 7.3.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 83 acres of vacant assessed lands within the JLUS study area, of which 2 are considered to be environmentally constrained.

Table 7.3.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	PVC-1	Pinelands Village Commercial	20,000	0.5	0.0
Industrial and Utilities	PM	Pinelands Manufacturing	20,000	82.4	1.7
				82.9	1.7

Some developments in progress or approved within the JLUS study area have been removed from this vacant land analysis. The Megan's Run development area is just outside the JLUS study area. The development consists of 127 residential units being built. Just south of the Megan's Run another development was proposed that is adjacent to the study area. The development was denied, pending the advancement of a sanitary line; 500 residential units had been proposed.

Table 7.3.5 Farmlands Build Out Scenario: Residential

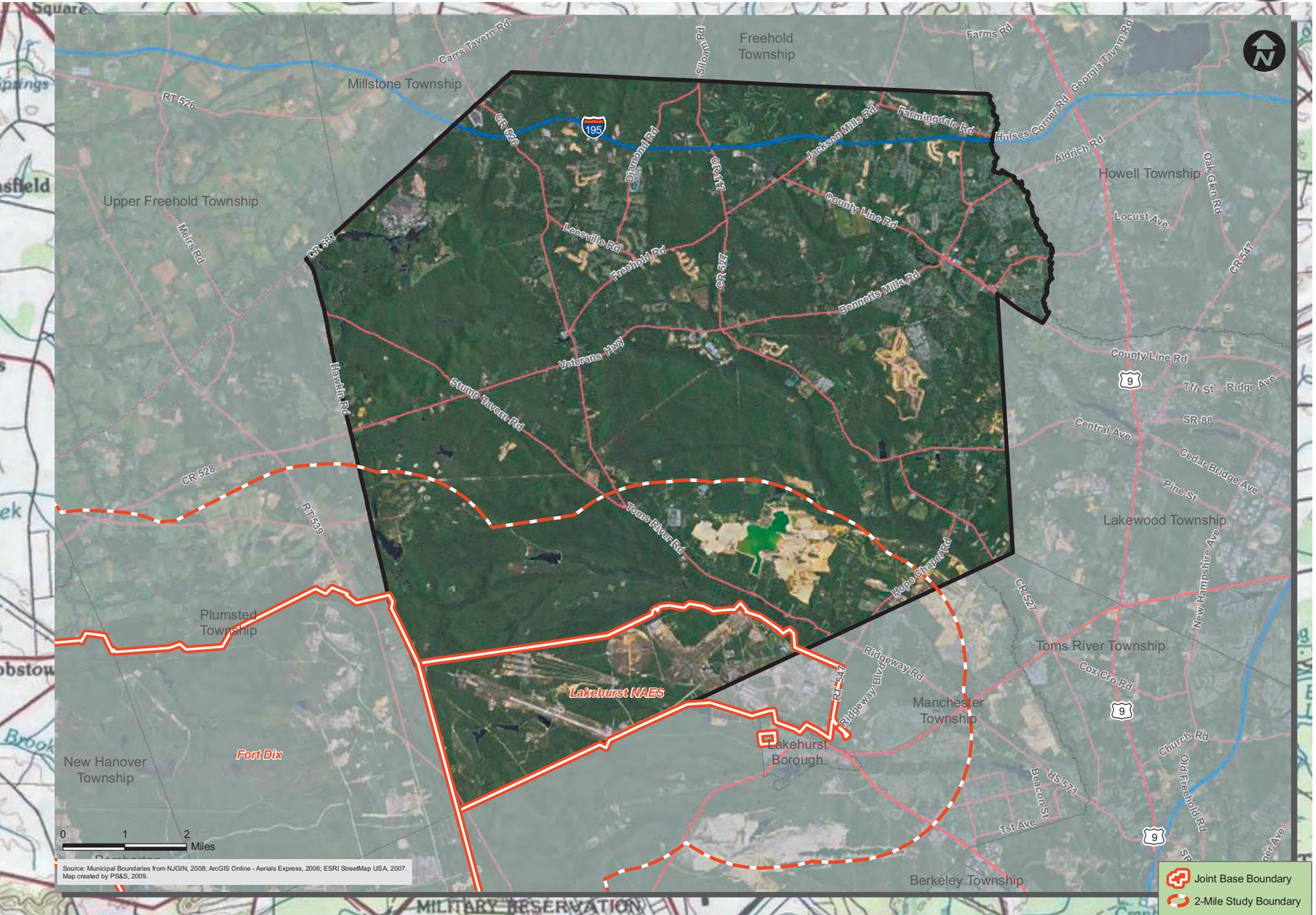
Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
High Density Residential	RG-3	Regional Growth	9,680	40.9	184	0.1
Low Density Residential	RD	Rural Development	165,528	13.0	3	2.3
Medium Density Residential	RD-1	Rural Development	43,560	7.7	8	0.0
Preservation	FA-6	Forest Area	261,360	2.8	0	0.0
				64.4	196	2.5

Table 7.3.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 64 acres of farm assessed lands within the JLUS study area, of which 3 are considered to be environmentally constrained. According to the existing zoning regulations, 196 residential units are possible on farm assessed lands within residential zoning districts. Based on this analysis, Jackson Township does not contain farm assessed lands within non-residential zoning districts located in the JLUS study area.

Growth Analysis

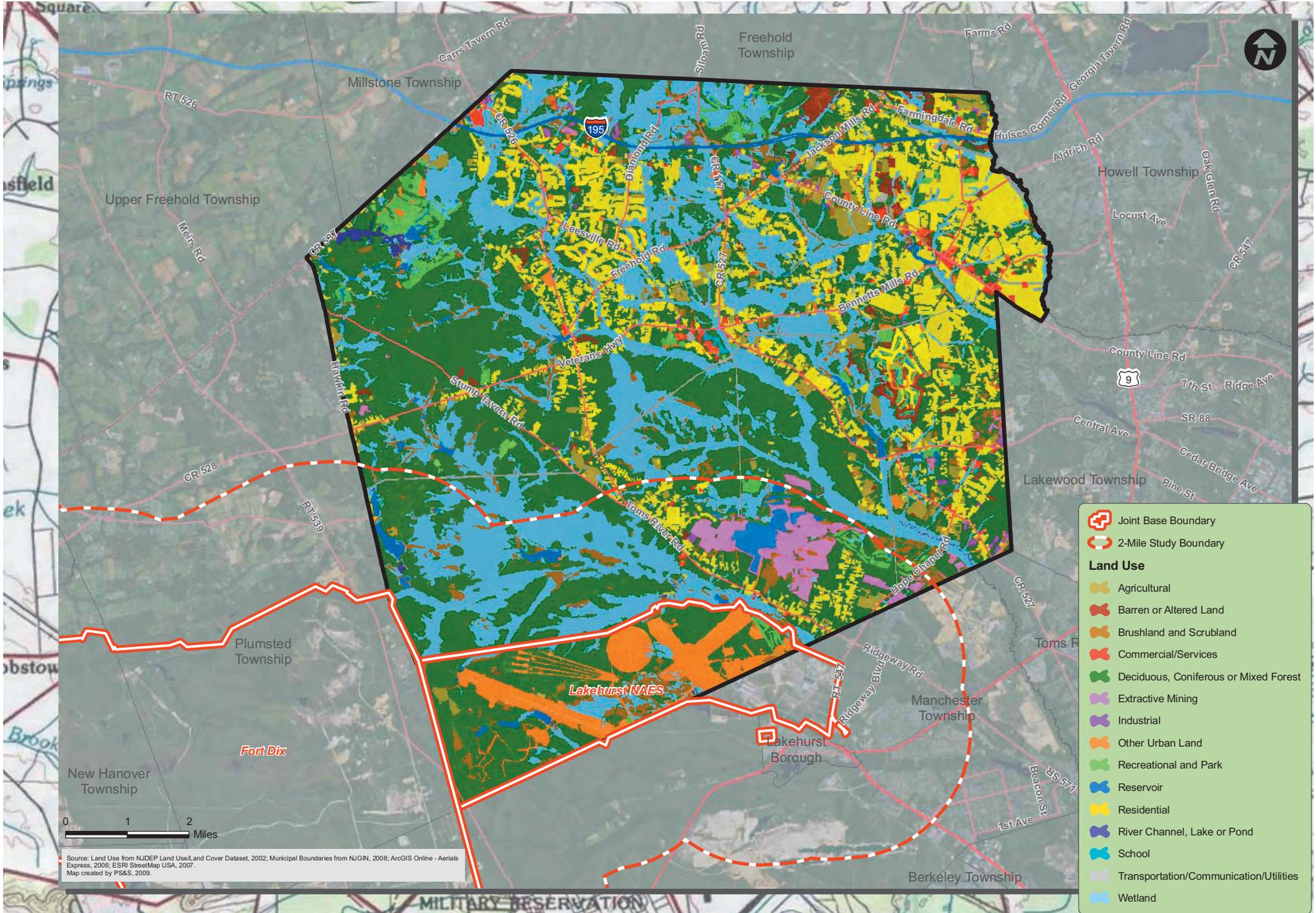
- The Township is looking for 3 sites that are approximately 40 acres in size for proposed new schools
- Many of Jackson’s homes are served by potable water wells, but Jackson Municipal Utility Authority also provides service in several sections of Jackson
- The Township has 1,300 + unit COAH obligation
 - o Second highest obligation in the State
 - o This obligation could encourage new residential growth near NAES Lakehurst
- Potential for residential development at the Clayton Sand Site
 - o Located in the Pinelands Rural Development Area
 - o Active mining activity now but the use could change under the current Pinelands residential zoning
 - o Preserved lands are adjacent due west of the property
 - o Property location is very close to accident potential zones for NAES Lakehurst and within higher decibel noise levels
 - o Currently not within a sewer service area
 - o Jackson would like to develop this property in a way that is complimentary to the Base needs
 - o There have been discussions regarding the possibility of changing the Pinelands growth designation for this site, which encourages residential development in areas in close proximity to NAES Lakehurst.

Figure 7.1 - Jackson Township Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.2 - Jackson Township Land Use Map



Legend

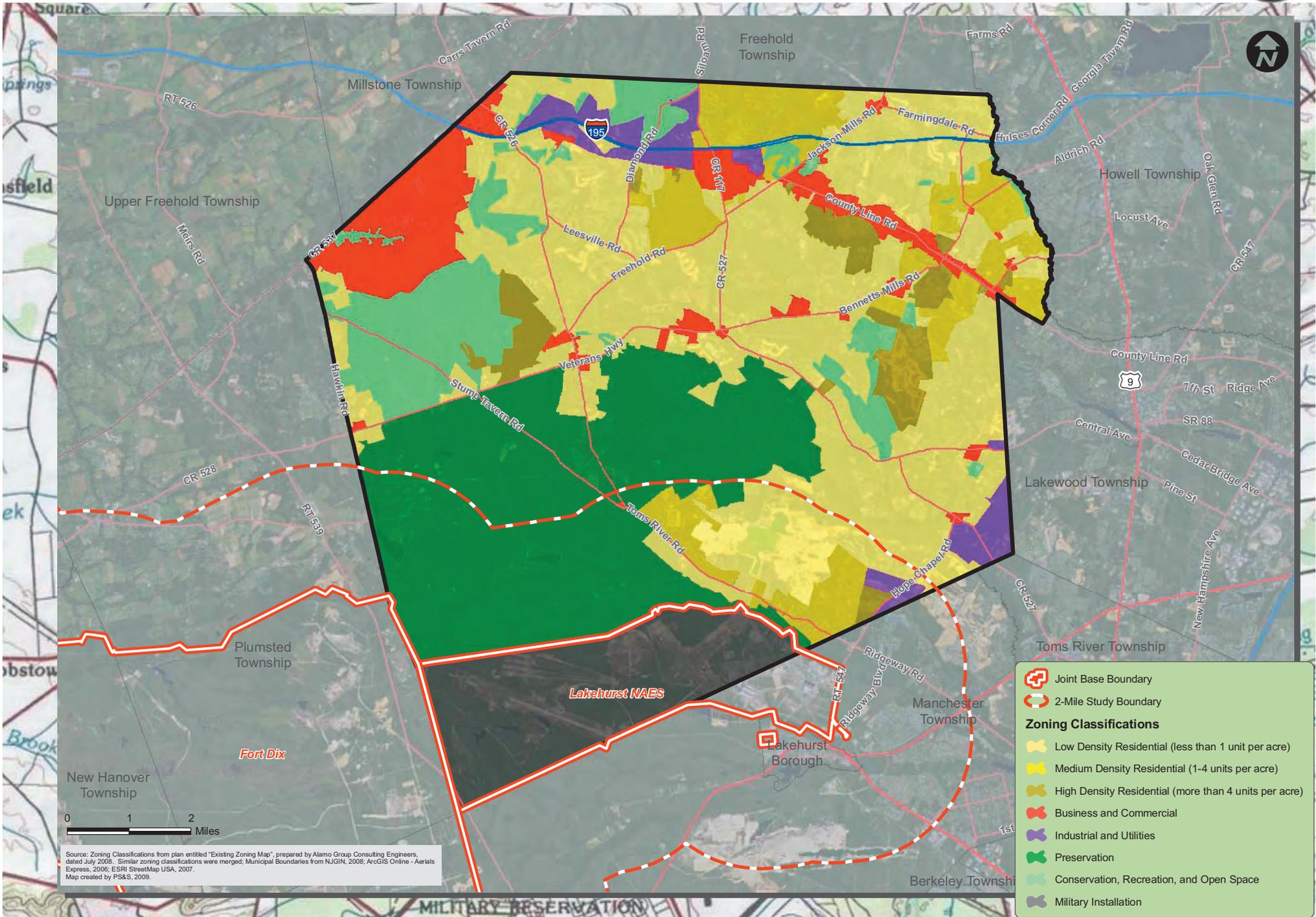
- Joint Base Boundary
- 2-Mile Study Boundary

Land Use

- Agricultural
- Barren or Altered Land
- Brushland and Scrubland
- Commercial/Services
- Deciduous, Coniferous or Mixed Forest
- Extractive Mining
- Industrial
- Other Urban Land
- Recreational and Park
- Reservoir
- Residential
- River Channel, Lake or Pond
- School
- Transportation/Communication/Utilities
- Wetland

Source: Land Use from NJDEP Land Use/Land Cover Dataset, 2002; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.3 - Jackson Township Zoning Map

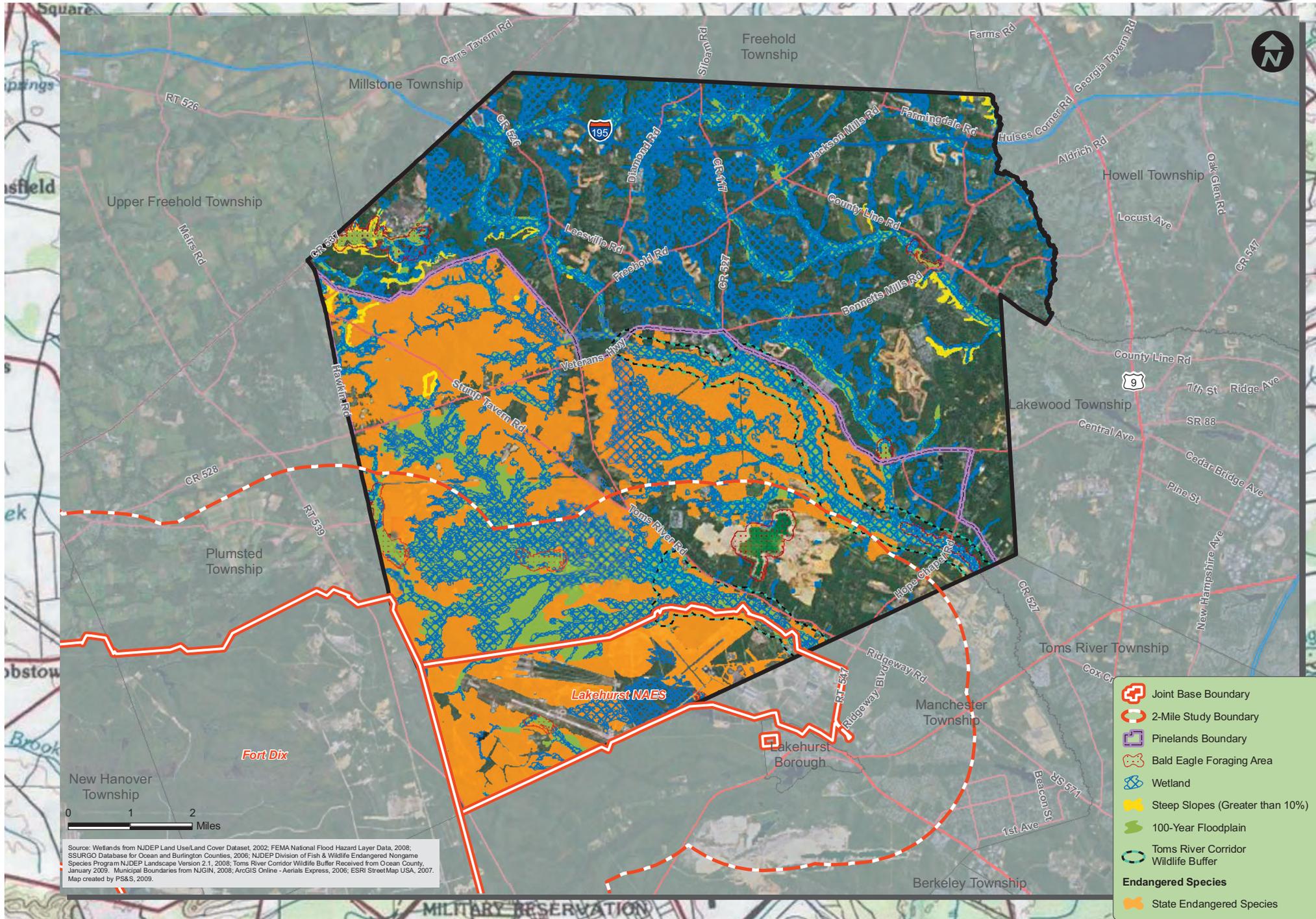


Legend

- Joint Base Boundary
- 2-Mile Study Boundary
- Zoning Classifications**
- Low Density Residential (less than 1 unit per acre)
- Medium Density Residential (1-4 units per acre)
- High Density Residential (more than 4 units per acre)
- Business and Commercial
- Industrial and Utilities
- Preservation
- Conservation, Recreation, and Open Space
- Military Installation

Source: Zoning Classifications from plan entitled "Existing Zoning Map", prepared by Alamo Group Consulting Engineers, dated July 2008. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.4 - Jackson Township Environmental Constraints Map



- Joint Base Boundary
- 2-Mile Study Boundary
- Pinelands Boundary
- Bald Eagle Foraging Area
- Wetland
- Steep Slopes (Greater than 10%)
- 100-Year Floodplain
- Toms River Corridor Wildlife Buffer
- Endangered Species**
- State Endangered Species

Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2008; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Toms River Corridor Wildlife Buffer Received from Ocean County, January 2009. Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI Street Map USA, 2007. Map created by PS&S, 2009.



Figure 7.5 - Jackson Township Preserved Lands

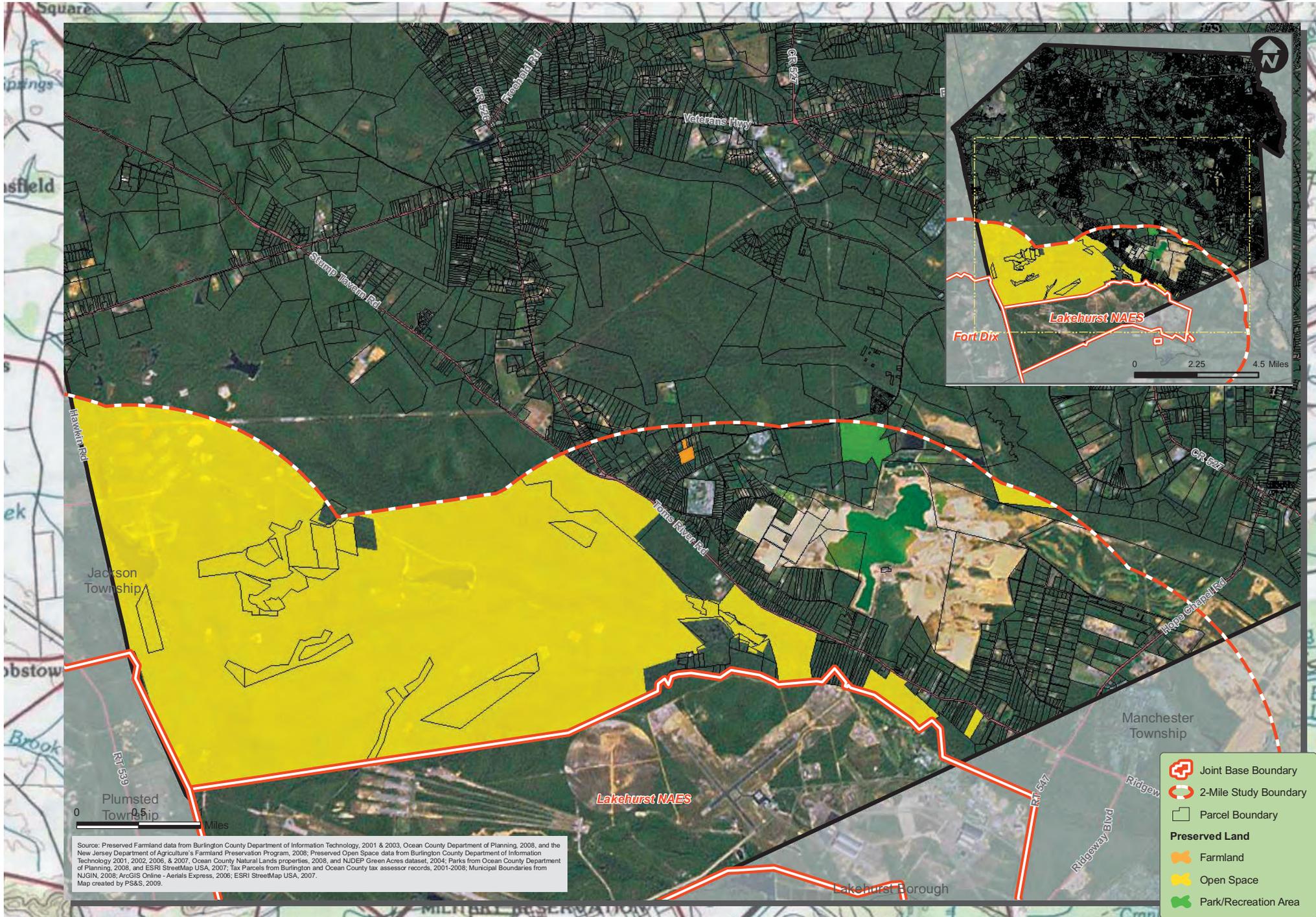
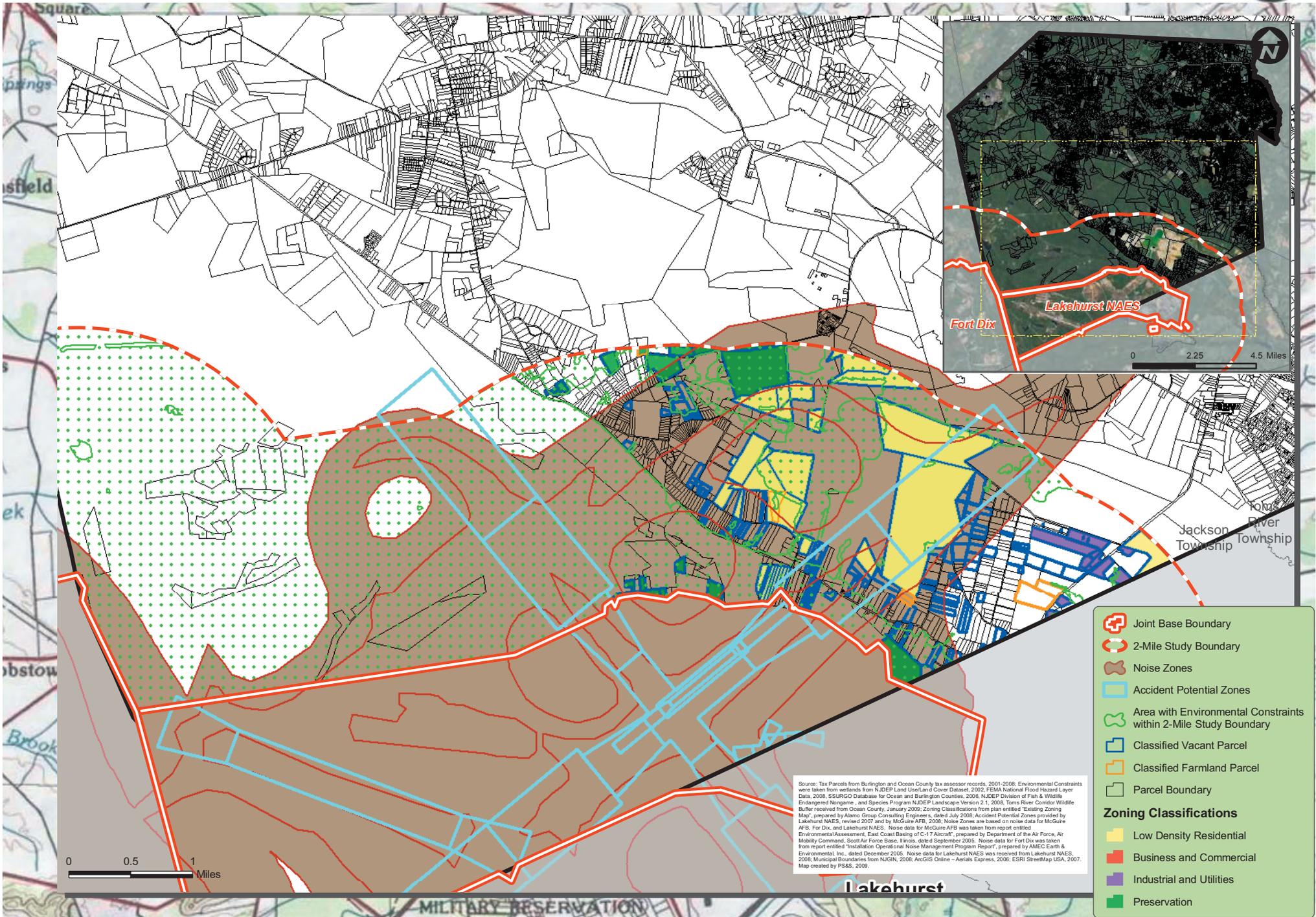


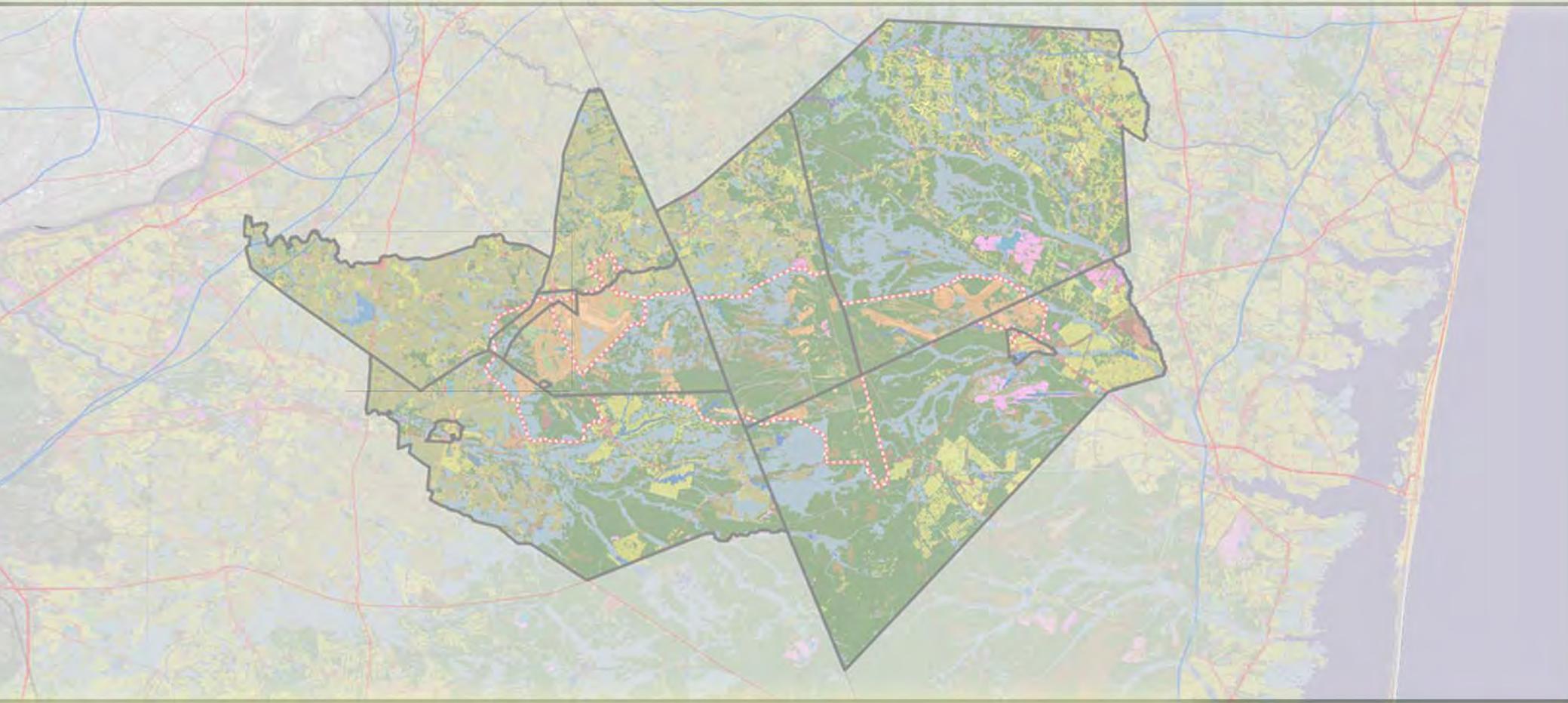
Figure 7.6 - Jackson Township Vacant and Farmland Assessed Lands



Figure 7.7 - Jackson Township Build Out Analysis for Vacant and Farmland Assessed Lands



Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.4 - Lakehurst Borough

Existing Land Use

Lakehurst Borough is adjacent to Lakehurst NAES. Lakehurst Borough’s recent history is linked with the Naval Base but was once a transit village for the Raritan and Delaware Bay Railroad. The Borough’s limits are approximately 9/10 of a square mile (584 acres). Almost 88% of the Borough is subject to the regulations of the Pinelands and the Borough is a designated Pinelands town. Commercial areas in the Borough are located along Route 70 and Union Avenue. The back gate to Lakehurst Base is located within the Borough. In the vicinity of the back gate, there is 28 acre devoted military housing area in Pinehurst Estates. This housing area has recently been reconstructed and twelve new townhouses were built.

The land area of the Borough is 37% residential. The Borough has home values that have been lower than both state and countywide regions. Lakehurst Borough has been moving forward with the vision of becoming a transit village if the MOM rail line were to be approved (the MOM rail line is a proposed NJ transit rail line that would originate in Ocean County and service the population in Monmouth, Ocean, and Middlesex Counties). Lakehurst Borough has traditionally been a commuter town and with the exception of the Base lands that occupy military housing, does not have a large number of residents that work at the Bases.

Due to the Borough’s size and its close proximity to NAES Lakehurst, all of its approximate 580 acres are located within the 2-Mile JLUS Study Area. Table 7.4.1 displays land use areas of Lakehurst Borough that are located within the 2-Mile JLUS study area. For the purposes of the municipality analysis the Lakehurst Base military housing was removed from the land use and subsequent tables.

Table 7.4.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Brushland and Scrubland	26 acres	4.5%
Commercial Services	61 acres	10.4%
Deciduous, Coniferous, or Mixed Forest	57 acres	9.8%
Industrial Lands	2 acres	0.3%
Other Urban Lands	33 acres	5.7%
Recreational and Parkland	7 acres	1.2%
Reservoirs	59 acres	10.1%
Residential Lands	218 acres	37.3%
School	2 acres	0.3%
Transportation/Communication/Utilities	22 acres	3.8%
Wetland	97 acres	16.6%
Total (excluding NAES Lakehurst lands)	584 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Table 7.4.1 indicates that residential development and commercial services make up the majority of the land uses within the Borough. Over a third of Lakehurst Borough consists of forested areas, reservoirs, and wetlands; mainly located along the southern edge of the Borough.

Zoning

Table 7.4.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.4.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Business and Commercial	103 acres	22.2%
High Density Residential (more than 4 units per acre)	273 acres	58.5%
Industrial and Utilities	9 acres	19.3%

Section 7.4 - Lakehurst Borough

During the JLUS process, Lakehurst Borough was undergoing a reexamination of their Master Plan. The proposed zoning shows a new Light Industrial area next to the Borough’s Solid Waste Management building and the back gate to Lakehurst. The Borough administrator is actively working with the Base officials to define a compatible use for this land area. As of last update, an office/warehouse was proposed to be developed. Lakehurst Base has indicated that there may be a relocation of civilian contractors off base in the near future and Lakehurst Borough is looking to apply available lands for this use. The proximity to Lakehurst Base and to the back gate would be considered complimentary to civilian contractors. Lakehurst Base has agreed to let contractors working in this proposed area to use the back gate which could lead to increased traffic through residential areas during morning and evening commutes.

The zone change from Residential to Light Industrial for the areas adjacent to Lakehurst Base is positive in terms of compatible land use planning. In accordance with local procedure the height of proposed structures is reviewed with the Base authorities to avoid interference with Air Operations.

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.4.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
High Density Residential	R-1	Single Family Residential	9,375	4.8	22	1.4
	R-2	Single Family Residential	7,500	3.8	22	2.1
	R-3	Two Family Residential	4,687	0.2	2	0.0
Medium Density Residential	R-4	Multiple Dwelling, Office District	22,500	0.5	1	0.4
				9.3	48	3.9

Table 7.4.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 9 acres of vacant assessed lands within the JLUS study area, of which 4 are considered to be environmentally constrained. According to the existing zoning regulations, 48 residential units are possible on vacant assessed lands within residential zoning districts.

Table 7.4.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	B-1	Downtown Business	5,000	0.3	0.0
	B-2	Highway Commercial	18,750	15.0	9.4
				15.3	9.4

Table 7.4.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 15 acres of vacant assessed lands within the JLUS study area, of which 9 are considered to be environmentally constrained.

Tax assessor records indicate that Lakehurst Borough does not contain any farm assessed lands.

Growth Analysis

- There is little to no growth projected in the Borough
- Given current land use patterns, anything leftover lands are mostly with environmental constraints. The community supports the ongoing operation of NAES Lakehurst, even though most of their residents do not work at the Base.
- The proposed MOM Line, if implemented, could alter land use patterns in the Borough

Figure 7.8 - Lakehurst Borough Overview Map



Figure 7.9 - Lakehurst Borough Land Use Map

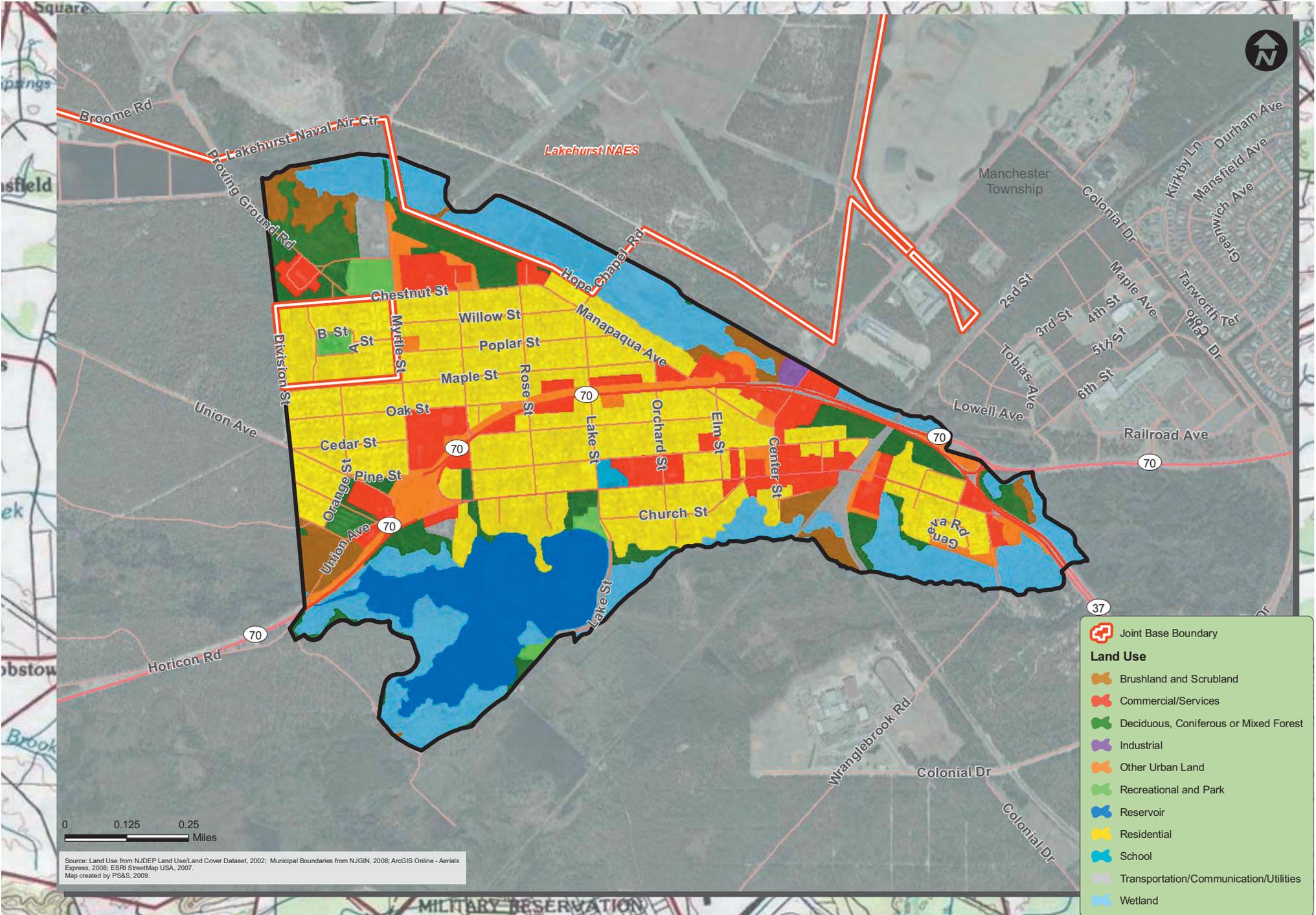
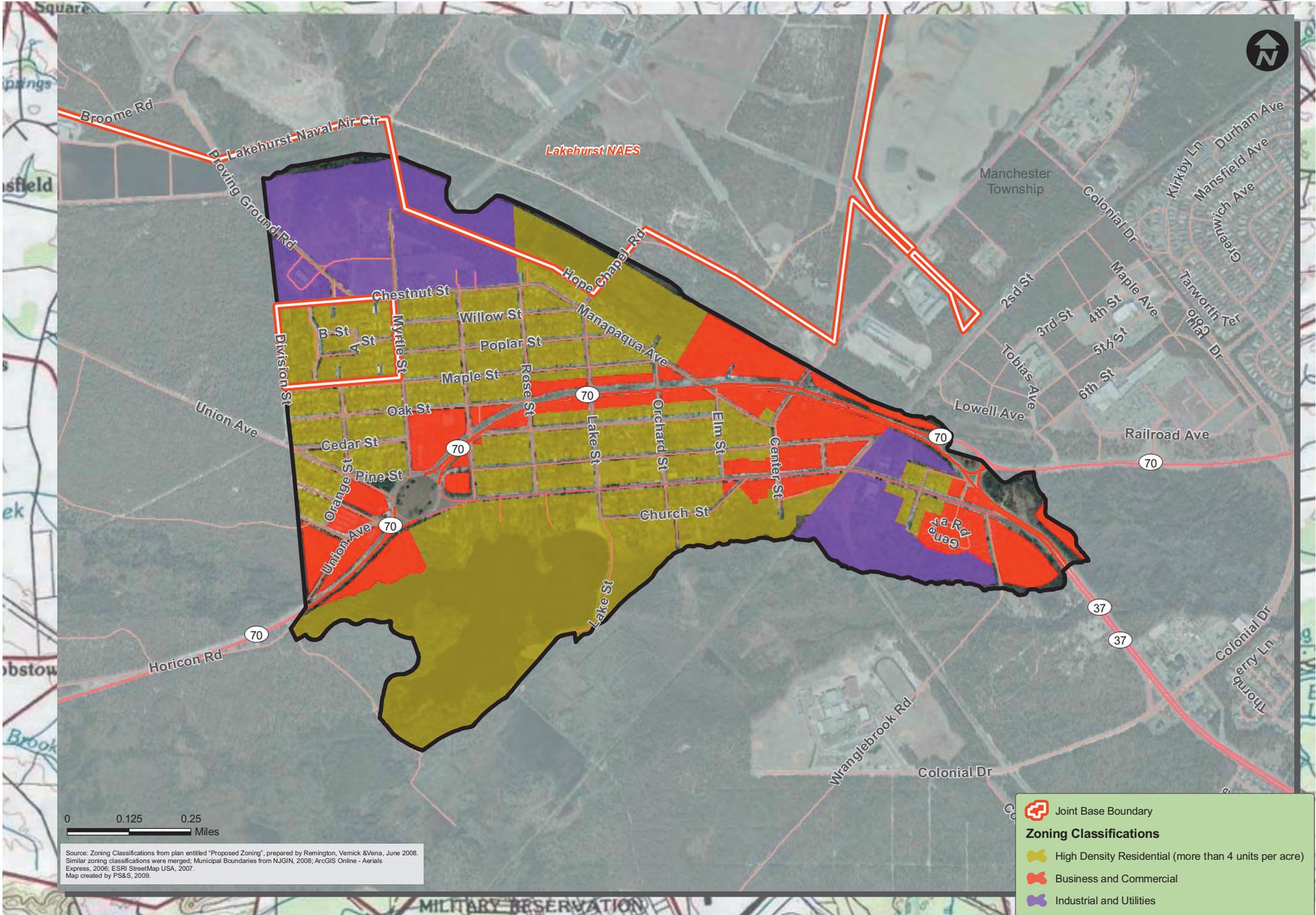


Figure 7.10 - Lakehurst Borough Zoning Map



0 0.125 0.25 Miles

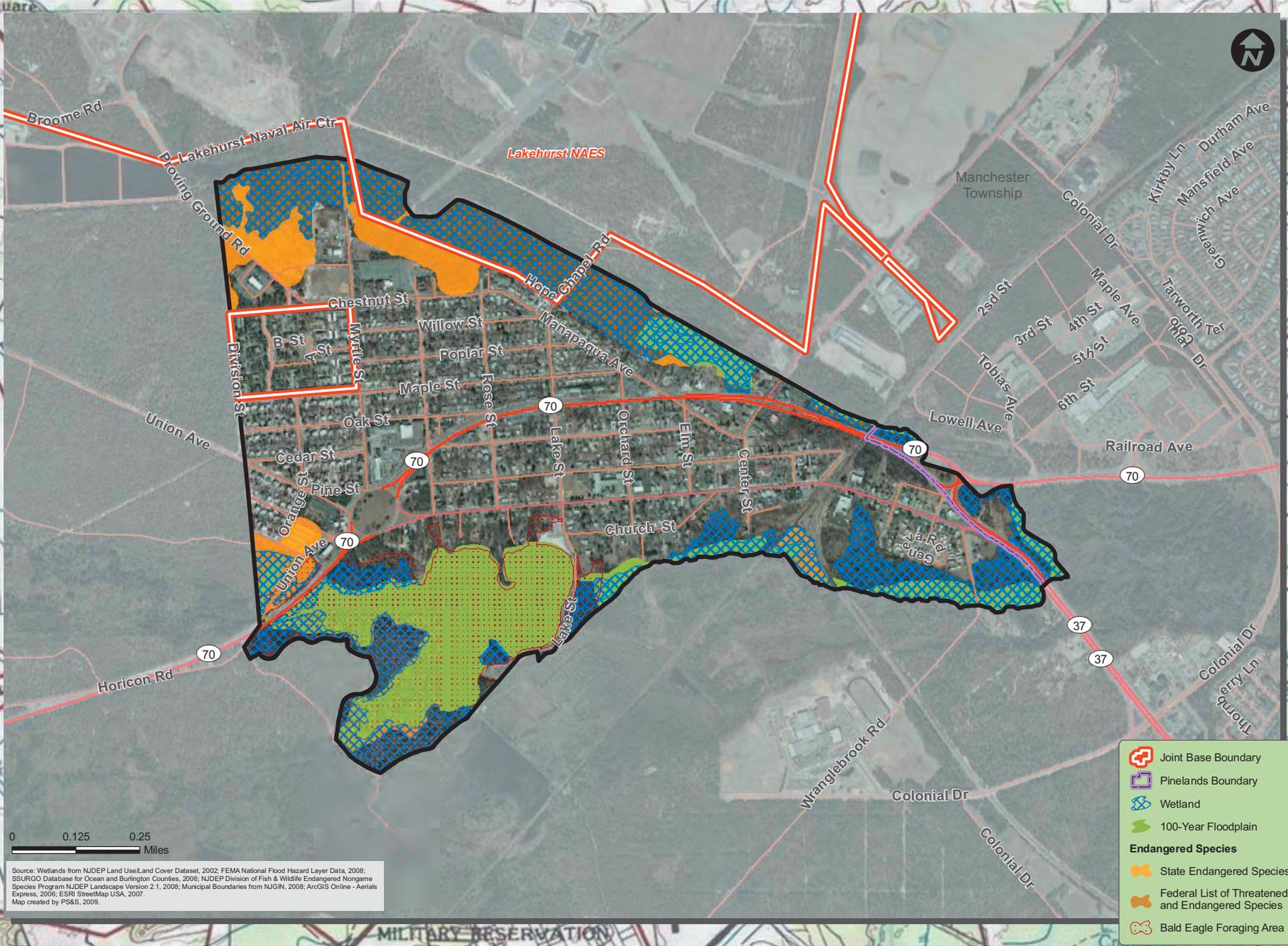
Source: Zoning Classifications from plan entitled "Proposed Zoning", prepared by Remington, Vernick & Vena, June 2008. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Joint Base Boundary

Zoning Classifications

- High Density Residential (more than 4 units per acre)
- Business and Commercial
- Industrial and Utilities

Figure 7.11 - Lakehurst Borough Environmental Constraints Map



0 0.125 0.25 Miles

Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- Pinelands Boundary
- Wetland
- 100-Year Floodplain
- Endangered Species**
- State Endangered Species
- Federal List of Threatened and Endangered Species
- Bald Eagle Foraging Area

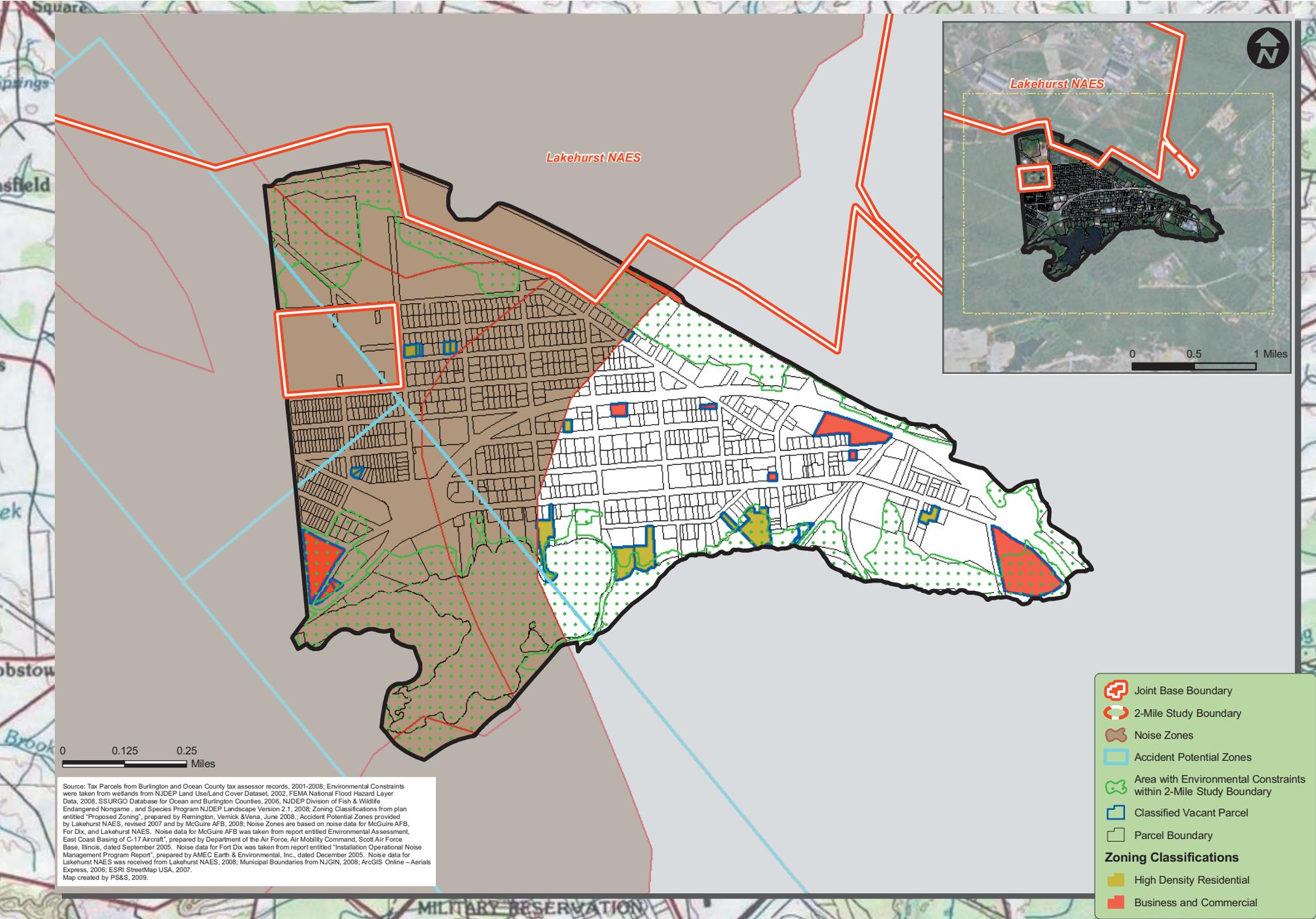
Figure 7.13 - Lakehurst Borough Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary
- Parcel Boundary
- Classified Vacant Parcel

Figure 7.14 - Lakehurst Borough Build Out Analysis for Vacant and Farmland Assessed Lands

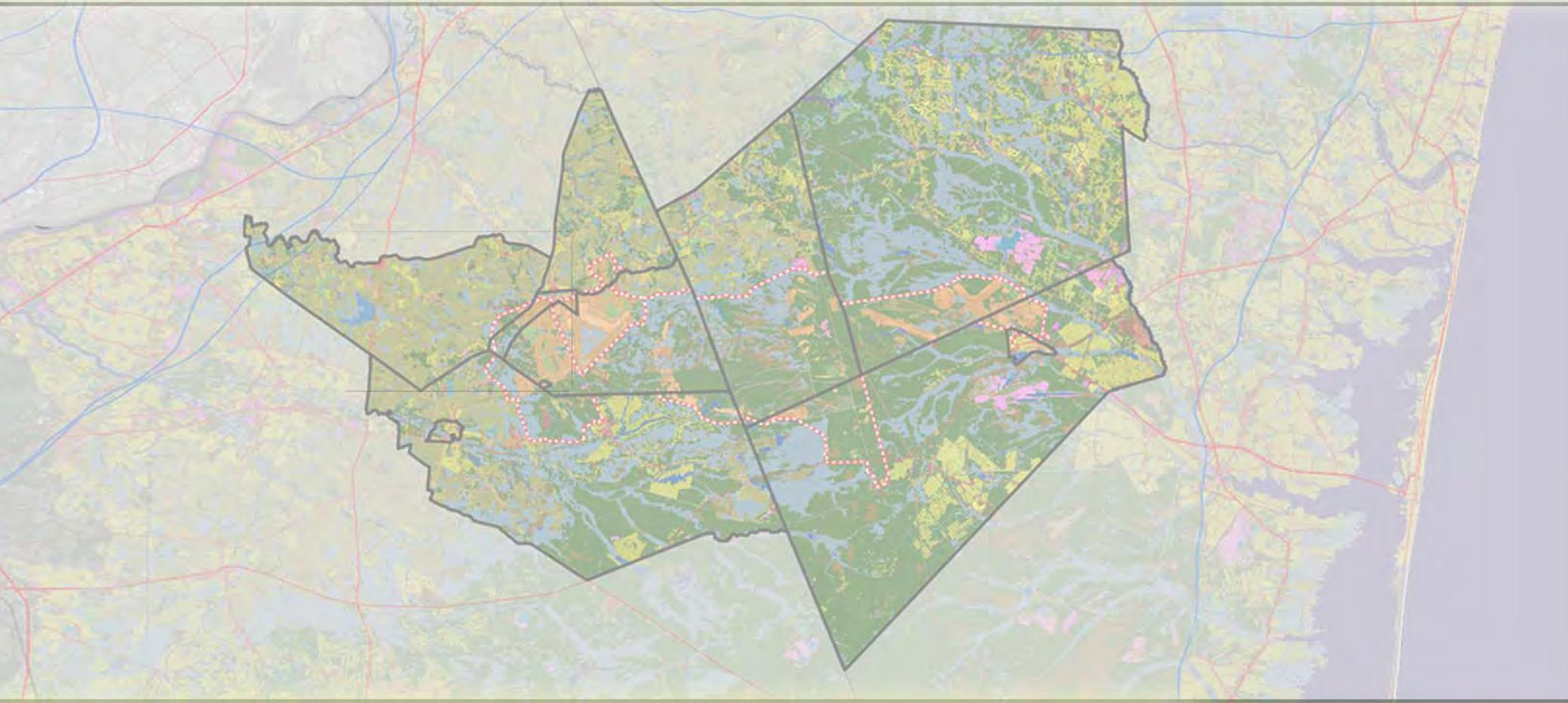


Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame, and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications from plan entitled "Proposed Zoning", prepared by Remington, Vernick & Vena, June 2008.; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basing of C-17 Aircraft", prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
 - 2-Mile Study Boundary
 - Noise Zones
 - Accident Potential Zones
 - Area with Environmental Constraints within 2-Mile Study Boundary
 - Classified Vacant Parcel
 - Parcel Boundary
- Zoning Classifications**
- High Density Residential
 - Business and Commercial

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.5 - Manchester Township

Existing Land Use

Manchester Township is located due east and south of Lakehurst Base. Over 1,000 acres of the Township are part of the Base lands. 80% of Manchester residents reside in senior housing. Manchester Township had most of its residential growth from 1965 into the 1980's, with the construction of large-scale retirement communities. The Township is well known in the state of New Jersey and the regional area for its large number of retirement communities. These communities are located in the eastern portion of the Township, mostly outside of the Pinelands management area, however some senior residences are located in the Whiting section of the Township, which is within the Pinelands management area. The Pinelands management areas consist of 6,300 acres in the Township.

Approximately 47% percent of Manchester Township falls within the 2-Mile JLUS Study Area, which intersects 25,000 acres in the northern portion of the Township. Much of the study area consists of environmentally sensitive forest, floodplain, wetland, and federal and state endangered specie habitats. Several pockets of large residential areas are located within the study area. These areas include the Town of Whiting and Beckerville Village. Table 7.5.1 displays land use areas of Manchester Township that are located within the 2-Mile JLUS Study Area.

Table 7.5.1 indicates that wetland areas and forested lands are the dominant land uses within the 2-Mile JLUS Study Area. There are approximately 2,500 acres of residential and commercial lands in the Township. The Town of Whiting, which is partly within the study area, is the largest Pinelands Town. Roosevelt City is also part of the Town of Whiting and is approximately 3,000 acres. Beckerville Village is a Pinelands Village located south of NAES Lakehurst and contains 57 apartment units originally built for NAES. The units were rehabilitated in 1998 and are dedicated to affordable housing.

Table 7.5.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	497 acres	2.0%
Barren or Altered Lands	112 acres	0.5%
Brushland and Scrubland	1,120 acres	4.5%
Commercial Services	157 acres	0.6%
Deciduous, Coniferous, or Mixed Forest	12,848 acres	51.4%
Extractive Mining	626 acres	2.5%
Industrial Lands	49 acres	0.2%
Other Urban Lands	188 acres	0.8%
Recreational and Parkland	123 acres	0.5%
Reservoirs	402 acres	1.6%
Residential Lands	2,358 acres	9.4%
River Channel, Lake, or Pond	2 acres	0%
School	49 acres	0.2%
Transportation/Communication/Utilities	230 acres	0.9%
Wetland	6,233 acres	24.9%
Total (excluding Lakehurst lands)	24,994 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Zoning

Table 7.5.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.5.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agriculture	85 acres	0.3%
Business and Commercial	988 acres	4.0%
Low Density Residential (less than 1 unit per acre)	184 acres	7.4%
Medium Density Residential (1-4 units per acre)	5,417 acres	21.9%
High Density Residential (more than 4 units per acre)	832 acres	3.4%
Preservation	15,566 acres	63.0%

Section 7.5 - Manchester Township

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.5.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	WTRA	Whiting Town Rural Agricultural	43,560	20.9	21	5.5
High Density Residential	R-10	Single Family Residential	10,000	33.6	146	0.1
	R-10A	Single Family Residential	10,000	0.2	1	0.0
Low Density Residential	PFA-R	Pinelands Forest Area - Receiving	871,200	309.7	15	223.9
Medium Density Residential	BVR-40	Beckerville Village Residential	40,000	65.4	71	42.2
	PED-1	Planned Environmental Development	0	229.0	600	4.0
	PR-15	Pinelands Single Family Residential	15,000	30.7	89	0.0
	PR-40	Pinelands Single Family Residential	20,000	128.3	279	54.7
	PRC-1	Pinelands Retirement Community	0	180.7	735	80.6
	R-14	Single Family Residential	14,000	0.7	2	0.6
	R-14AF	Single Family Residential	14,000	6.9	22	1.3
	R-40	Single Family Residential	40,000	151.8	165	38.9
	WTR-40	Whiting Town Single Family Residential	40,000	49.7	54	21.8
	WTRC	Whiting Town Retirement Community	43,560	11.8	12	4.1
	WTRC-AF	Whiting Town Retirement Community	43,560	22.4	22	18.1
	Preservation	PFA-S	Pinelands Forest Area Sending	871,200	3,135.9	157
				4,377.7	2,392	3,359.0

*Manchester Township and Jackson Township have agreed on a 'density transfer' settlement agreement which permits 600 senior dwelling units to be built within the PED-1 zoning district. The PRC-1 zoning district is also subject to a settlement agreement to allow 700 age-restricted and 35 affordable housing units on two contiguous tract areas within the township. Zoning density values were not assigned to these zoning districts and the Total Potential Development Units were manually entered in accordance to the settlement agreements.

Table 7.5.3 shows the vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 4,378 acres of vacant assessed lands within the JLUS study area, of which 3,359 are considered to be environmentally constrained. According to the existing zoning regulations, 2,214 residential units are possible on vacant assessed lands within residential zoning districts, 21 units within the agriculture zoning district, and 157 units within the preservation zoning district.

Table 7.5.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	B-1	Business	43,560	8.1	0.0
	HD-3	Highway Development	130,680	67.8	16.3
	HD-3A	Highway Development	130,680	10.1	0.0
	O-P	Office Professional	40,000	7.2	4.7
	PB-I	Pinelands Business	20,000	45.9	29.9
	POR-LI	Pinelands Office, Research & Light Industrial	130,680	0.2	0.0
	TC	Town Center	435,600	112.0	46.4
	WTB-1	Whiting Town Business	20,000	4.3	0.6
	WTHD	Whiting Town Highway Development	40,000	26.3	13.9
	WTO-P	Whiting Town Office Professional	40,000	38.4	16.8
					320.3

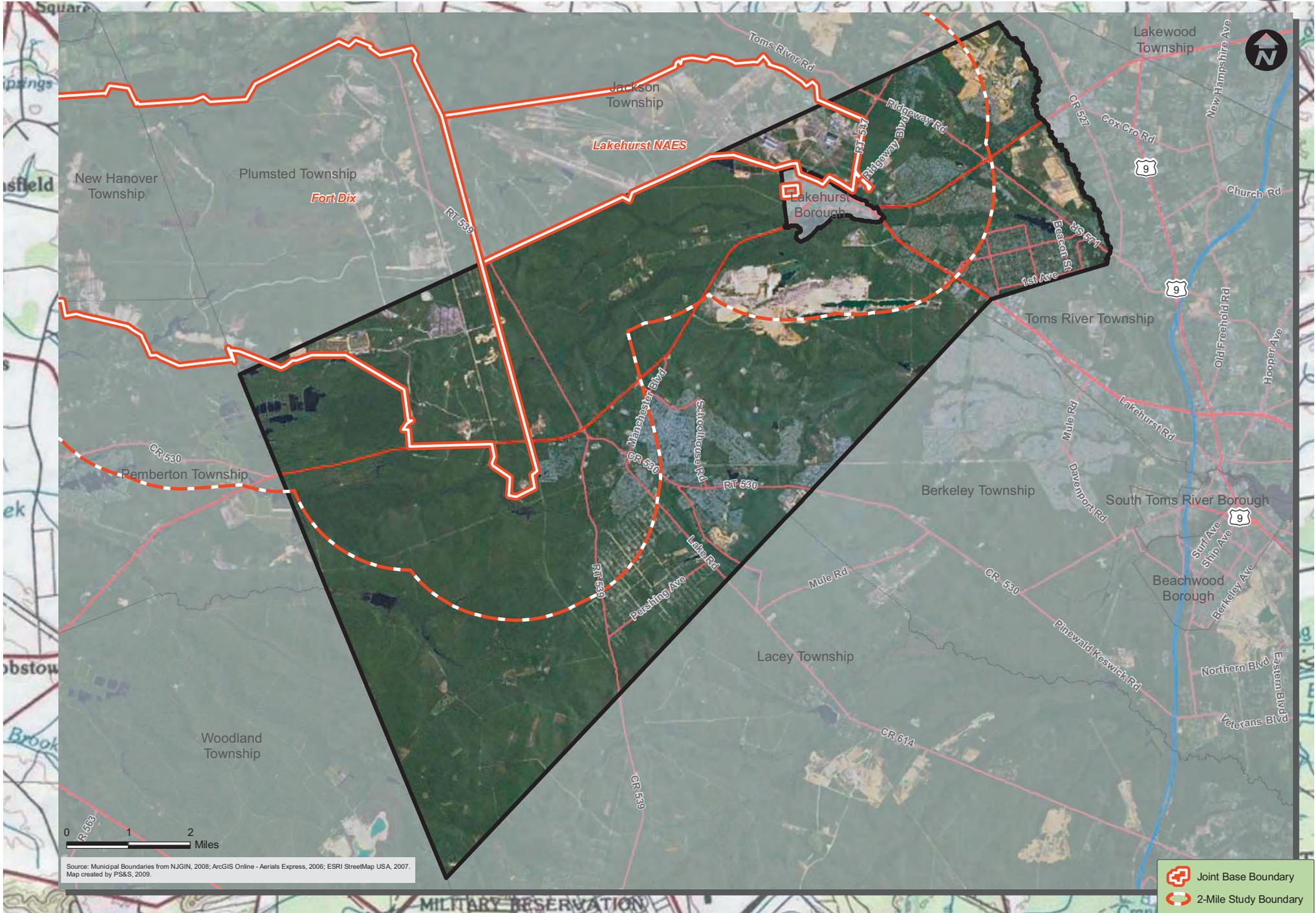
Table 7.5.4 shows the vacant assessed lands summarized by zoning districts that permit non-residential development. There are 320 acres of vacant assessed lands within the JLUS study area, of which 129 are considered to be environmentally constrained.

Based on this analysis, Manchester Township does not contain farm assessed lands within the JLUS study area.

Growth Analysis

- The Heritage Minerals site, a very large tract of land in the southern portion of Manchester, has approvals for residential development. The development firm K. Hovnanian was approved for 2,205 units. To date, this site has not begun construction.
- The area known as the “Golden Triangle” property, directly to the west of NAES Lakehurst and located between Route 547 and Ridgeway Boulevard is being developed. The development is known as River Pointe. Upon completion, this community will feature 504 single family homes, a gated entry, and a clubhouse. Due to its proximity to NAES Lakehurst an aviation easement has been established to provide awareness to homeowners and protection to the military flight patterns.
 - o For River Pointe development the military proximity is noted in the prospectus and advertising.
- Within the PRC-1 Zone (Pinelands Retirement Community) there is the potential for 300-330 residential units.

Figure 7.15 - Manchester Township Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary

Figure 7.16 - Manchester Township Land Use Map

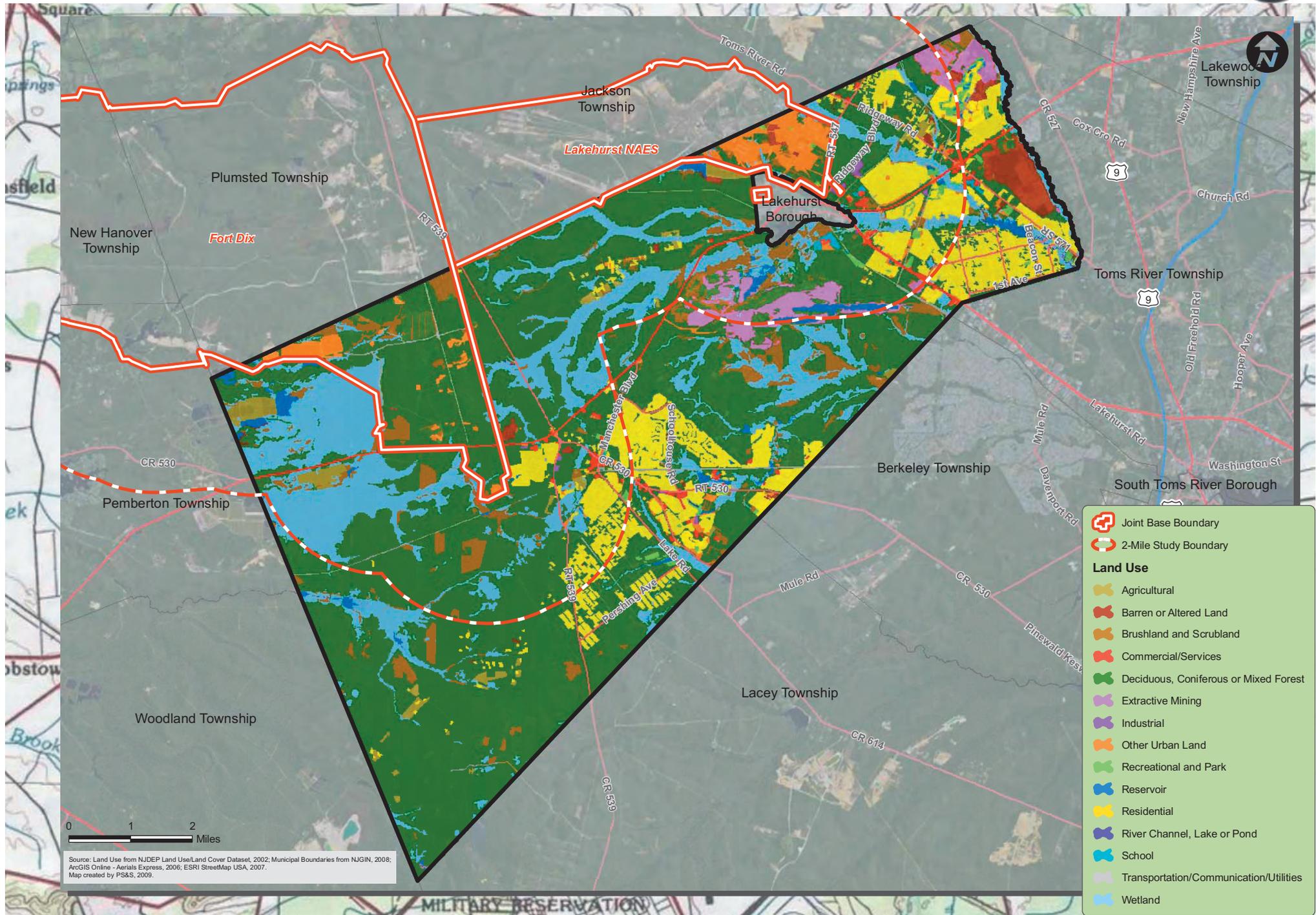
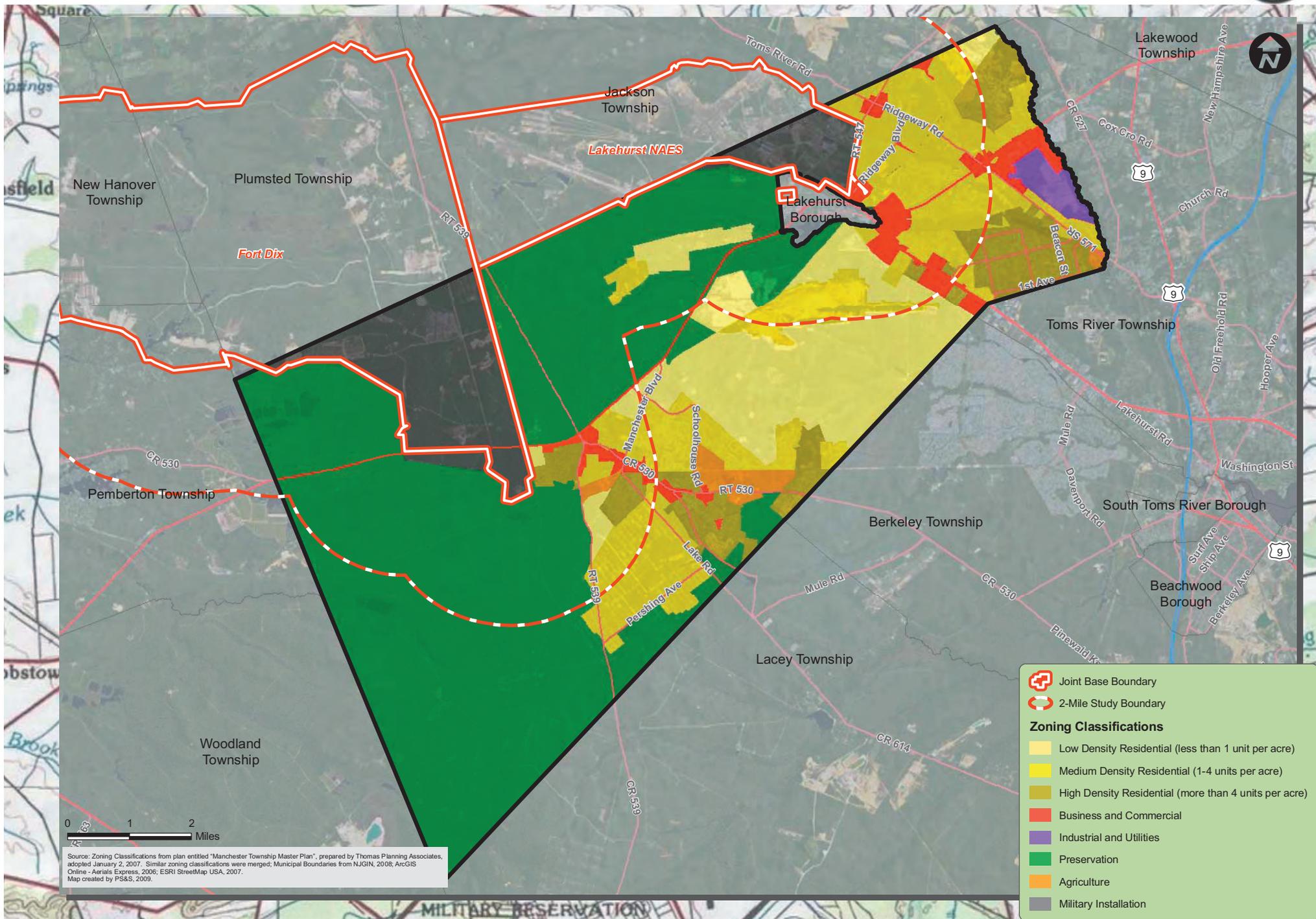
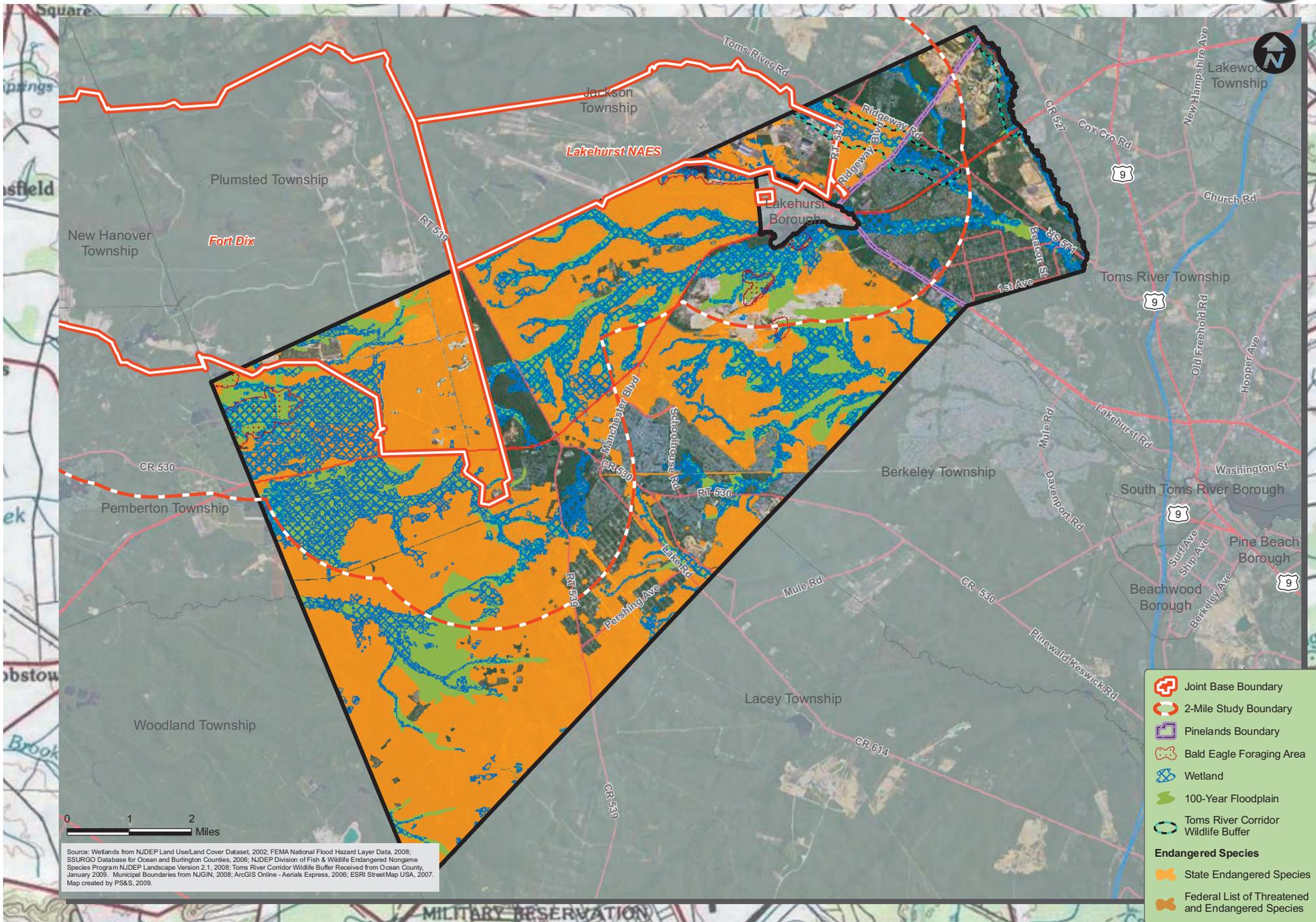


Figure 7.17 - Manchester Township Zoning Map



Source: Zoning Classifications from plan entitled "Manchester Township Master Plan", prepared by Thomas Planning Associates, adopted January 2, 2007. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by P&S&S, 2009.

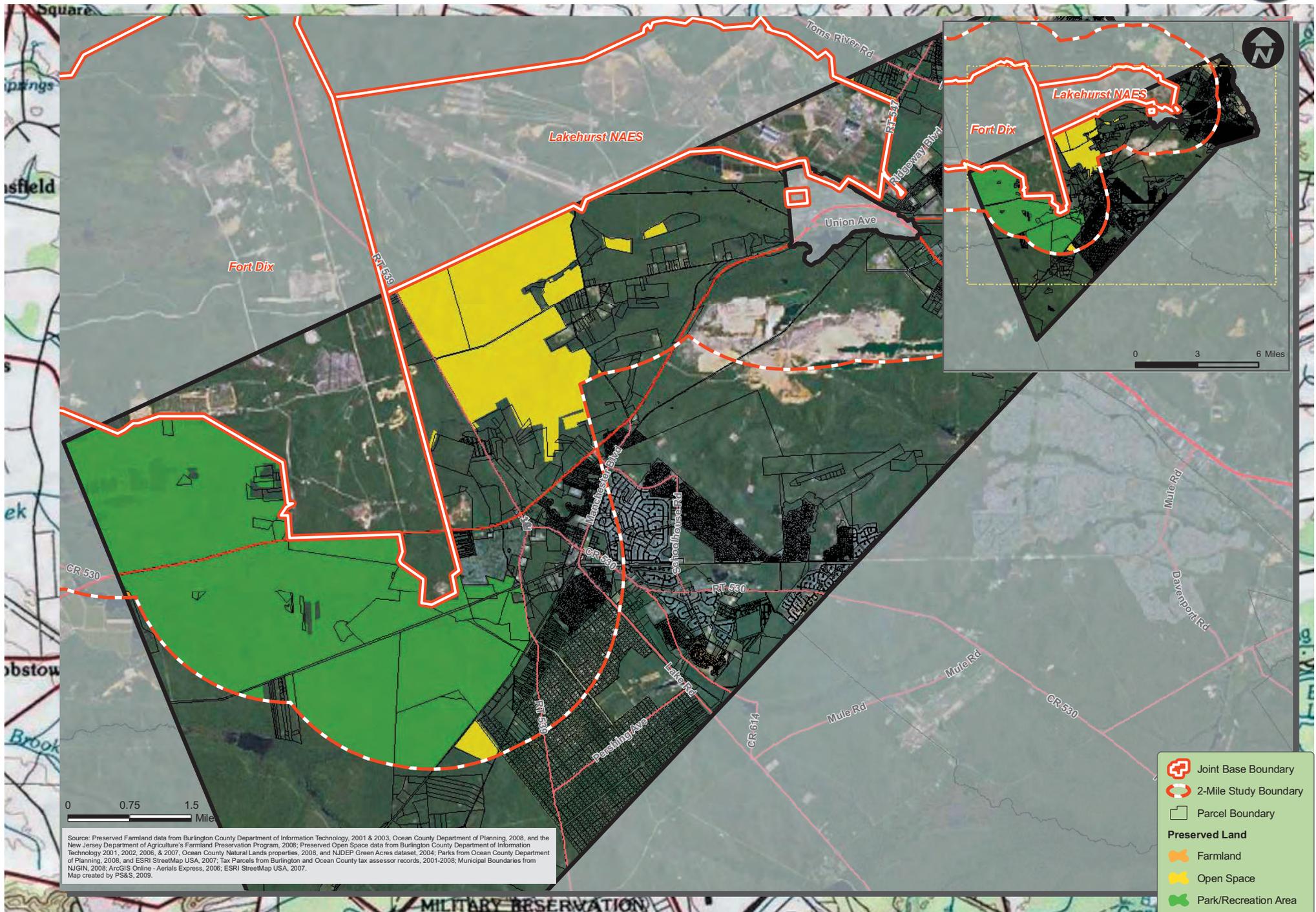
Figure 7.18 - Manchester Township Environmental Constraints Map



Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Toms River Corridor Wildlife Buffer Retrieved from Ocean County, January 2009. Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI Street Map USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
 - 2-Mile Study Boundary
 - Pinelands Boundary
 - Bald Eagle Foraging Area
 - Wetland
 - 100-Year Floodplain
 - Toms River Corridor Wildlife Buffer
- Endangered Species**
- State Endangered Species
 - Federal List of Threatened and Endangered Species

Figure 7.19 - Manchester Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

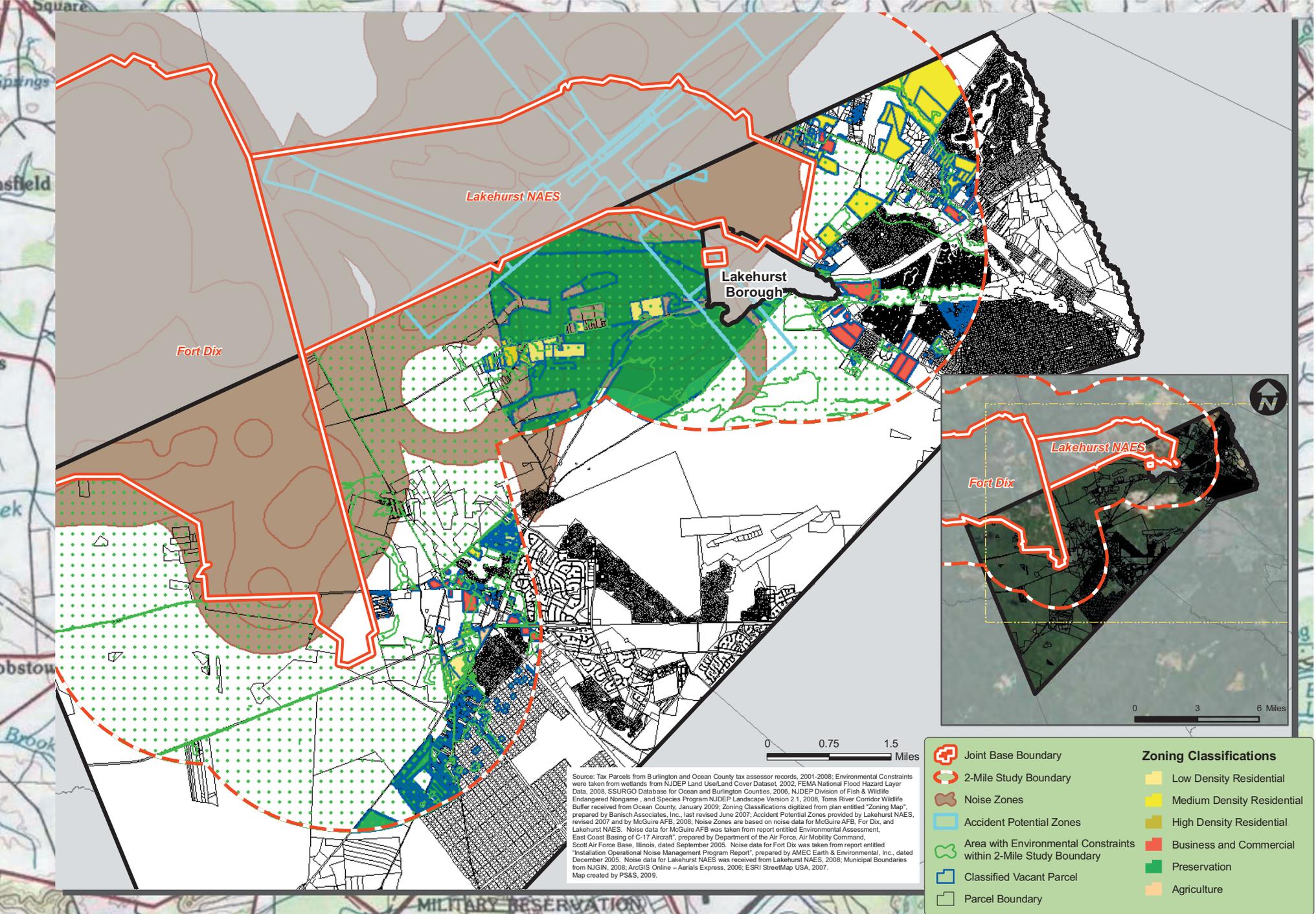
- Joint Base Boundary
- 2-Mile Study Boundary
- Parcel Boundary
- Preserved Land**
- Farmland
- Open Space
- Park/Recreation Area

Figure 7.20 - Manchester Township Vacant and Farmland Assessed Lands

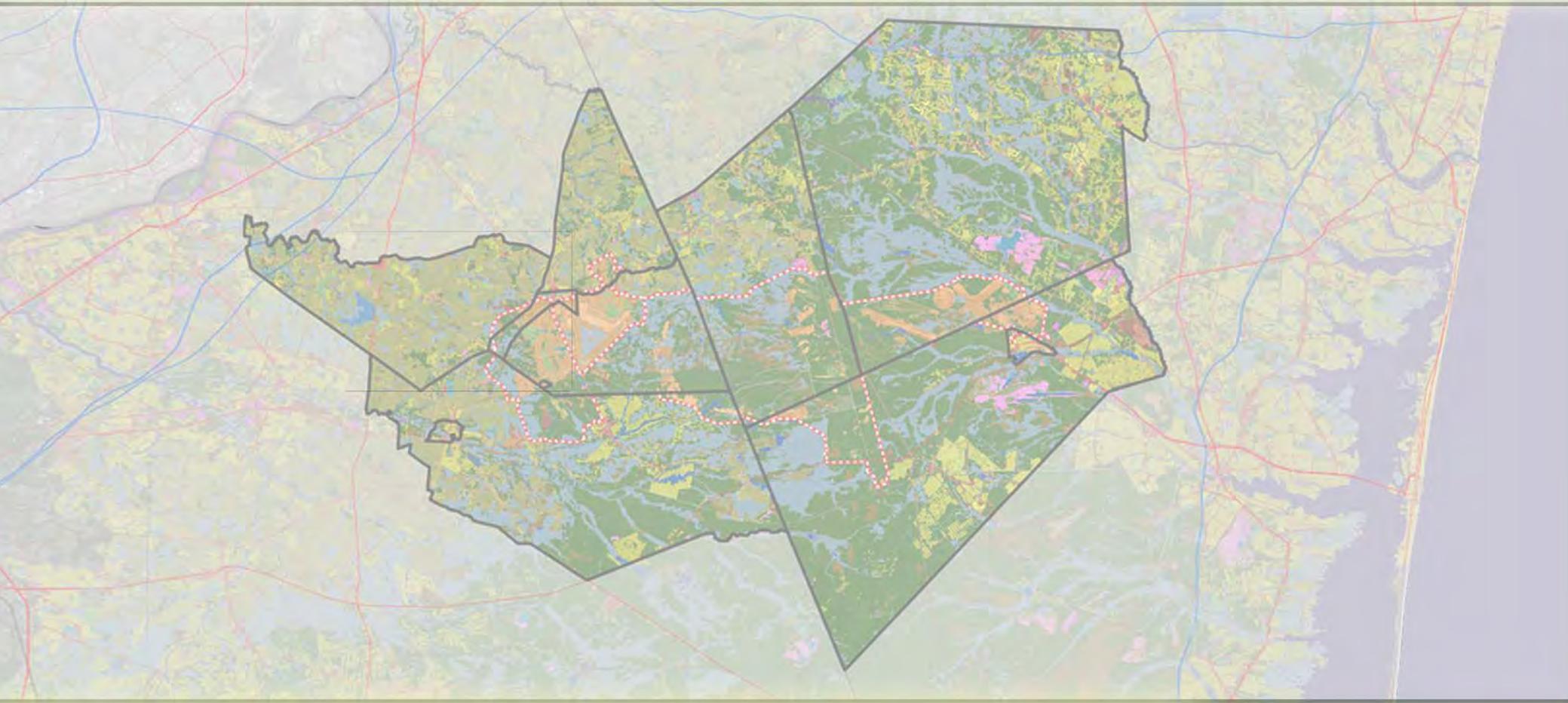


Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.21 - Manchester Township Build Out Analysis for Vacant and Farmland Assessed Lands



Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.6 - Plumsted Township

Existing Land Use

Plumsted Township is located to the north of Fort Dix and is bordered by North Hanover and New Hanover Townships of Burlington County to the west and Jackson Township to the east. Approximately half of Plumsted’s land area is part of Fort Dix lands. The New Egypt area of Plumsted is where most of Plumsted’s civilian population resides and is a designated town center within the State Development and Redevelopment Plan. Plumsted is an agricultural community that values and is looking to preserve its rural character. Plumsted’s planning goals include compact residential development with clustering of homes and an increase in greenways and connectors throughout the Town. A visioning process is ongoing for Main Street in Plumsted.

Approximately 26% percent of Plumsted Township falls within the 2-Mile JLUS Study Area, which intersects 6,660 acres through the central portion of the Township. Much of the study area consists of agricultural lands and sensitive wetland areas. The town of New Egypt is located within the northwestern edge of the study area. Table 7.6.1 displays land use areas of Plumsted Township that are located within the 2-Mile JLUS Study Area.

Table 7.6.1 indicates that the dominant land uses is agriculture, which encompasses over a third of the area within the study area. Wetland and forested areas are the second and third largest land uses, covering approximately 24% and 19% of the land area, respectively.

Table 7.6.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	2,517 acres	37.8%
Barren or Altered Lands	18 acres	0.3%
Brushland and Scrubland	179 acres	2.7%
Commercial Services	43 acres	0.7%
Deciduous, Coniferous, or Mixed Forest	1,276 acres	19.1%
Extractive Mining	83 acres	1.2%
Industrial Lands	2 acres	0.0%
Other Urban Lands	52 acres	0.8%
Recreational and Parkland	49 acres	0.7%
Reservoirs	65 acres	1.0%
Residential Lands	697 acres	10.5%
River Channel, Lake, or Pond	1 acres	0.0%
School	49 acres	0.7%
Transportation/Communication/Utilities	52 acres	0.8%
Wetland	1,581 acres	23.7%
Total (excluding Fort Dix lands)	6,664 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Zoning

Table 7.6.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.6.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agriculture	3,476 acres	54.2%
Business and Commercial	92 acres	1.4%
Conservation, Recreation, and Open Space	32 acres	0.5%
Low Density Residential (less than 1 unit per acre)	519 acres	8.1%
Medium Density Residential (1-4 units per acre)	311 acres	4.8%
High Density Residential (more than 4 units per acre)	54 acres	0.8%
Preservation	1,924 acres	30.0%

Section 7.6 - Plumsted Township

Agricultural zoning is the largest composite zoning type in the Plumsted JLUS study area. This township specific zone is RA-5, Rural Agricultural, and is zoned for one residential dwelling per five acres. The composite preservation area consists of the FP zone, farmland preservation zone, and the FA zone, which is the Pinelands Forest Area designation. Plumsted’s township ordinances are supportive of the rights to farm and farmland preservation. Plumsted has the largest amount of farmland preserved in Ocean County.

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.6.3 shows vacant assessed lands summarized by zoning districts that permit residential development.

Table 7.6.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	RA-5	Rural Agricultural	217,800	312.6	63	135.3
High Density Residential	R-10	Residential	10,000	3.7	16	3.2
Low Density Residential	RD-2	Rural Development Area	152,460	15.8	5	2.3
Medium Density Residential	R-40	Rural Residential	40,000	15.1	16	8.6
Preservation	FA	Forest Area	784,080	172.3	10	166.7
				519.5	109	316.1

Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 520 acres of vacant assessed lands within the JLUS study area, of which 316 are considered to be environmentally constrained. According to the existing zoning regulations, 99 residential units are possible on vacant assessed lands within residential zoning districts and 10 units within the preservation zoning district.

Table 7.6.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	C-4	Commercial	40,000	13.5	1.8
				13.5	1.8

Table 7.6.5 Farmlands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	RA-5	Rural Agricultural	217,800	1,024.7	205	622.8
Low Density Residential	RD-1	Rural Development Area	152,460	77.9	22	20.6
	RD-2	Rural Development Area	152,460	155.3	44	93.3
Medium Density Residential	R-40	Rural Residential	40,000	28.2	31	10.7
Preservation	FA	Forest Area	784,080	8.3	0	7.4
				1,294.5	303	754.8

Table 7.6.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 14 acres of vacant assessed lands within the JLUS study area, of which 2 are considered to be environmentally constrained.

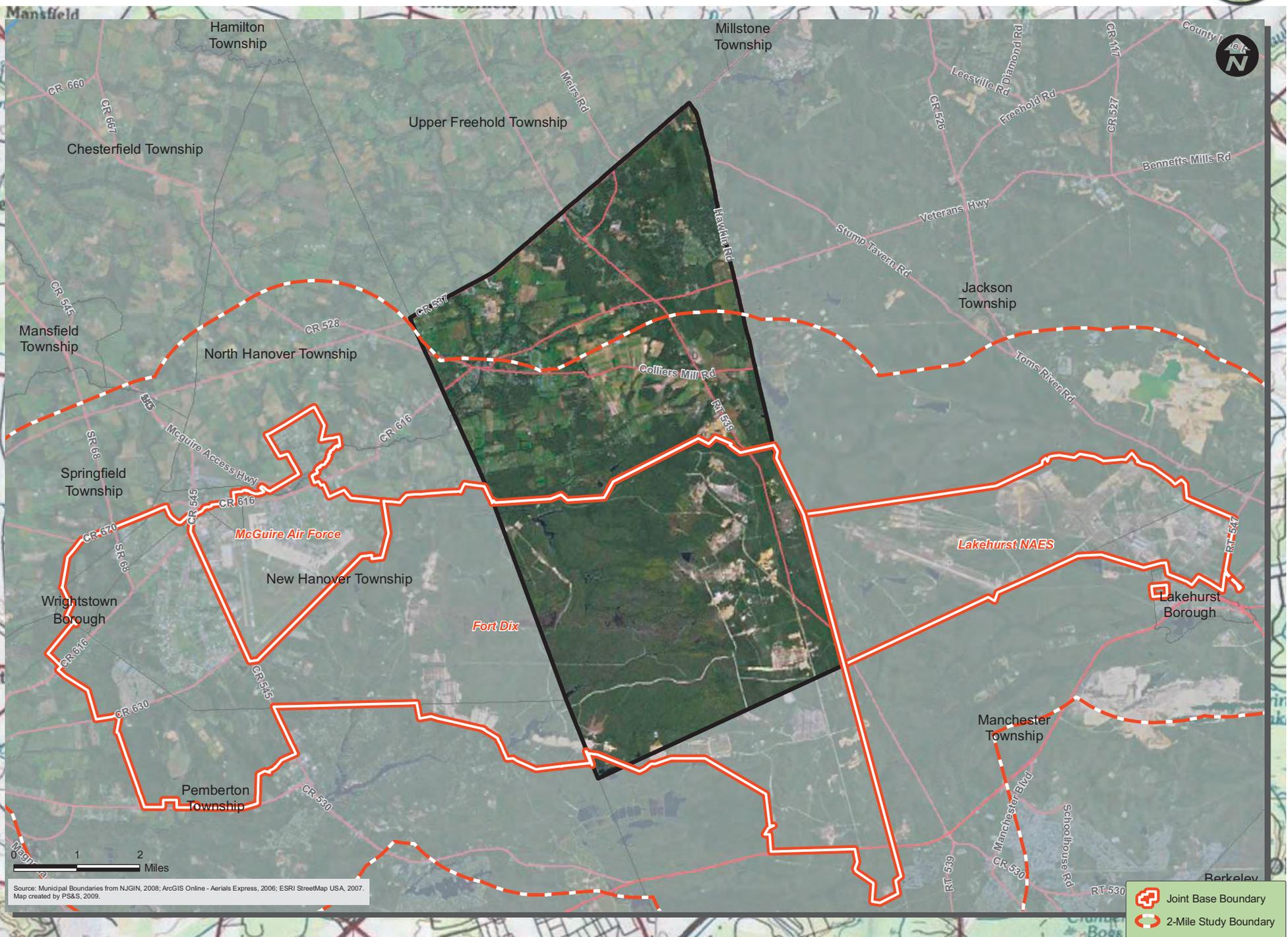
Table 7.6.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 1,295 acres of farm assessed lands within the JLUS study area, of which 755 are considered to be environmentally constrained. According to the existing zoning regulations, 303 residential units are possible on farm assessed lands within residential zoning districts; however, this is unlikely based upon the objectives stated in the township master plan. Based on this analysis, Plumsted Township has an insignificant amount of farmland assessed lands within non-residential zoning districts.

During the JLUS, two large parcels were in the preservation process for Plumsted. They are the Hyde Property, consisting of 110 acres and located by Brindletown and Kockamik Roads, and Jumping Brook property, consisting of 99 acres and located along Long Swamp Road.

Growth Analysis

- There is no public sewer in Plumsted. Given New Egypt's State Plan center designation and downtown revitalization plans underway, new growth is anticipated, but would need wastewater infrastructure. Sewer solutions are being researched with the State Office of Smart Growth, Ocean County, and representatives from NAES Lakehurst.
- Plumsted is currently in exceedance for water supply. Discussions are ongoing with American Water that could provide for future downtown development in New Egypt.
- Outside of the New Egypt center, little to no growth is anticipated due to agricultural zoning regulations and a right-to-farm ordinance.

Figure 7.22 - Plumsted Township Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

-  Joint Base Boundary
-  2-Mile Study Boundary

Figure 7.23 - Plumsted Township Land Use Map

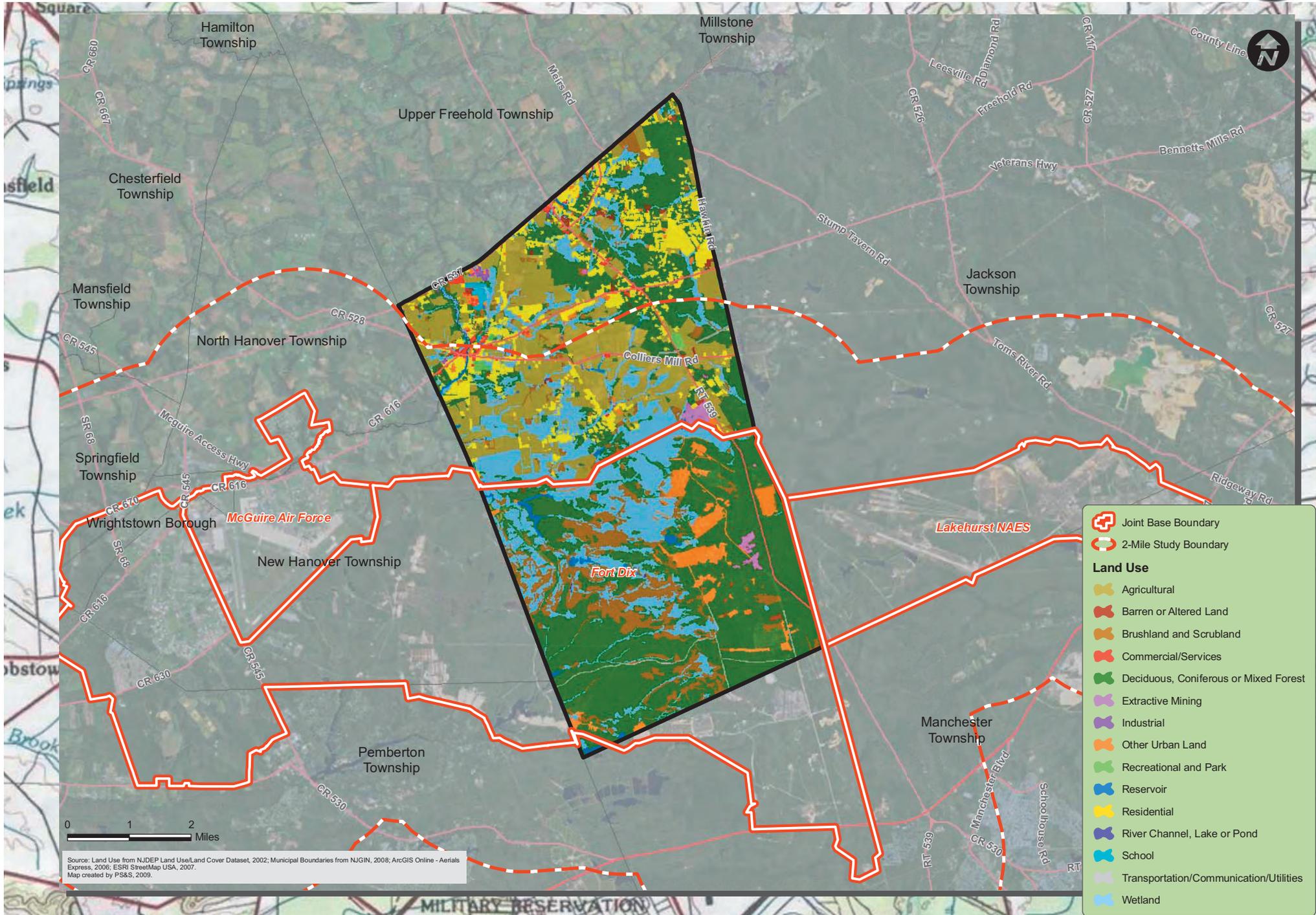
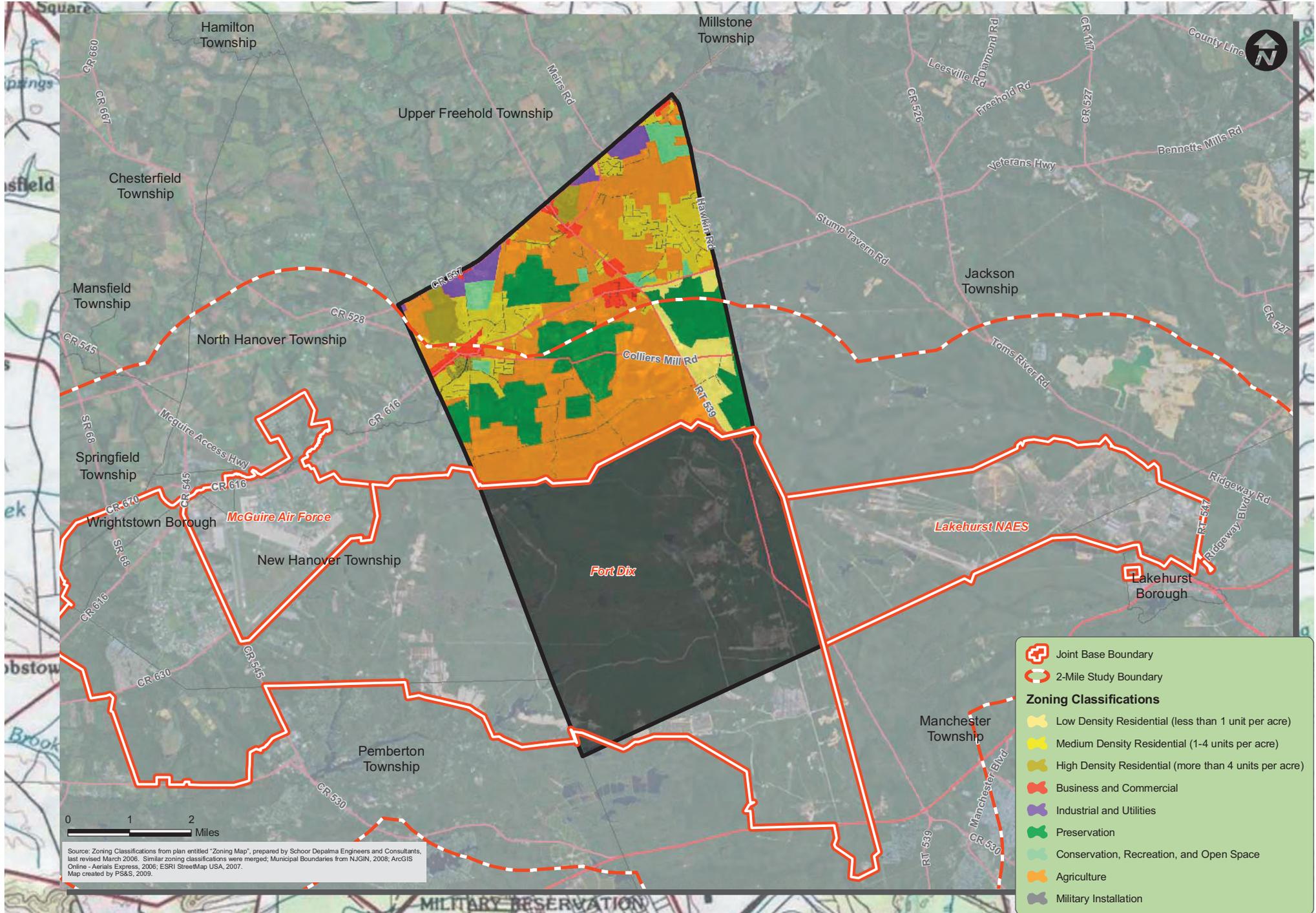
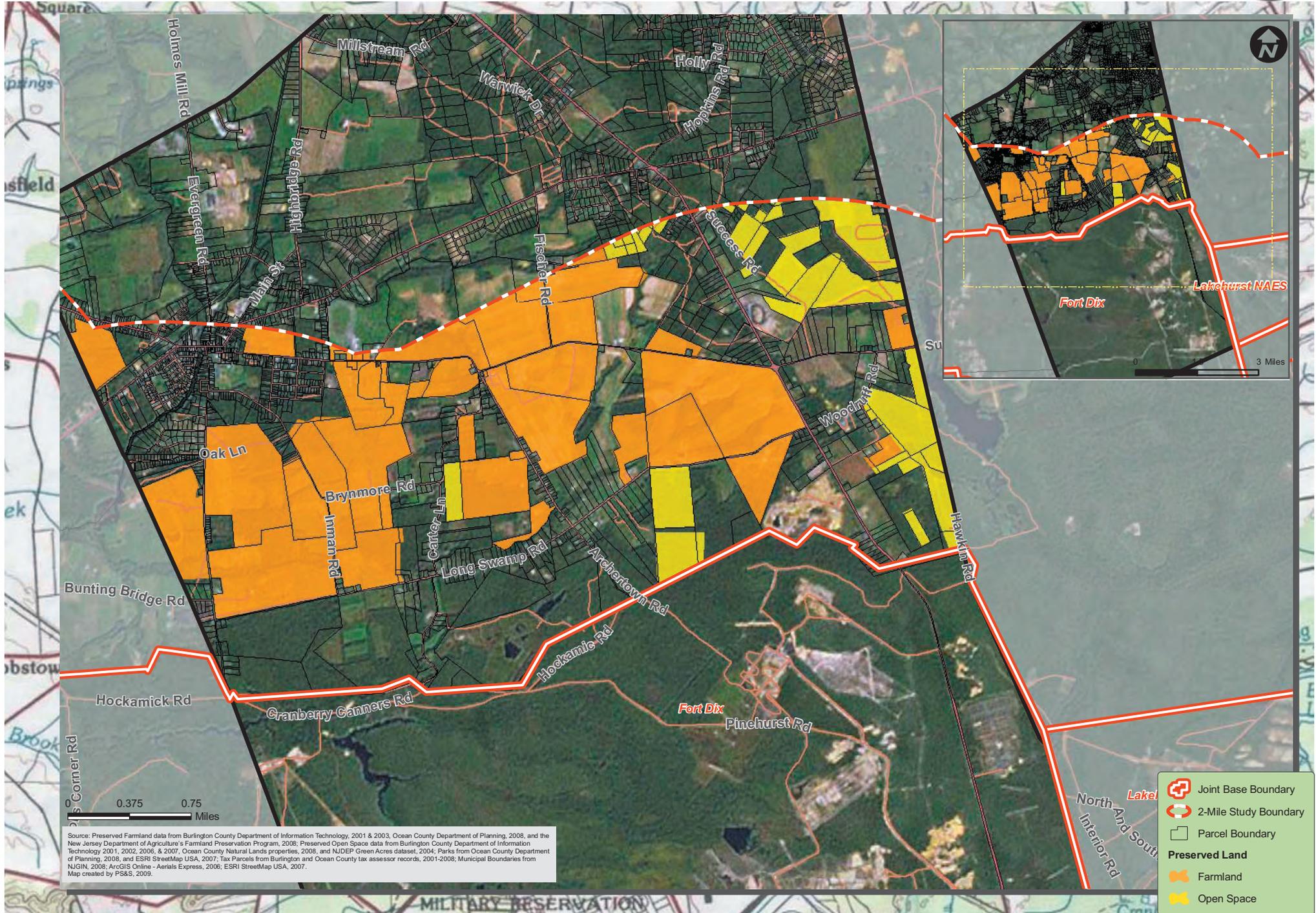


Figure 7.24 - Plumsted Township Zoning Map



Source: Zoning Classifications from plan entitled "Zoning Map", prepared by Schoor Depalma Engineers and Consultants, last revised March 2006. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

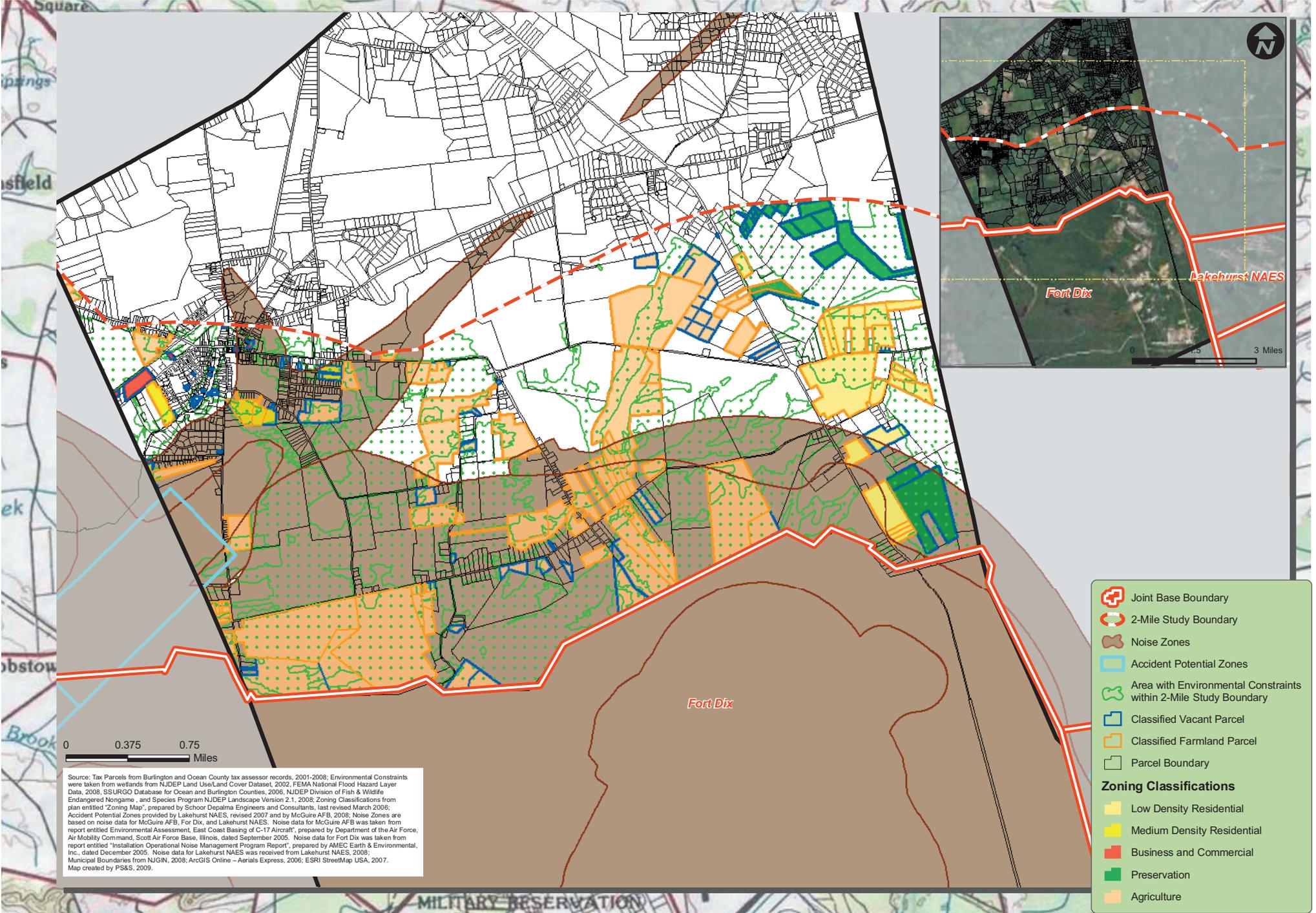
Figure 7.26 - Plumsted Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2008; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary
- Parcel Boundary
- Preserved Land**
- Farmland
- Open Space

Figure 7.28 - Plumsted Township Build Out Analysis for Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame, and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications from plan entitled "Zoning Map", prepared by Schoor Depalma Engineers and Consultants, last revised March 2006; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, For Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basing of C-17 Aircraft, prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Section 7.7 - Burlington County

Burlington County has the largest land area of any county in New Jersey and is in the Philadelphia-Camden metro area.

The Burlington County municipalities involved in the JLUS are:

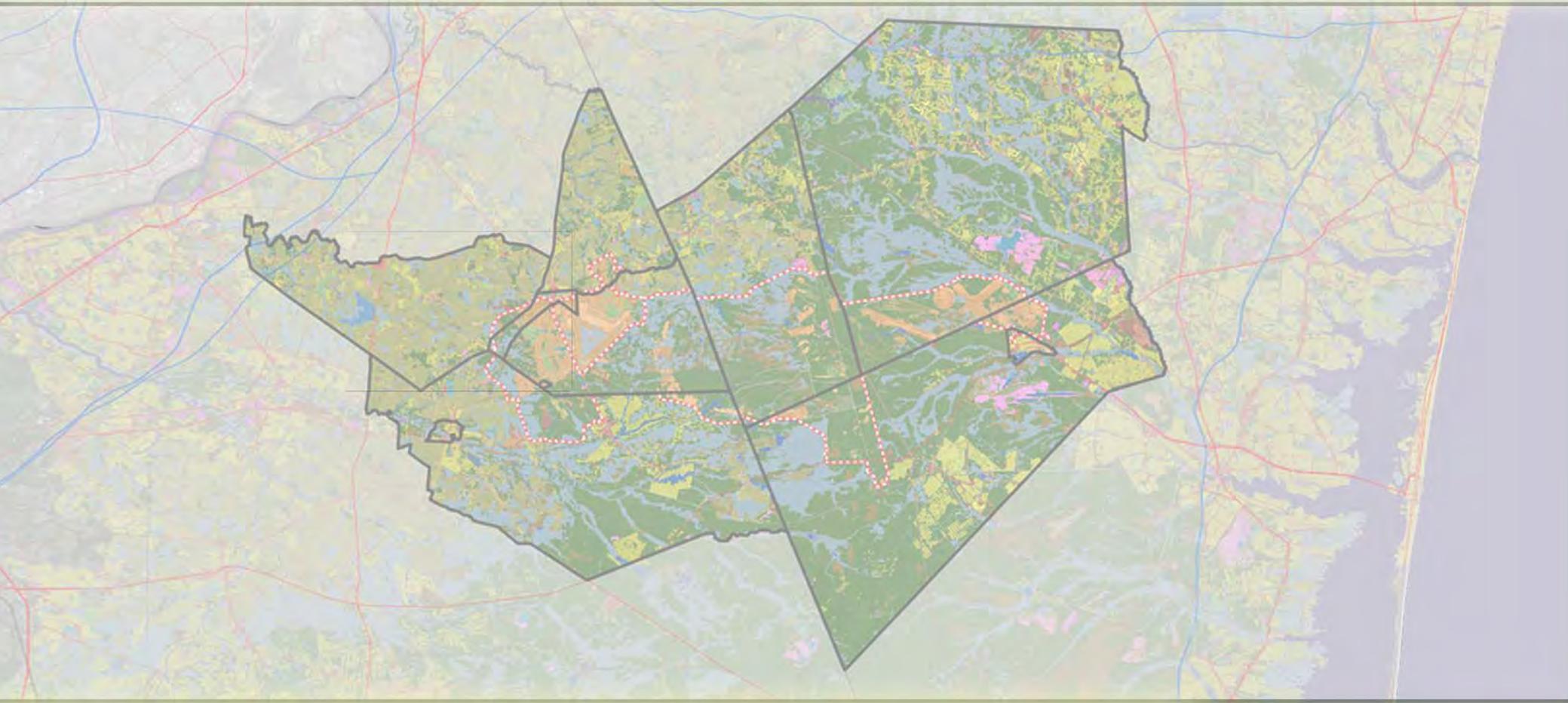
- New Hanover Township located to the north of McGuire AFB and Fort Dix
- North Hanover Township located to the north of McGuire AFB
- Pemberton Borough located to the southwest of Fort Dix
- Pemberton Township located to the south of Fort Dix
- Springfield Township located to the west of Fort Dix
- Wrightstown Borough located to the north of Fort Dix and to the west of McGuire AFB

The townships of Springfield, North Hanover, New Hanover and Pemberton are working to preserve farmland and agriculture industries, and would like to concentrate new growth and redevelopment in centers of place. Pemberton Borough is a smaller community with a main historic streetscape that is interested in infill development. Wrightstown Borough's history has been closely aligned with the nearby Bases. Historically, when a decline in the Base activity occurs, there is also an associated downturn in Wrightstown's economy. Wrightstown is actively working to revitalize their economic center with commercial industry that would be applicable to Base commuters as well as the regional community context.

In October 2008, Burlington County produced the North Burlington County Growth and Preservation Plan (GAPP), which presents a broad-based approach to conservation, preservation, and regional growth. This plan is referenced throughout this Burlington County JLUS municipality analysis.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.8 - New Hanover Township

Existing Land Use

Approximately 90% of New Hanover Township is owned by the Federal Government as part of the McGuire Air Force Base and the Fort Dix military reservation. Most of New Hanover’s population resides within the two bases. The civilian population resides within the Cookstown section of New Hanover. Cookstown is designated as a village center and has a mix of historic and modern housing. Agriculture strongly influences the land use and the character of Cookstown.

New Hanover Township has adopted the objective of preserving as much farmland as possible in the civil portion of the Township. The Planning Board adopted a Farmland Preservation Element of the Master Plan in November 2006 in support of its resolve to pursue farmland preservation. Lands in the northeastern portion of the Township were changed from Rural Planning Area to Rural Environmentally Sensitive lands to comply with the non-growth designation of the Northern Burlington County GAPP Land Use Concept Map.

Located immediately outside of the gate to McGuire AFB is a small commercial node. This commercial area offers conveniences to the population traveling in and out of the Base. Currently a motel, gas station, pizza restaurant, and a self storage warehouse are located in close vicinity to the Base gate. Some of the other local businesses, like Drytech on Wrightstown-Cookstown Road, hold contracts with the military and have located to the area to be in close vicinity to the bases.

Approximately 10% percent of New Hanover Township falls within the 2-Mile JLUS Study Area. The village center of Cookstown, located in the northeastern region of the Township, comprises all 1,400 acres of the study area. Much of the study area consists of agricultural and residential lands. Table 7.8.1 displays land use areas of New Township that are located within the 2-Mile JLUS Study Area.

Table 7.8.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	781 acres	56.1%
Barren or Altered Lands	1 acre	0.1%
Brushland and Scrubland	45 acres	3.2%
Commercial Services	31 acres	2.2%
Deciduous, Coniferous, or Mixed Forest	130 acres	9.4%
Industrial Lands	10 acres	0.7%
Other Urban Lands	23 acres	1.7%
Recreational and Parkland	8 acres	0.6%
Reservoirs	16 acres	1.2%
Residential Lands	152 acres	10.9%
River Channel, Lake or Pond	10 acres	0.7%
Transportation/Communication/Utilities	3 acres	0.2%
Wetland	181 acres	13.0%
Total (excluding McGuire lands)	1,391 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Table 7.8.1 indicates that the dominant land use in the 2-mile study area is agriculture followed by lands designated as wetlands.

Zoning

In recent years, New Hanover has created an Agricultural/Residential zone to buffer the military bases. This AR-10 zone requires 10 acres of land to each housing unit. This zone has provided a buffer or 2,000 – 3,000 feet of land directly north of McGuire and Fort Dix and should ensure lower development density.

McGuire’s accident potential zones do extend into the Cookstown limits, however much of the zones overlay into the very low density AR-10 zone and not the higher density residential zones of Cookstown’s village center. The Cookstown village center has single family residential zoning, public lands, and a village professional zone.

Section 7.8 - New Hanover Township

Table 7.8.2 Composite Zoning within the 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agriculture	697 acres	53.5%
Business and Commercial	101 acres	7.7%
Conservation, Recreation, and Open Space	3 acres	2.3%
Medium Density Residential (1-4 units per acre)	369 acres	28.4%
Preservation	105 acres	8.1%

Table 7.8.2 displays the composite zoning areas within the 2-Mile JLUS Study Area. Agricultural and Low Density residential zones consist of the most land within the JLUS study area. The township of New Hanover falls entirely within the study area.

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.8.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR	Agricultural/Residential	130,680	2.0	1	0.0
Medium Density Residential	R-25	Residential	25,000	1.9	3	0.0
	R-40	Residential	40,000	30.2	33	13.4
				34.1	37	13.4

Table 7.8.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 34 acres of vacant assessed lands within the JLUS study area, of which 13 are considered to be environmentally constrained. According to the existing zoning regulations, 36 residential units are possible on vacant assessed lands within residential zoning districts and 1 unit within the agriculture zoning district.

Table 7.8.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	GC	General Commercial	21,780	10.4	0.0
	NC	Neighborhood Commercial	10,890	0.8	0.0
				11.2	0.0

Table 7.8.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 11 acres of vacant assessed lands within the JLUS study area, of which none are considered to be environmentally constrained.

Table 7.8.5 Farmlands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR	Agricultural/Residential	130,680	674.9	225	337.6
Medium Density Residential	R-40	Residential	40,000	98.5	107	56.3
	R-40/1	Residential/Industrial	43,560	68.5	68	19.7
				841.9	401	413.6

Table 7.8.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 842 acres of farm assessed lands within the JLUS study area, of which 414 are considered to be environmentally constrained. According to the existing zoning regulations, 176 residential units are possible on farm assessed lands within residential zoning districts and 225 units within the agriculture zoning district; however, this is unlikely based upon the objectives stated in the township master plan.

Table 7.8.6 Farmlands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District	Zoning	Density	Total Farmland Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
	District Code	Town Zoning District	(Minimum Lot Area Sq. Ft.)	Zone (Ac.)	
Business and Commercial	GC	General Commercial	21,780	10.4	0.2
	NC	Neighborhood Commercial	10,890	25.3	0.2
				35.7	0.4

Table 7.8.6 shows farm assessed lands summarized by zoning districts that permit non-residential development. There are 36 acres of farm assessed lands within the JLUS study area, of which less than 1 acre is considered to be environmentally constrained.

There are 1,473 acres in New Hanover with 334 outside of the base boundaries. In 2005 there were 230 housing units in the Cookstown area. New Hanover states in its Master Plan it must be responsive to the needs of the military and this includes utilizing farmland preservation to buffer the bases from development and protecting the edges around the bases. The flight patterns of aircraft are to be acknowledged and development kept away from flight easement areas.

Growth Analysis

- The Cookstown area does not have sewer capacity and has a failing sewer infrastructure from the 1960’s – 1970’s. Due to new septic requirements, and the existing infrastructure, growth is limited unless other considerations are made. The nearby municipality of Wrightstown has a public sewer system with excess capacity. The municipalities have discussed using some of the capacity for the nearby development in Cookstown.
- The Sunnymead residential community is almost complete. A nearby previously-approved development, New Hanover Estates, must resubmit required development applications due to an expired approval and to new septic and storm water standards, before it can be developed.
- New Hanover is in the process of identifying a redevelopment area. New retail businesses and restaurants are considered for the area.

Figure 7.30 - New Hanover Township Land Use Map

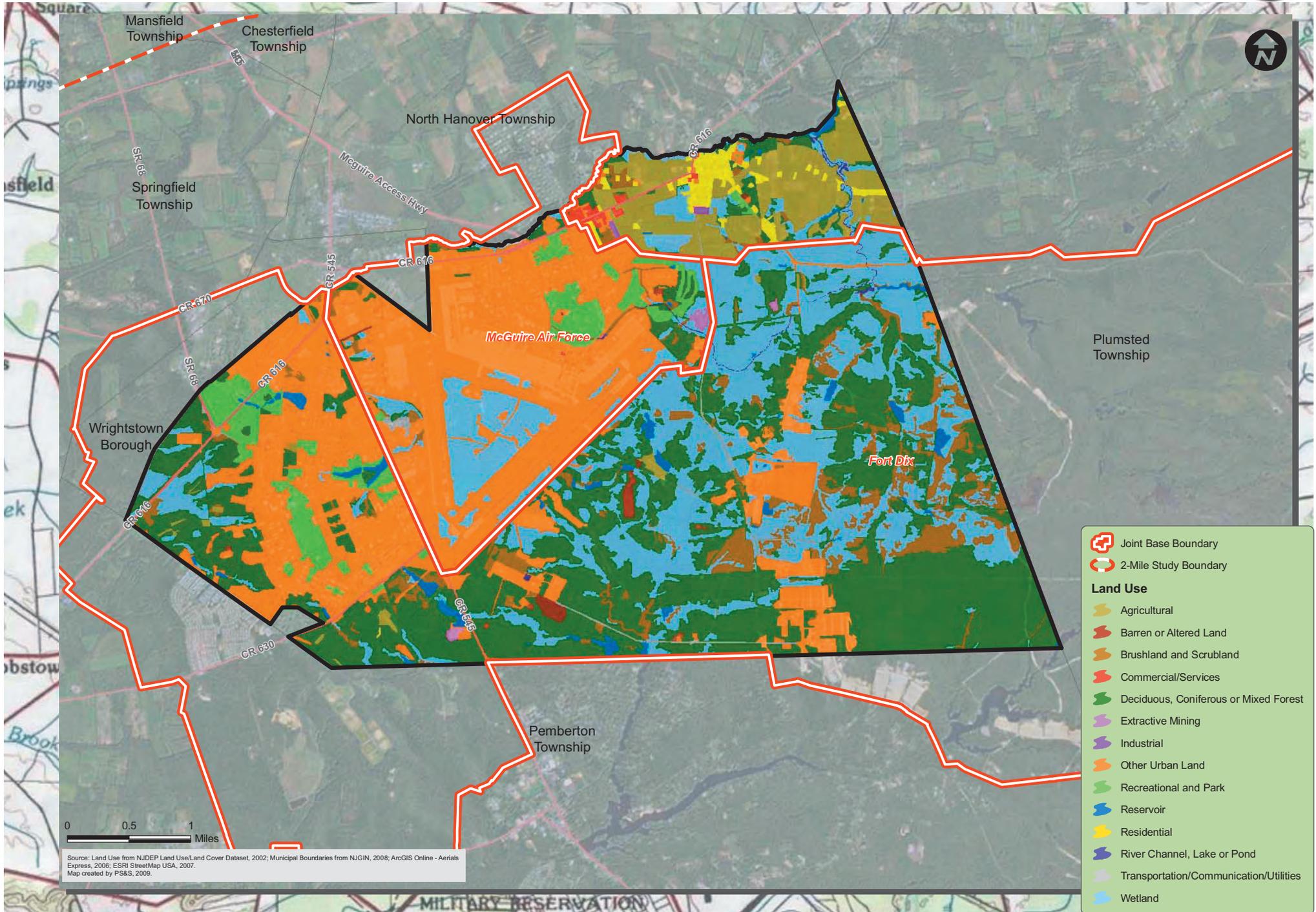
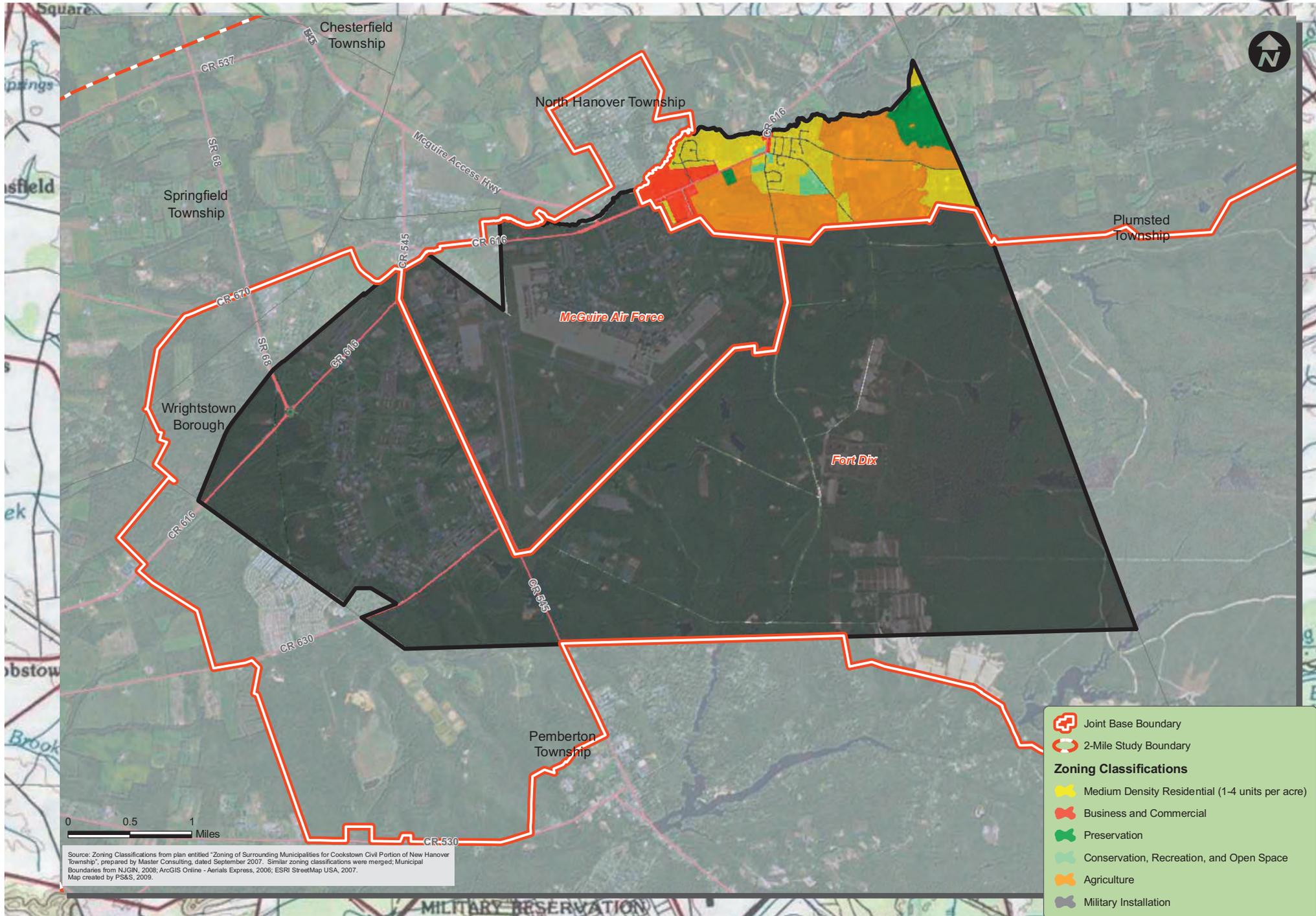


Figure 7.31 - New Hanover Township Zoning Map

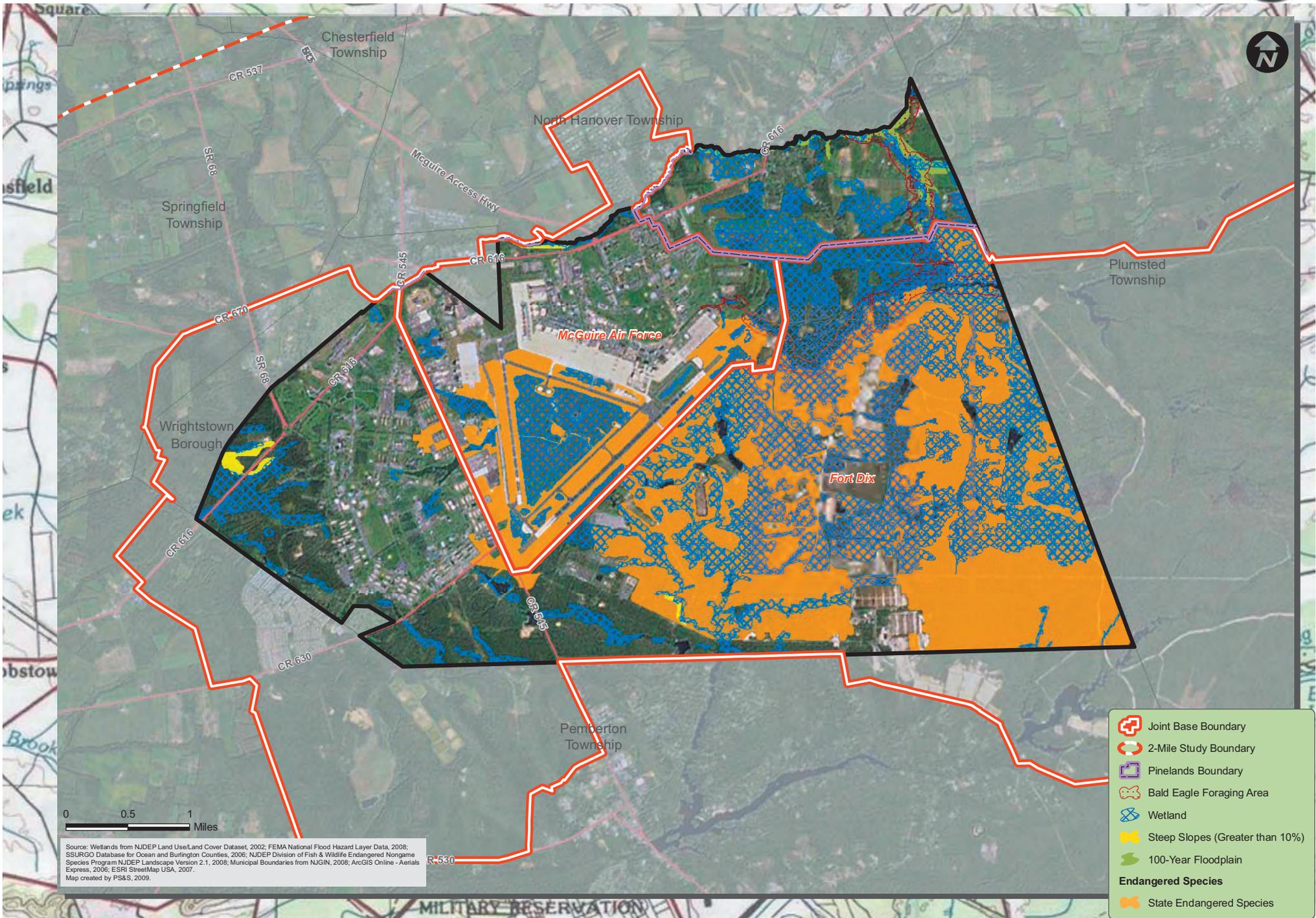


Source: Zoning Classifications from plan entitled "Zoning of Surrounding Municipalities for Cookstown Civil Portion of New Hanover Township", prepared by Master Consulting, dated September 2007. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Legend

- Joint Base Boundary
- 2-Mile Study Boundary
- Zoning Classifications**
- Medium Density Residential (1-4 units per acre)
- Business and Commercial
- Preservation
- Conservation, Recreation, and Open Space
- Agriculture
- Military Installation

Figure 7.32 - New Hanover Township Environmental Constraints Map

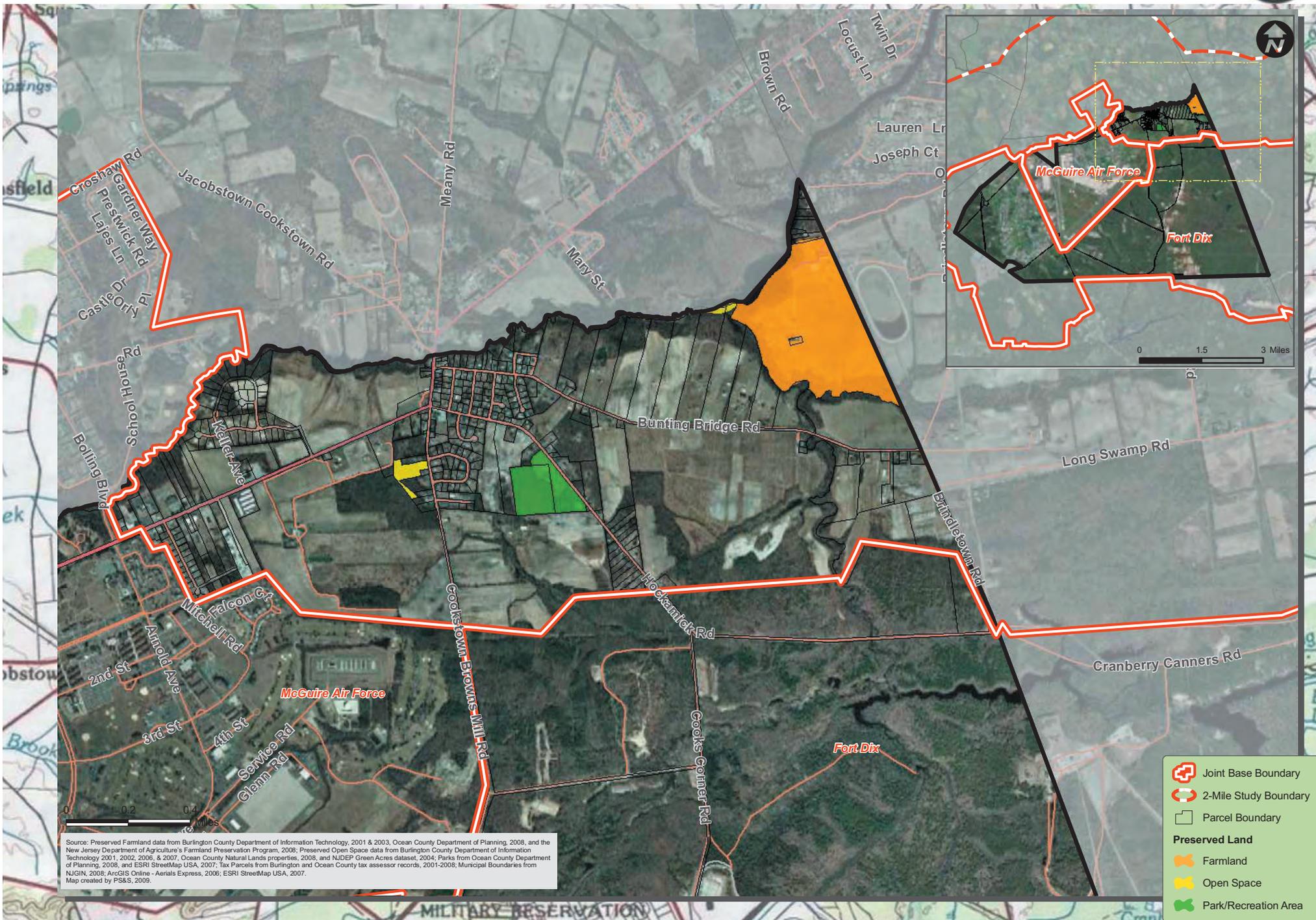


0 0.5 1 Miles

Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by P&S, 2009.

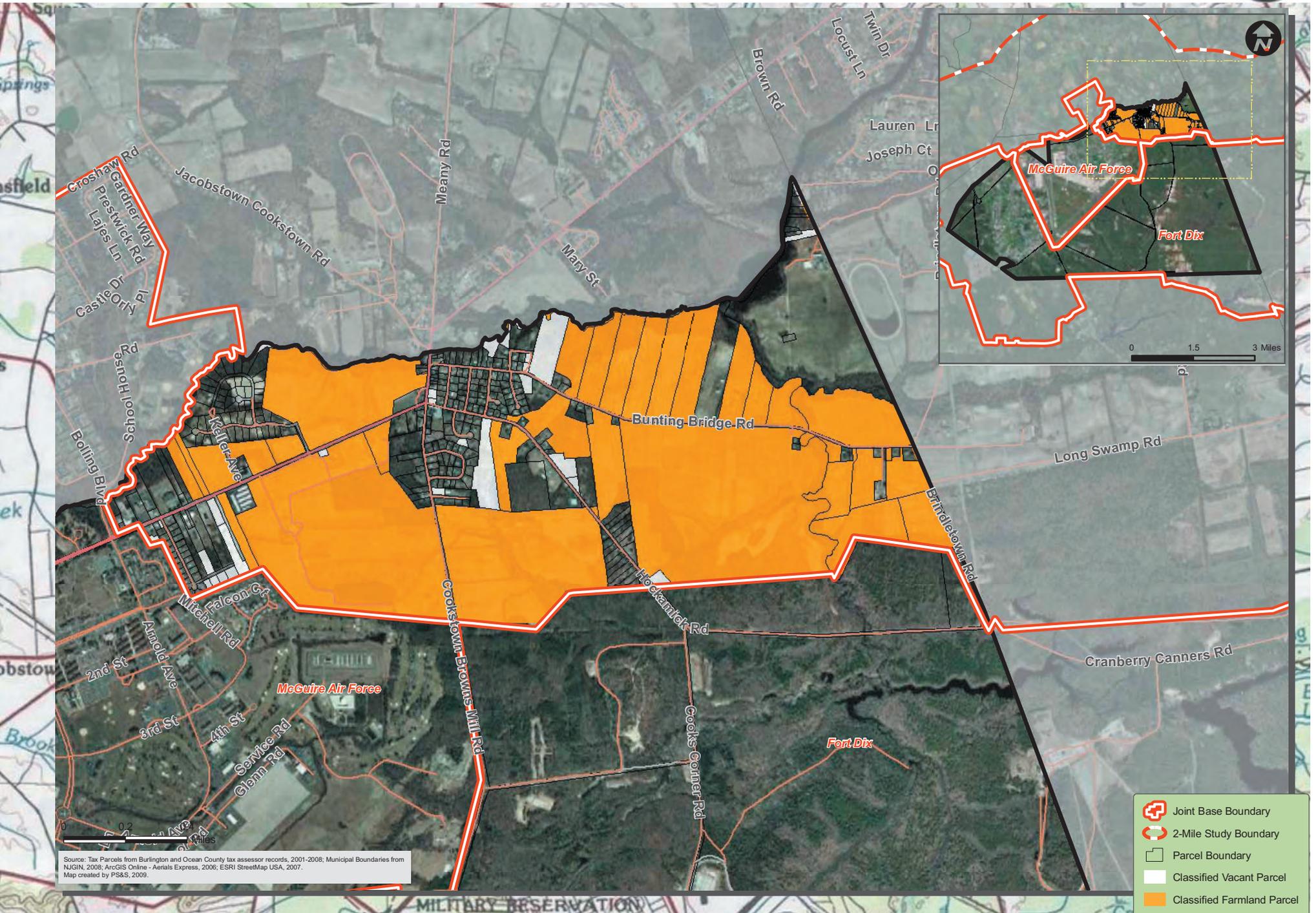
- Joint Base Boundary
- 2-Mile Study Boundary
- Pinelands Boundary
- Bald Eagle Foraging Area
- Wetland
- Steep Slopes (Greater than 10%)
- 100-Year Floodplain
- Endangered Species**
- State Endangered Species

Figure 7.33 - New Hanover Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by P&S, 2009.

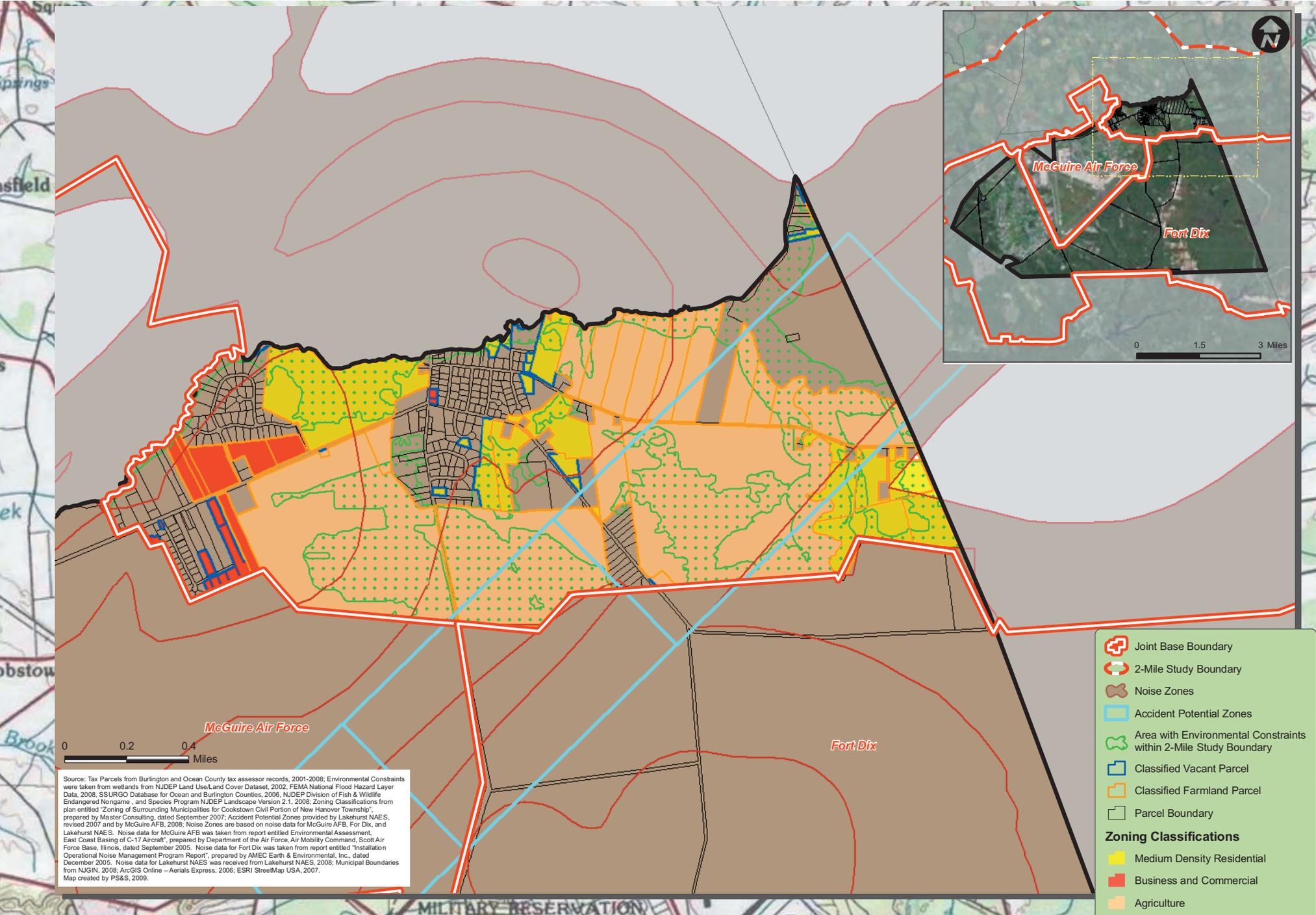
Figure 7.34 - New Hanover Township Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NCGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

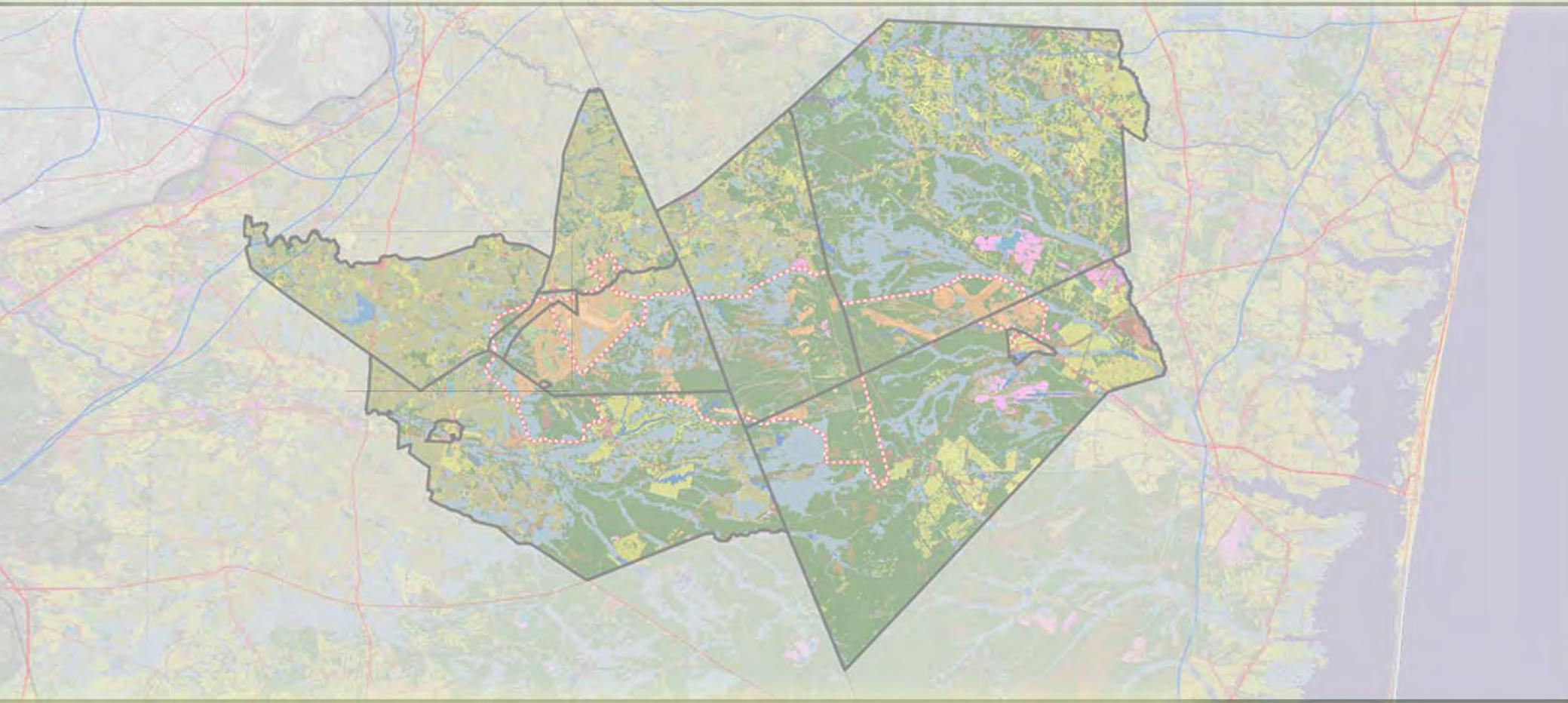
- Joint Base Boundary
- 2-Mile Study Boundary
- Parcel Boundary
- Classified Vacant Parcel
- Classified Farmland Parcel

Figure 7.35 - New Hanover Township Build Out Analysis for Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame, and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications from plan entitled "Zoning of Surrounding Municipalities for Cookstown Civil Portion of New Hanover Township", prepared by Master Consulting, dated September 2007; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basing of C-17 Aircraft, prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005; Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PSS&S, 2009.

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.9 - North Hanover Township

Existing Land Use

North Hanover is located directly north of McGuire Air Force Base. The Township is 17.5 square miles and had a population of 7,347 as of the 2000 Census. Approximately, 40% of the housing units and 45% of the population reside in the area owned by the McGuire Air Force Base. Agriculture is the largest industry for North Hanover Township. To date, 3,350 acres of farmland have been permanently preserved. Commercial development is clustered near Wrightstown along the Route 545 corridor and is part of a planned Town Center and redevelopment area. Much of the residential properties are located in Jacobstown and along the major thru routes in the Township. Jacobstown is a historic crossroad settlement that includes the municipal building, an elementary school, two churches and a firehouse. Almost 2,000 acres of the total Township area is forested.

Approximately 55% percent of North Hanover Township falls within the 2-Mile JLUS Study Area, which intersects the southern half of the Township. Much of the area consists of agricultural lands. The towns of Jacobstown and Sykesville are located within the study area. Table 7.9.1 displays land use areas of North Township that are located within the 2-Mile JLUS Study Area.

Table 7.9.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	2,826 acres	45.7%
Barren or Altered Lands	55 acres	0.9%
Brushland and Scrubland	194 acres	3.1%
Commercial Services	97 acres	1.6%
Deciduous, Coniferous, or Mixed Forest	1,127 acres	18.2%
Extractive Mining	5 acres	0.1%
Industrial Lands	13 acres	0.2%
Other Urban Lands	126 acres	2.0%
Recreational and Parkland	36 acres	0.6%
Reservoirs	44 acres	0.7%
Residential Lands	813 acres	13.2%
School	33 acres	0.5%
Transportation/Communication/Utilities	52 acres	0.8%
Wetland	757 acres	12.3%
Total (excluding McGuire lands)	6,178 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

An analysis of the existing lands within the 2-mile study area indicates that a large portion of the lands is used for agriculture. The Jacobstown and Sykesville areas of North Hanover have a concentration of residential housing outside of the Joint Base noise contours, however a part of the Sykesville area is located within the APZ II zone. Some residential lands located along Maple Avenue may be affected by noise associated with Joint Base activity.

Section 7.9 - North Hanover Township

Zoning

North Hanover’s zoning reflects a desire to preserve farmland. Jacobstown and Sykesville are the largest residential zones with much of the Township being zoned Residential Single Family /Agriculture. This zone allows for a minimum lot area of 2-5 acres per single family dwelling.

Table 7.9.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.9.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agricultural	489 acres	82.1%
Business and Commercial	251 acres	4.2%
Industrial and Utilities	198 acres	3.3%
Low Density Residential (less than 1 unit per acre)	478 acres	8.0%
Medium Density Residential (1-4 units per acre)	143 acres	2.4%

Build Out Capacity for 2-Mile JLUS Study Area

Table. 7.9.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	R-A	Residential-Agricultural	87,120	243.7	122	90.0
Low Density Residential	R-1	Residential-Two Acres	87,120	23.7	12	7.8
	R-A	Residential-Agricultural	87,120	0.0	0	0.0
Medium Density Residential	R-2	Residential High Density	22,000	2.6	5	0.0
				270.0	139	97.9

Table 7.9.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 270 acres of vacant assessed lands within the JLUS study area, of which 98 are considered to be environmentally constrained. According to the existing zoning regulations, 17 residential units are possible on vacant assessed lands within residential zoning districts and 122 units within the agriculture zoning district.

Table. 7.9.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	C-1	Commercial	43,560	16.8	4.9
	C-2	Commercial-Professional	25,000	39.8	3.0
				56.6	7.9

Table 7.9.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 57 acres of vacant assessed lands within the JLUS study area, of which 8 are considered to be environmentally constrained.

Table 7.9.5 Farmlands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	R-A	Residential-Agricultural	87,120	1,609.1	805	440.9
Low Density Residential	R-1	Residential-Two Acres	87,120	20.5	10	0.0
				1,629.6	815	440.9

Table 7.9.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 1,630 acres of farm assessed lands within the JLUS study area, of which 441 are considered to be environmentally constrained. According to the existing zoning regulations, 10 residential units are possible on farm assessed lands within the residential zoning district and 805 units within the agriculture zoning district; however, this is unlikely based upon the objectives stated in the township master plan.

Table 7.9.6 Farmlands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	C-1	Commercial	43,560	4.4	0.0
	C-2	Commercial-Professional	25,000	0.5	0.4
Industrial and Utilities	IND	Industrial	43,560	107.0	1.7
				111.9	2.1

Table 7.9.6 shows farm assessed lands summarized by zoning districts that permit non-residential development. There are 112 acres of farm assessed lands within the JLUS study area, of which 2 are considered to be environmentally constrained.

The approach of North Hanover Township with regard to new development includes concentrated density for new residential units to preserve farmland. The Township is undergoing a process for town center concepts. The proposed town center would be adjacent to Wrightstown Borough. Three concept plans were created after workshops in the Town. All concepts incorporated the Base Accident Potential Zones and noise zones. In each concept Open Space/Recreation and Recreational Trails were proposed to be located where the Accident Potential Zones overlay. The Township is identifying sewer solutions, however plans for access to sewers are limited to the redevelopment area and Town Center. Currently private septic systems and wells serve the township with exception to the McGuire Air Force Base housing and school areas and three mobile home parks.

Growth Analysis

- North Hanover is planning for future development in close proximity to Wrightstown Borough as part of a multi-municipal Town Center.
- North Hanover presently has a COAH surplus.
- The Ames Center along Wrightstown-Sykesville Road was recently sold and but would need water and sewer for any major land use changes.
- A build out analysis was performed by the Burlington County Department of Economic Development and Regional Planning in July of 2007. The study concluded that there are 982 developable lots in the RA Rural Agricultural district.
- North Hanover is working on a non-contiguous clustering ordinance and exploring Transfer of Development Rights (TDR). Neither is yet in effect.
- Lands located in the southeastern portion of North Hanover Township were changed from Rural (PA 4) planning area to Rural Environmentally Sensitive (PA 4B) planning area as part of the recommendations issued during the State Plan third-round cross-acceptance process, which may inhibit to growth in this area.

Figure 7.36 - North Hanover Township Overview Map

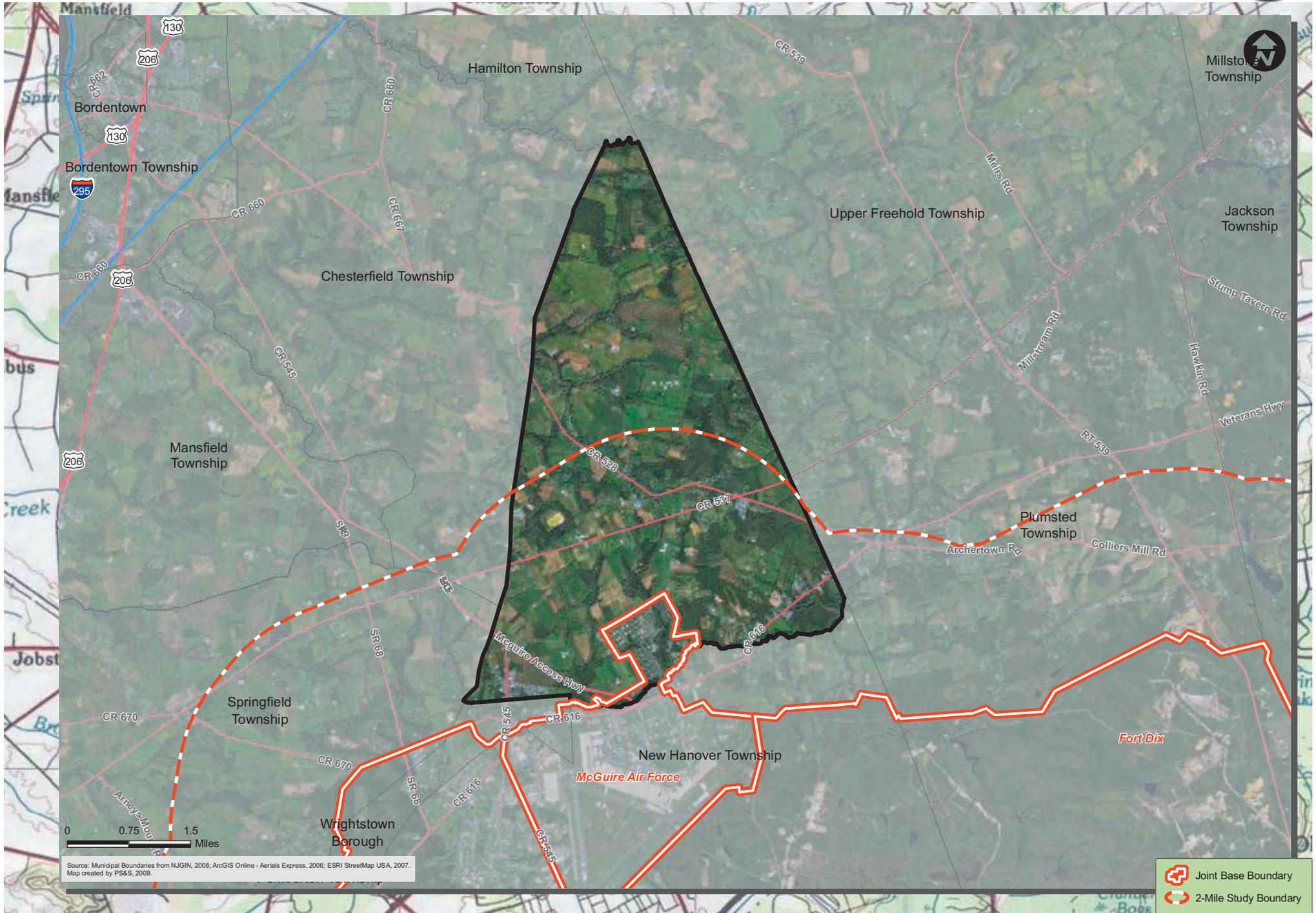


Figure 7.37 - North Hanover Township Land Use Map

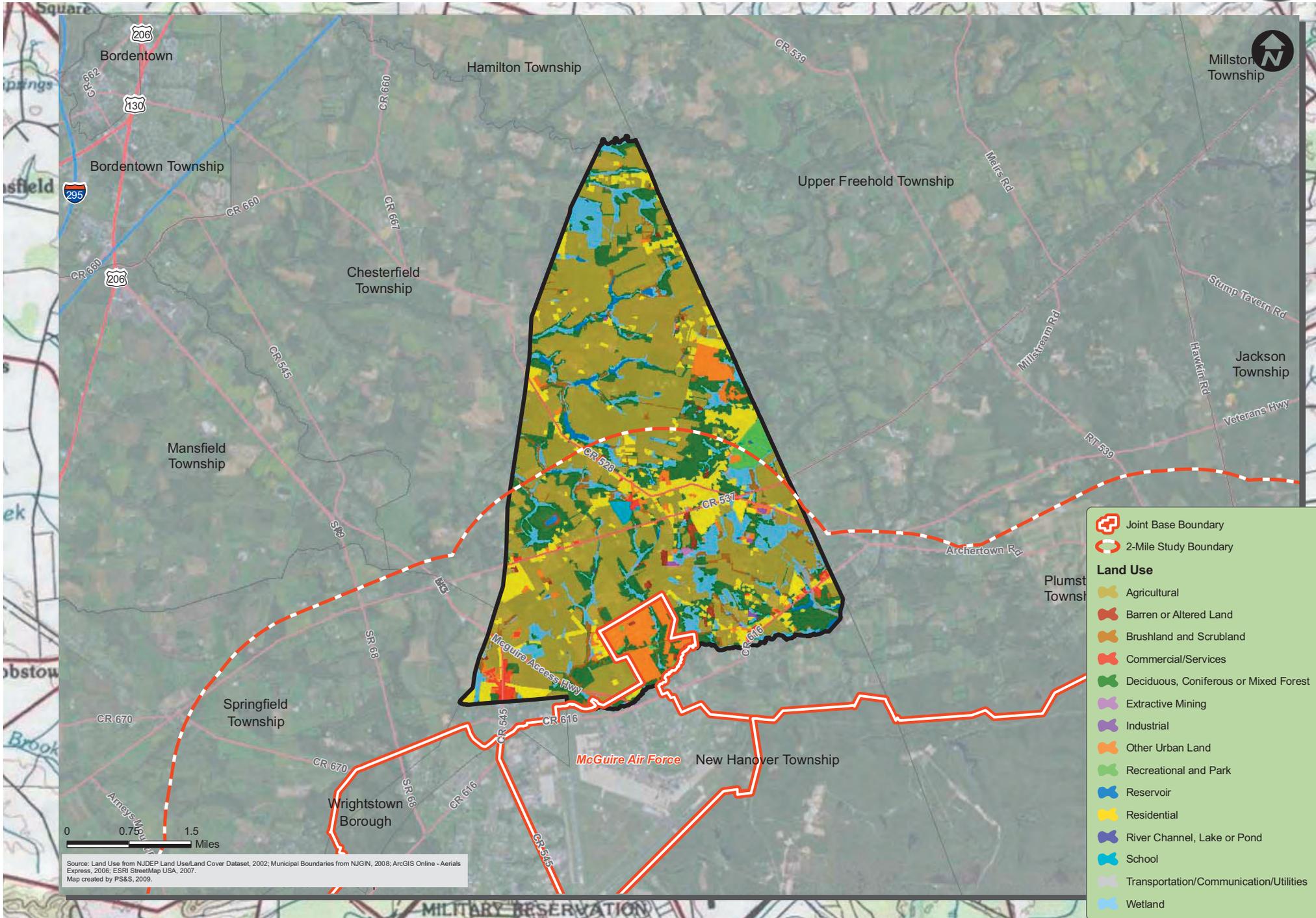
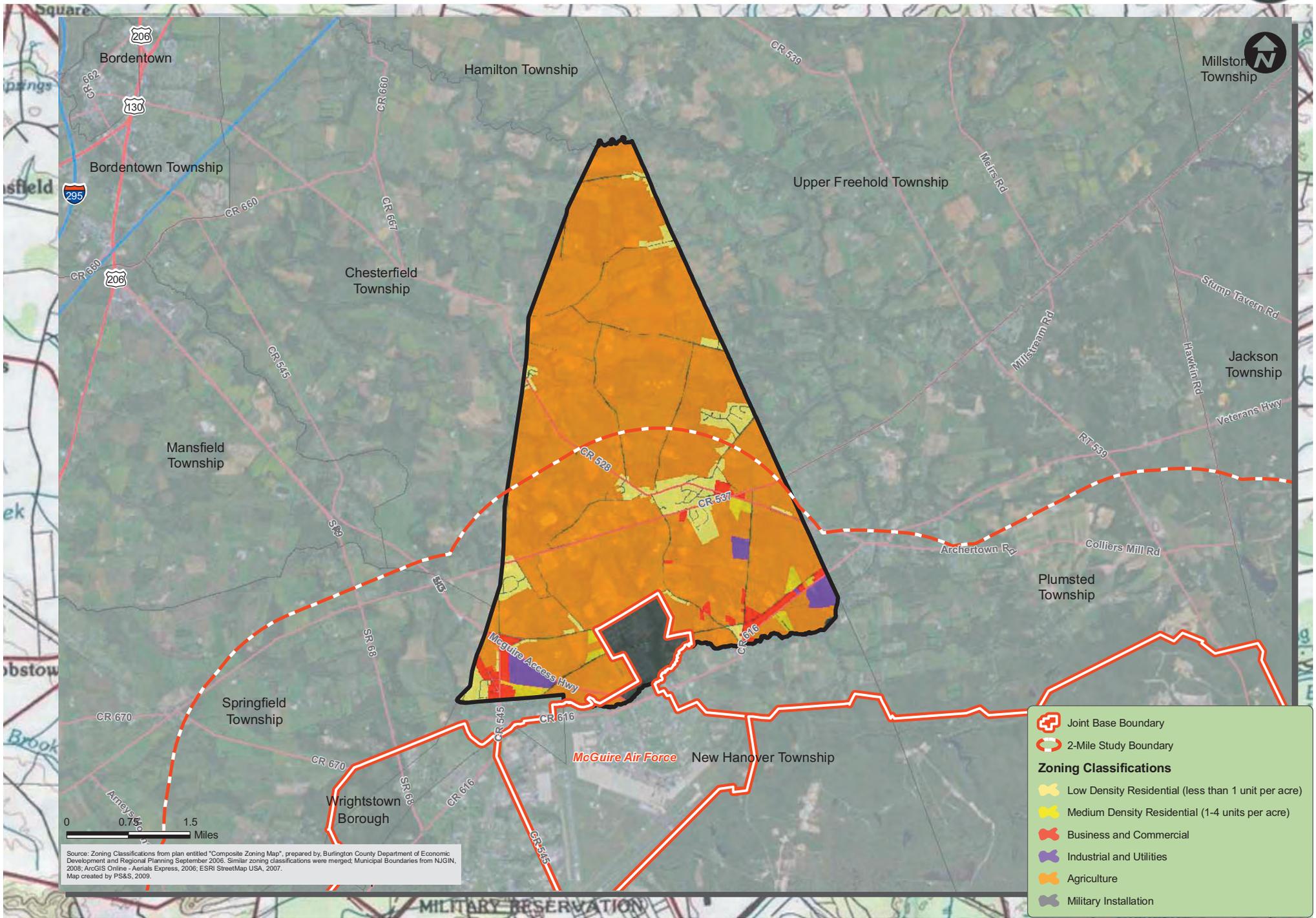
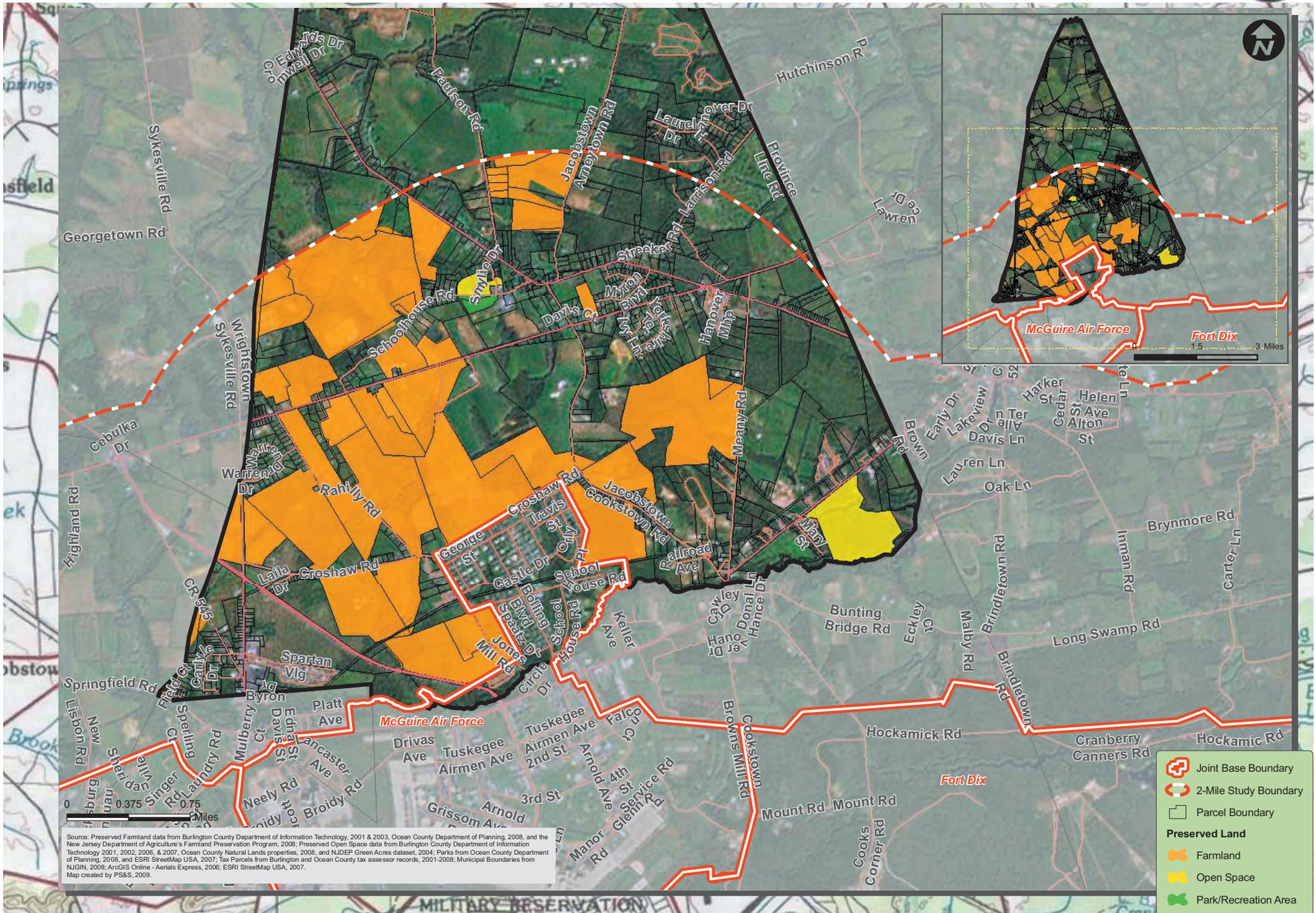


Figure 7.38 - North Hanover Township Zoning Map



Source: Zoning Classifications from plan entitled "Composite Zoning Map", prepared by Burlington County Department of Economic Development and Regional Planning September 2016. Similar zoning classifications were merged; Municipal Boundaries from NUGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.40 - North Hanover Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology, 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.41 - North Hanover Township Vacant and Farmland Assessed Lands

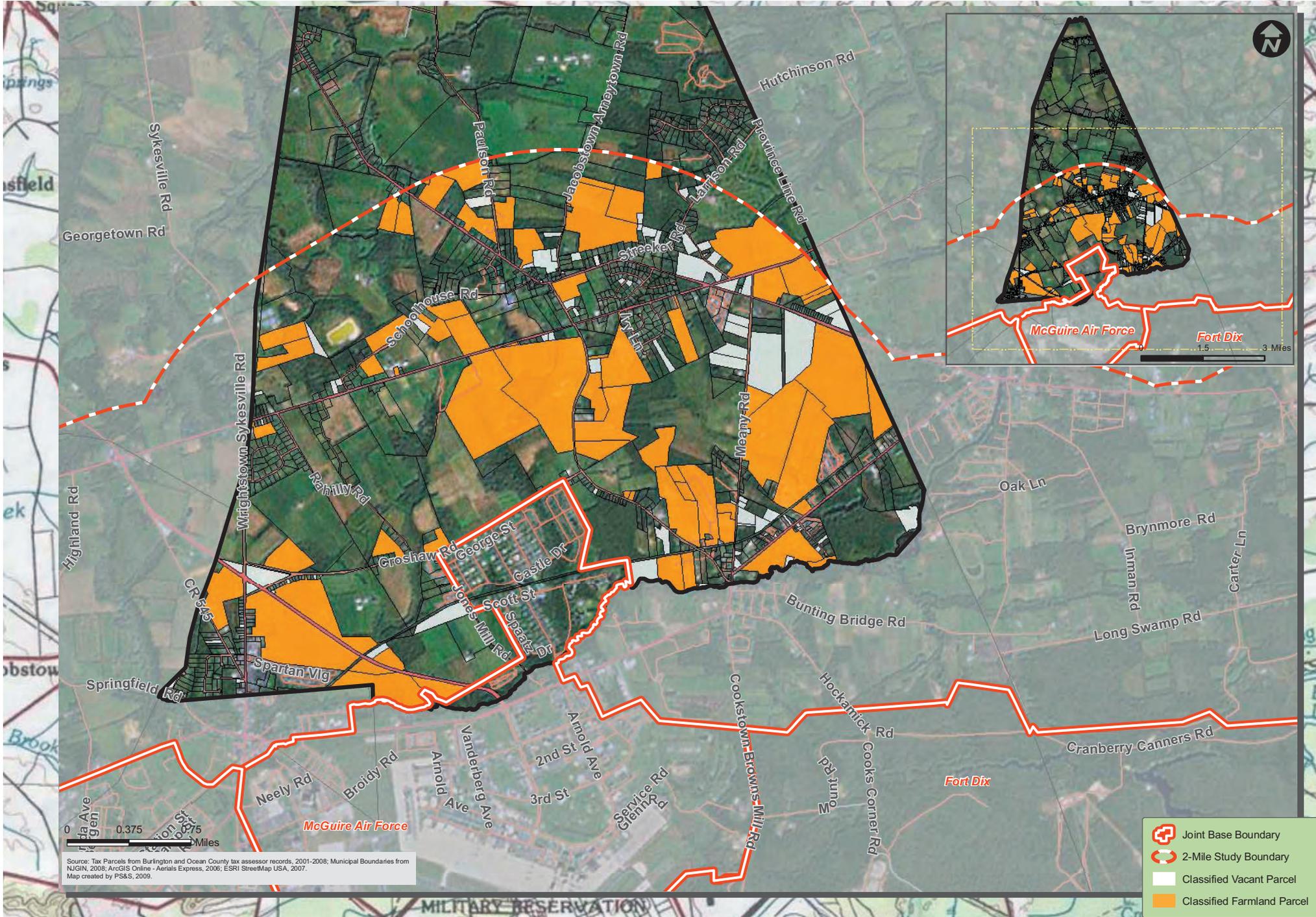
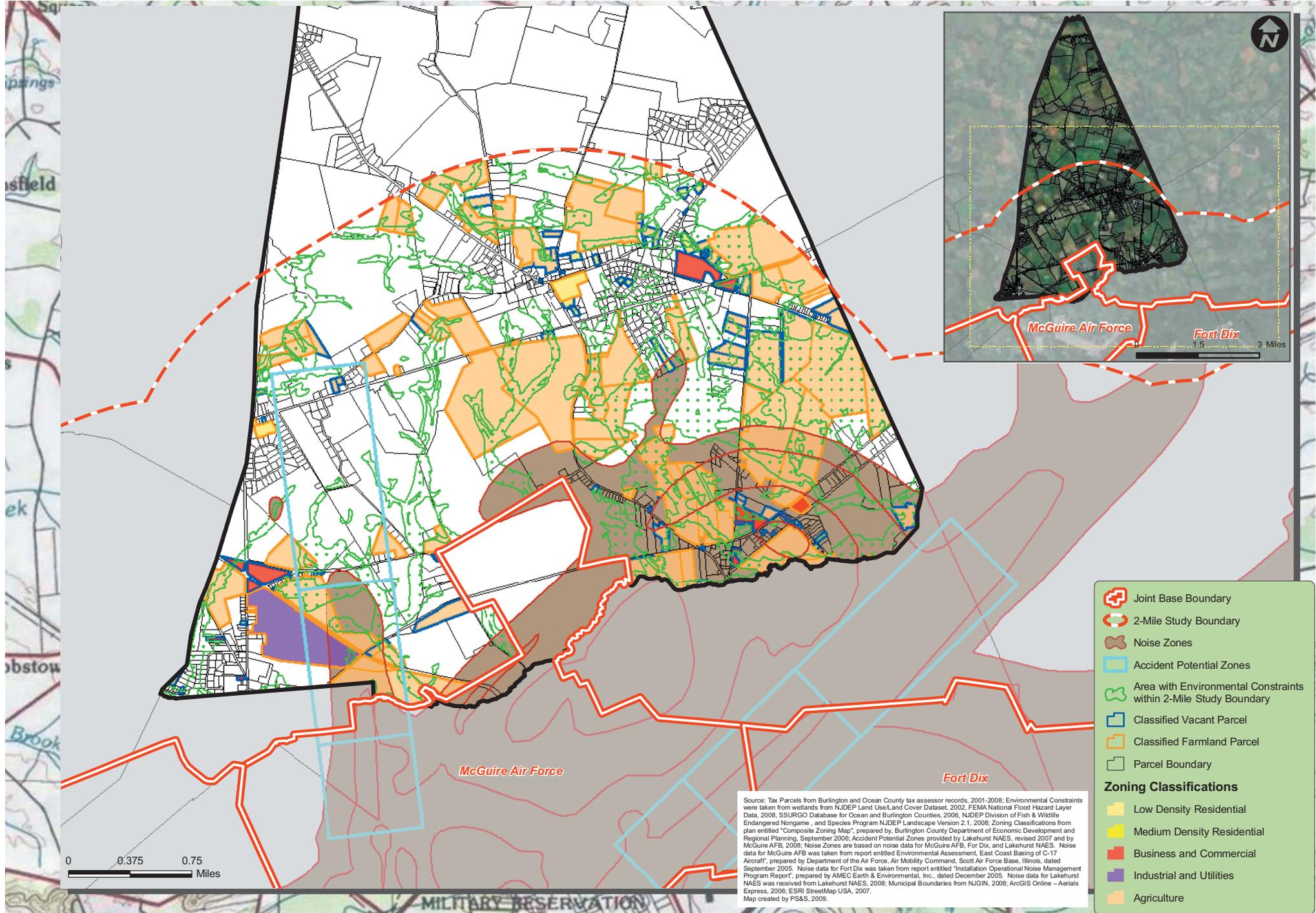
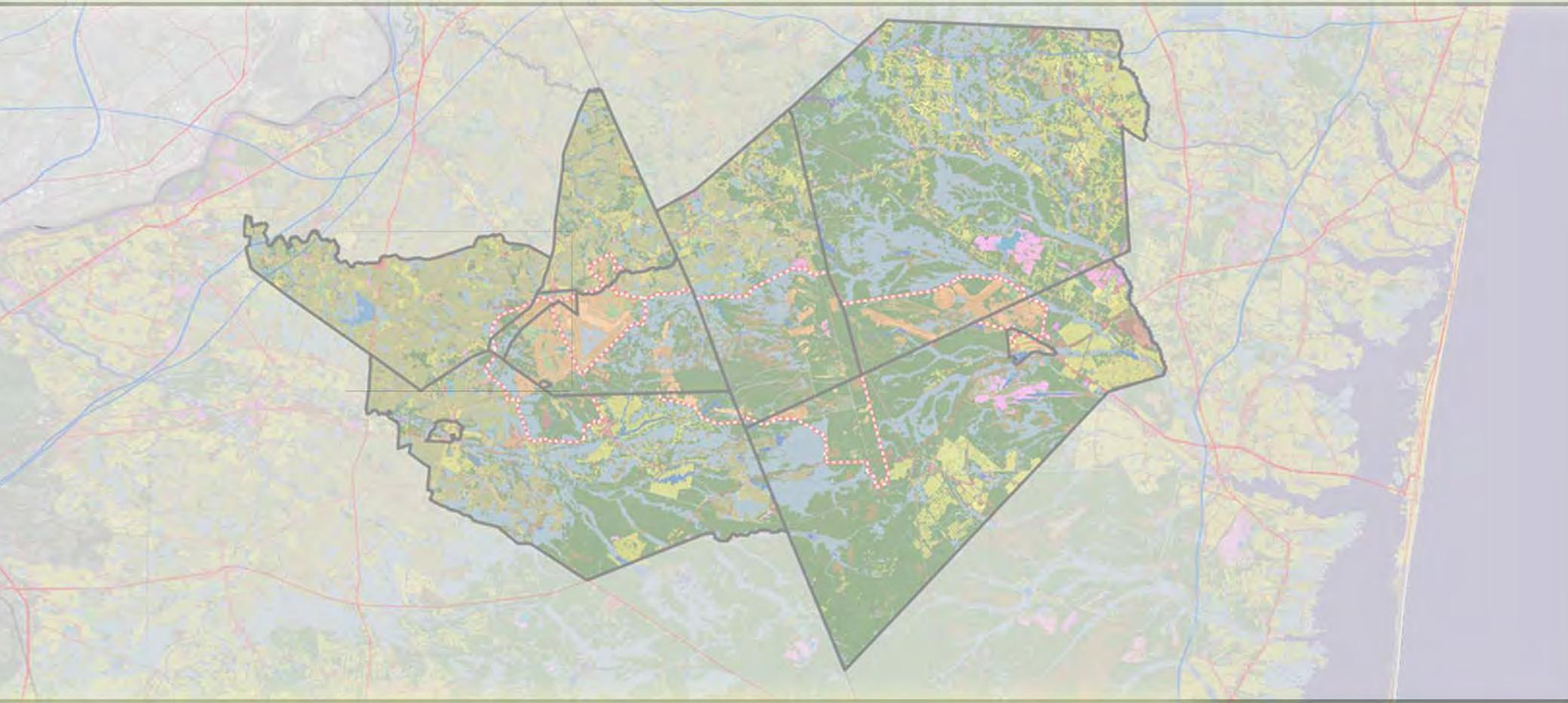


Figure 7.42 - North Hanover Build Out Analysis for Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame, and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications from plan entitled "Composite Zoning Map", prepared by Burlington County Department of Economic Development and Regional Planning, September 2006; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basing of C-17 Aircraft, prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2006; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.10 - Pemberton Borough

Existing Land Use

Pemberton Borough is one of the smallest municipalities in Burlington County. County Roads 530, 616 (Hanover Street), and 644 run through the Borough limits. The borough is entirely surrounded by Pemberton Township. A historic district is concentrated around Hanover and Jarvis Streets.

Approximately 15% of Pemberton Borough falls within the JLUS study area, which intersects the northeastern portion of the Borough. Residential development, along with the Brotherhood School and Pemberton Borough Elementary School are located within the study area. Table 7.10.1 displays the land uses within the 2-Mile JLUS Study Area.

Table 7.10.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Barren or Altered Lands	12 acres	19.7%
Brushland and Scrubland	1 acre	1.6%
Commercial Services	7 acres	11.5%
Deciduous, Coniferous, or Mixed Forest	4 acres	6.6%
Other Urban Lands	8 acres	13.1%
Residential Lands	20 acres	32.8%
School	4 acres	6.6%
Wetland	5 acres	8.2%
Total	61 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Zoning

Table 7.10.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.10.2 Composite Zoning within JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Medium Density Residential (1-4 units per acre)	34 acres	65.5%
High Density Residential (more than 4 units per acre)	18 acres	34.5%

Build Out Analysis for 2-Mile JLUS Study Area

Table 7.10.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
High Density Residential	RC	Residential C	7,500	0.4	2	0.0
	RP	Residential	20,000	7.9	17	4.0
				8.3	20	4.0

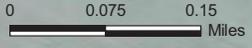
Table 7.10.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 8 acres of vacant assessed lands within the JLUS study area, of which 4 are considered to be environmentally constrained. According to the existing zoning regulations, 20 residential units are possible on vacant assessed lands within residential zoning districts.

Based on this analysis, Pemberton Borough does not contain vacant assessed lands within non-residential zoning district. Pemberton Borough also has an insignificant amount of farmland assessed lands within the JLUS study area.

Growth Analysis (Borough-wide)

- The Borough has a proposed redevelopment plan in consideration for a block of land off of County Route 616/Hanover Street
 - Possible commercial development at street level with residential apartments on the top floor is being discussed.
- There is an interest to increase commercial industry in the Borough.
- Block 102 Lot 1, located to the north of Rte 530 has an approved site plan for approximately 18 new homes on 30 acres of land.
- In the northwest portion of the Borough, 122 houses for population over 55 have recently been built; 142 units were added all together including the Hearthstone development.
- On the southeast side of the Borough there are vacant lands listed by the NJDEP as wetlands that the Borough would like to see as a future commercial area.

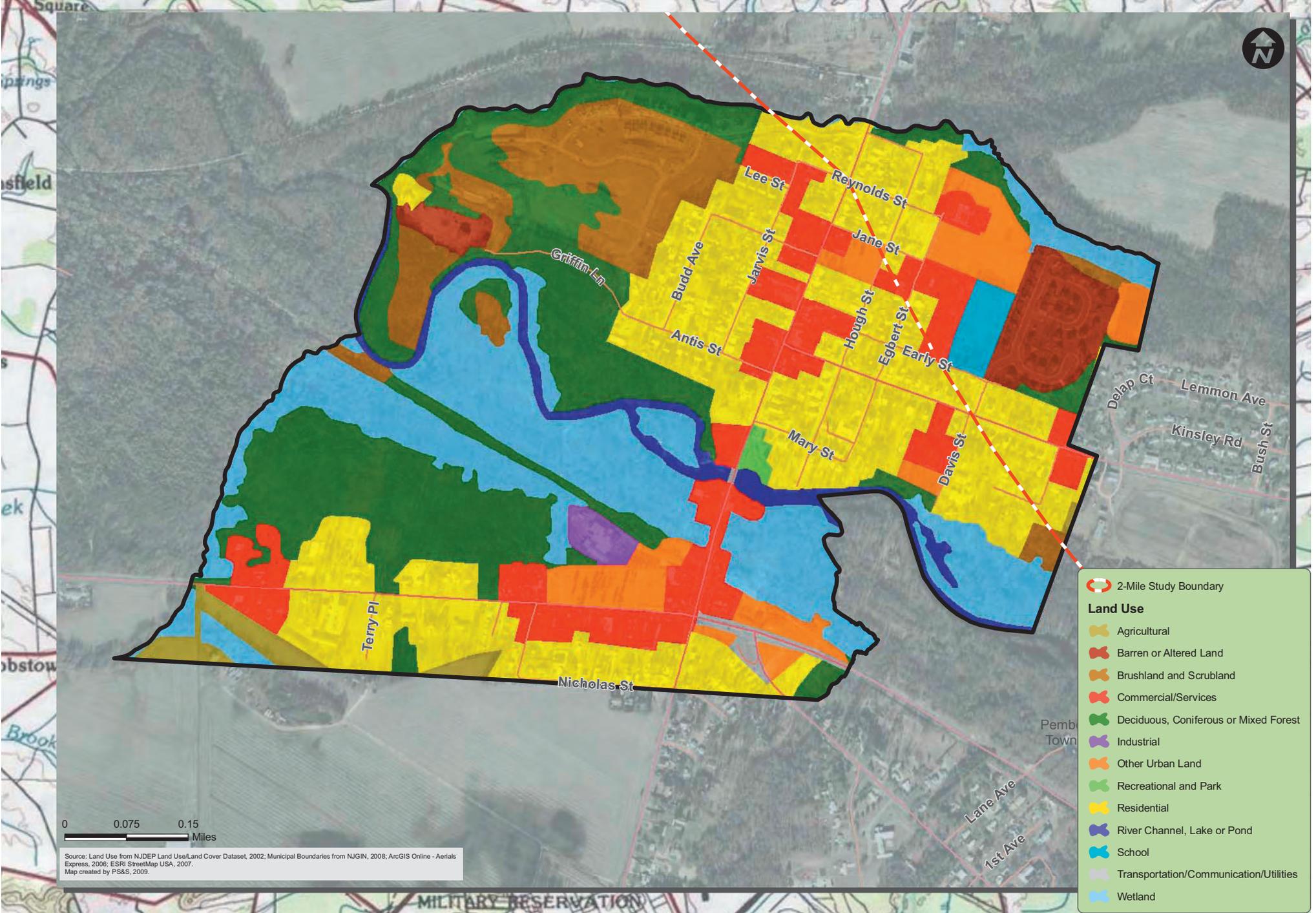
Figure 7.43 - Pemberton Borough Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

 2-Mile Study Boundary

Figure 7.44 - Pemberton Borough Land Use Map



2-Mile Study Boundary

Land Use

- Agricultural
- Barren or Altered Land
- Brushland and Scrubland
- Commercial/Services
- Deciduous, Coniferous or Mixed Forest
- Industrial
- Other Urban Land
- Residential
- River Channel, Lake or Pond
- School
- Transportation/Communication/Utilities
- Wetland

Figure 7.45 - Pemberton Borough Zoning Map

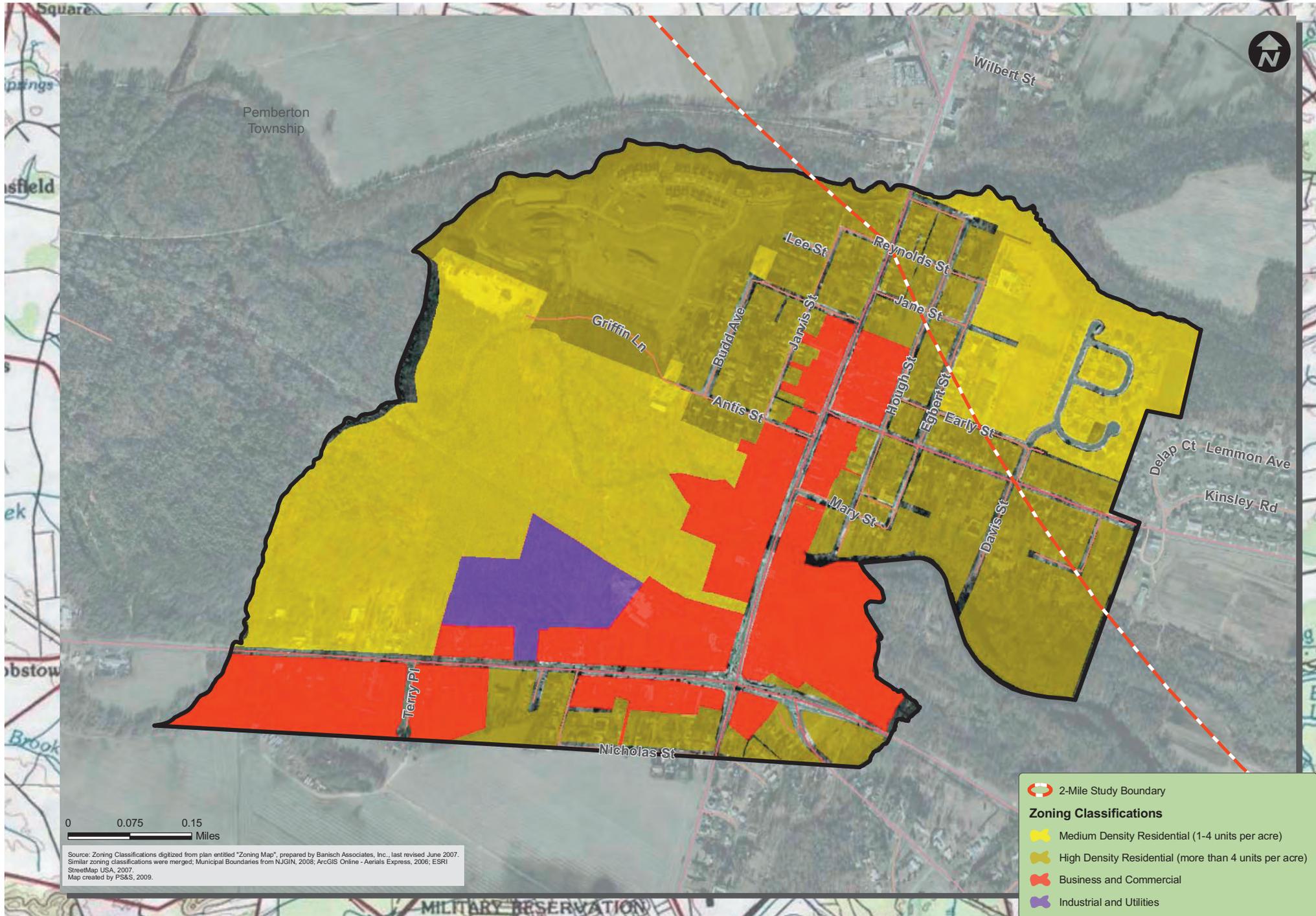
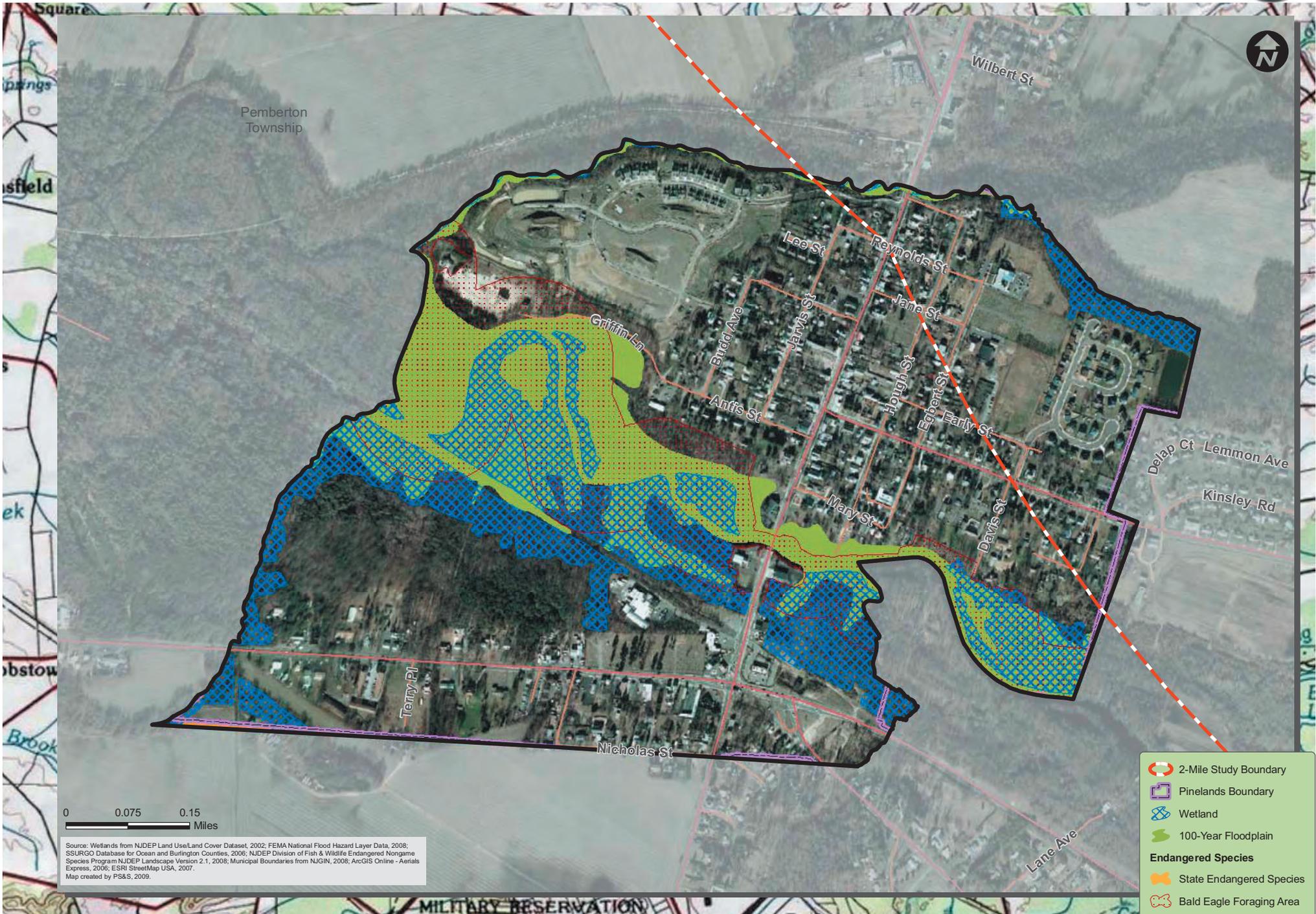


Figure 7.46 - Pemberton Borough Environmental Constraints Map



Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by PS&S, 2009.

- 2-Mile Study Boundary
- Pinelands Boundary
- Wetland
- 100-Year Floodplain
- Endangered Species**
- State Endangered Species
- Bald Eagle Foraging Area

Figure 7.47 - Pemberton Borough Preserved Lands



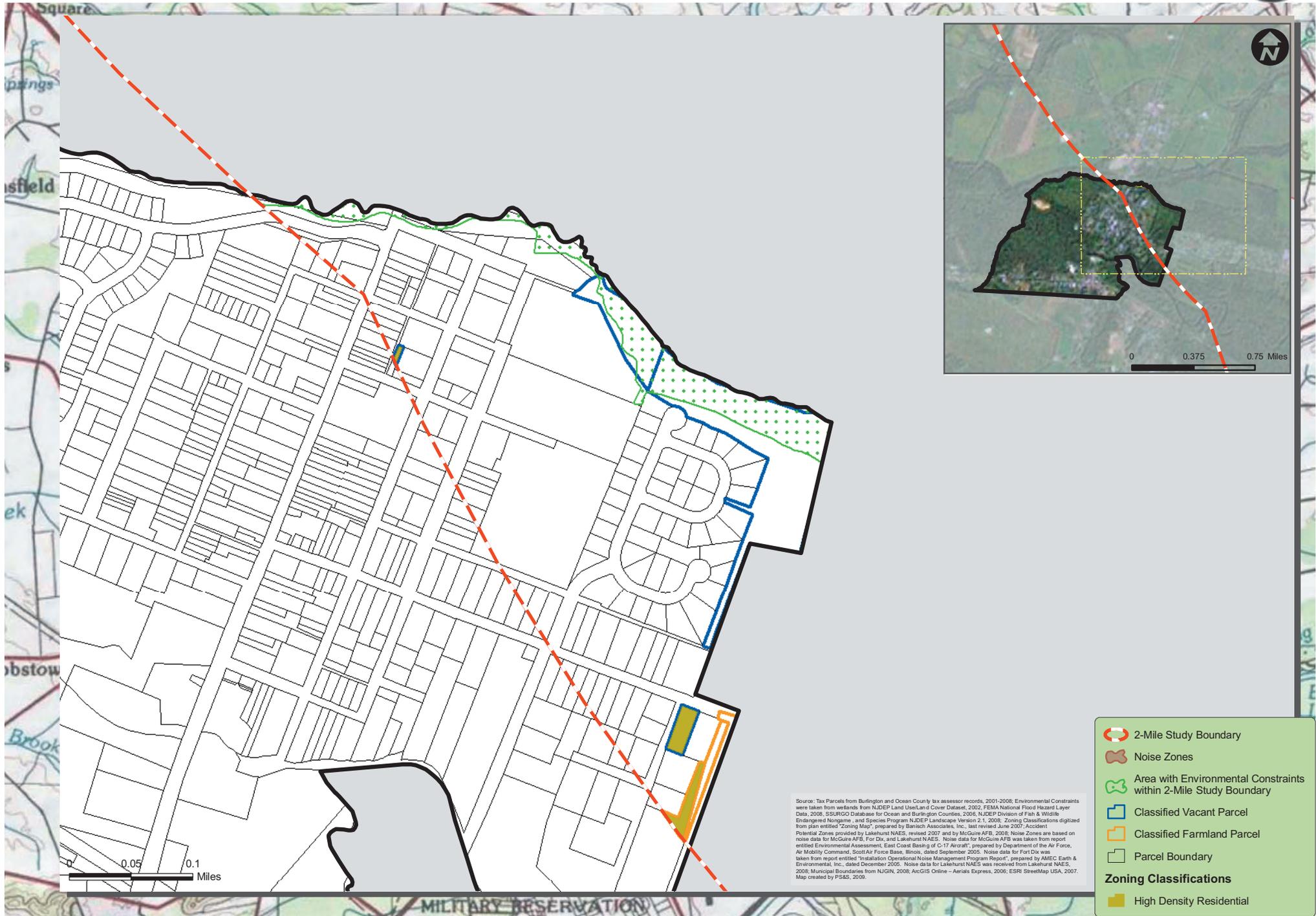
Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2006; Preserved Open Space data from Burlington County Department of Information Technology 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by PS&S, 2009.

Figure 7.48 - Pemberton Borough Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by PS&S, 2009.

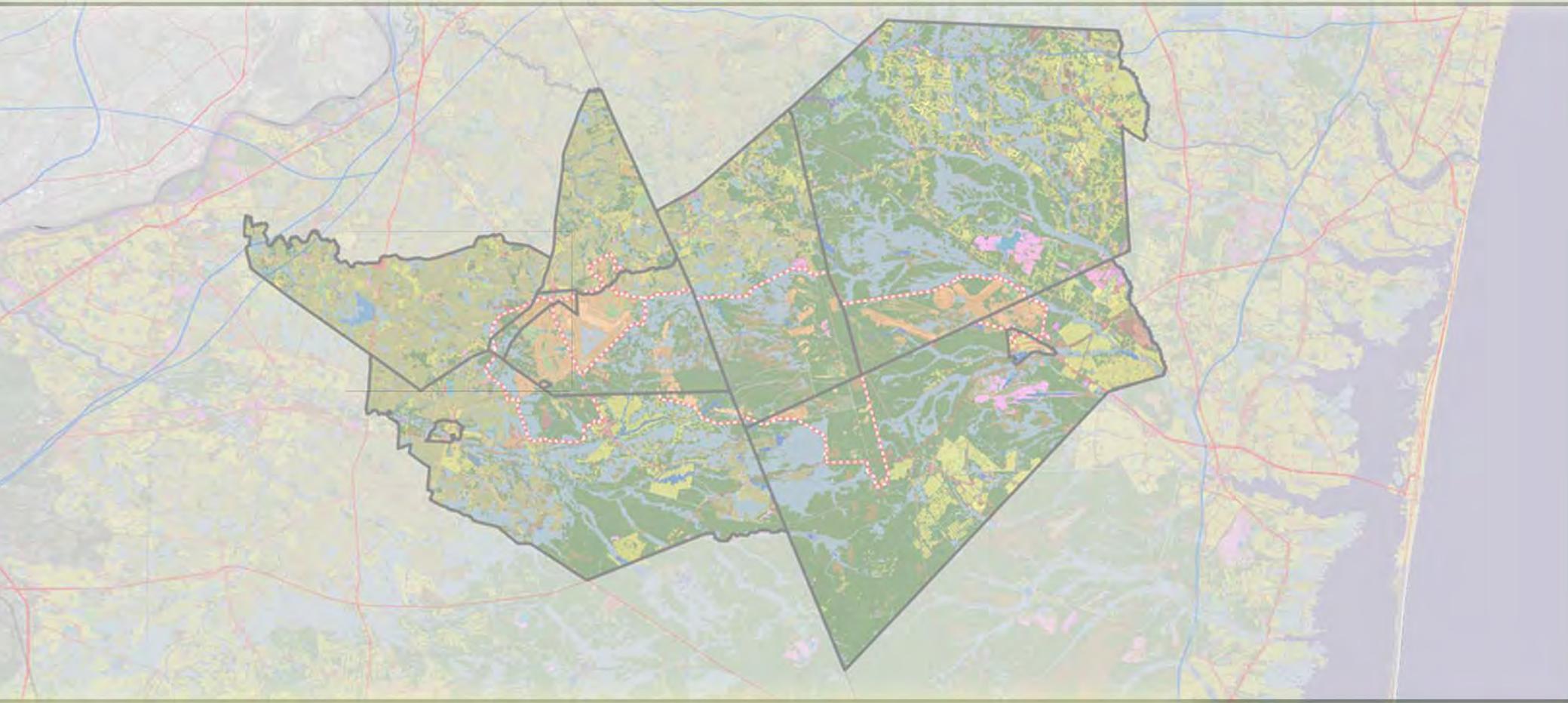
Figure 7.49 - Pemberton Borough Build Out Analysis for Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame - and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications digitized from plan entitled "Zoning Map", prepared by Bantisch Associates, Inc., last revised June 2007; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2006; Noise Zones are based on noise data for McGuire AFB, For Div. and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basing of C-17 Aircraft, prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NACIM, 2008; AccGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.11 - Pemberton Township

Existing Land Use

Pemberton Township is one of the larger townships within the Burlington County side of the JLUS. The Township has approximately 30,000 residents and occupies 64 square miles. There are a number of residential communities in Pemberton Township including Browns Mills, Browns Mills Junction, Country Lake Estates, and Presidential Lakes Estates, to name a few. The Browns Mills area of Pemberton is due south of Fort Dix and is part of the Browns Mills and Country Lake regional growth area (RGA) that consists of 5,300 housing units and 14,000 residents. This area which consists of a downtown area, rustic residential area, and the Deborah Health Center, is the most densely populated section of the Township. Currently 77% of the Township is vacant, wooded, or agricultural. With the exception of a section of lands to the northwest of Pemberton Borough, the Township falls almost entirely within the Pinelands Management Areas.

Approximately 42% of Pemberton Township falls within the 2-mile JLUS Study Area, which intersects 17,000 acres along the northern tier of the Township. A large portion of the study area consists of environmentally sensitive lands including protected forests, wetlands, floodplains, and state endangered specie habitats. The largest residential development area in the Township, Browns Mills, is located within the study area. Table 7.11.1 displays the land uses within the 2-Mile JLUS Study Area.

Table 7.11.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	3,204 acres	18.8%
Barren or Altered Lands	39 acres	0.2%
Brushland and Scrubland	861 acres	5.1%
Commercial Services	326 acres	1.9%
Deciduous, Coniferous, or Mixed Forest	3,839 acres	22.6%
Extractive Mining	13 acres	0.1%
Industrial Lands	13 acres	0.1%
Other Urban Lands	266 acres	1.6%
Recreational and Parkland	48 acres	0.3%
Reservoirs	331 acres	1.9%
Residential Lands	2,218 acres	13.0%
School	117 acres	0.7%
Transportation/Communication/Utilities	108 acres	0.6%
Wetland	5,622 acres	33.1%
Total (excluding Fort Dix lands)	17,005 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Table 7.11.1 indicates that wetland and forest areas cover over 55% of the land area within the Township. Over 3,200 acres of agricultural lands comprise the third largest land use within the Township.

Section 7.11 Pemberton Township

Zoning

Agricultural and residential zones are the dominant zoning in Pemberton Township’s JLUS study area. The eastern-most area of the Township, adjacent to Manchester Township, and a southern section referred to as Lower Mill, are zoned Preserved land. Both of these land areas fall within the Pinelands preservation areas. Table 7.11.2 displays composite zoning areas within the 2-Mile JLUS Study Area.

Table 7.11.2 Composite Zoning with 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agriculture	4,768 acres	27.9%
Business and Commercial	54 acres	3.2%
Conservation, Recreation, and Open Space	504 acres	3.0%
Low Density Residential (less than 1 unit per acre)	4,417 acres	25.9%
Medium Density Residential (1-4 units per acre)	1,612 acres	9.4%
High Density Residential (more than 4 units per acre)	2,684 acres	15.7%
Preservation	2,546 acres	14.9%

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.11.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR	Agricultural Residential	261,360	64.0	11	51.3
High Density Residential	R-60	Two Family Residential	6,000	0.3	2	0.0
	R-80	Very High Density Single Family Residential	8,000	330.4	1,798	149.7
	R-96	Very High Density Single Family Residential	9,600	9.7	44	7.1
	R-A	Infill Residential District With Planned Retirement	10,000	1.1	5	0.6
	R-I	Infill Single-Family Residential	10,000	66.7	291	60.1
Low Density Residential	R-17	Single-Family Residential	740,520	785.5	46	770.6
	R-3	Medium Density Single Family Residential	139,392	248.7	77	224.2
	R-6	Low Density Single Family Residential	261,360	29.8	5	25.4
Medium Density Residential	PV	Pinelands, Village Residential	43,560	10.8	11	5.6
	R-1	Single-Family Residential	43,560	348.2	348	211.1
	R-200	Very High Density Single Family Residential	20,000	2.6	6	1.7
				1,897.9	2,644	1,507.3

Table 7.11.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 1,898 acres of vacant assessed lands within the JLUS study area, of which 1,507 are considered to be environmentally constrained.

According to the existing zoning regulations, 2,633 residential units are possible on vacant assessed lands within residential zoning districts and 11 units within the agriculture zoning district. Based on this analysis, approximately 80 percent of the vacant assessed lands are environmentally constrained, significantly reducing the residential development potential within the JLUS study area.

Table 7.11.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	GCLJ	General Commercial/ Light Industrial	30,000	70.7	18.0
	TC	Town Center	8,000	18.9	3.8
				89.5	21.9

Table 7.11.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There are 90 acres of vacant assessed lands within the JLUS study area, of which 22 are considered to be environmentally constrained.

Table 7.11.5 Farmlands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR	Agricultural Residential	261,360	1,039.8	173	274.1
High Density Residential	R-80	Very High Density Single Family Residential	8,000	4.1	22	4.1
Low Density Residential	R-17	Single-Family Residential	740,520	308.7	18	303.9
	R-3	Medium Density Single Family Residential	139,392	520.0	163	305.3
Medium Density Residential	PV	Pinelands, Village Residential	43,560	1.5	2	1.5
	R-1	Single-Family Residential	43,560	143.7	144	56.3
				2,017.8	522	945.2

Table 7.11.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 2,018 acres of farm assessed lands within the JLUS study area, of which 945 are considered to be environmentally constrained. According to the existing zoning regulations, 349 residential units are possible on farm assessed lands within the residential zoning district and 173 units within the agriculture zoning district; however, this is unlikely based upon the objectives stated in the township master plan. Based on this analysis, Pemberton Township does not contain farm assessed lands within non-residential zoning districts located in the JLUS study area.

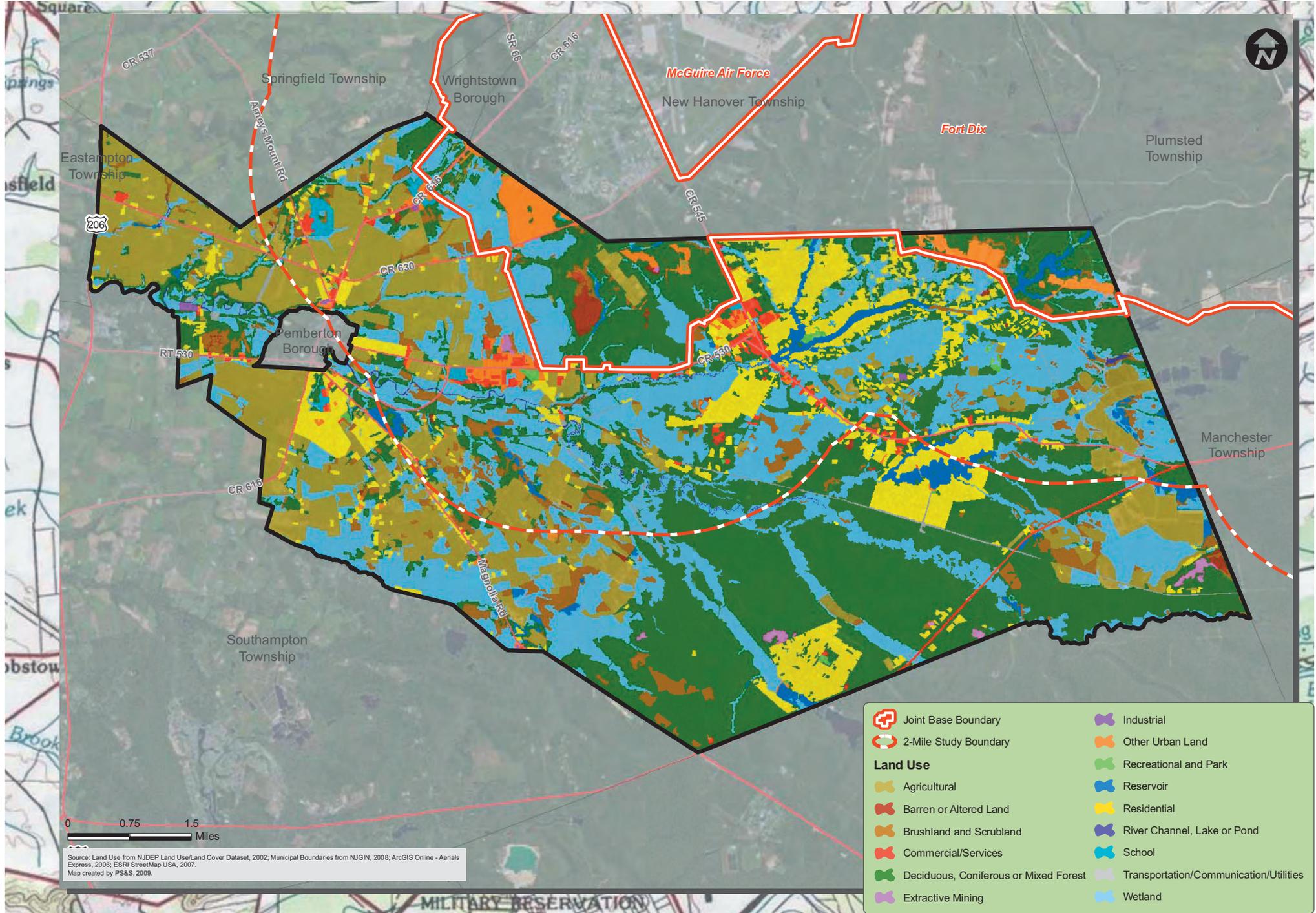
Growth Analysis

- With the Texas Avenue (CR 545) closure, Pemberton Township lost town synergy.
 - o Traffic Volumes in Pemberton are down by half since 9/11
 - o Local businesses suffer from the volume reduction
 - o Browns Mills Area has been affected
 - o There may be a long term concern to the Deborah Hospital – no easy access to doctors/location
- There is a lack of public water and sewer in the southern portion of the Township, which may inhibit growth.
- The northwestern portion of the Township located to the North of Pemberton Borough has been designated a proposed town center by the third round cross acceptance process of the State Plan and also in the Township’s 2008 Master Plan.
- The western portion of Pemberton Township is designated “Industrial Node” on the Northern Burlington County GAPP Land Use Concept map and “New Commercial-Manufacturing Node” as a State Plan Map Amendment in the Burlington County 2004/2005 Cross-Acceptance Report. Industrial and commercial growth is planned in this area.
 - o Areas along Route 206 are emerging as a Commercial/Light Industrial Node. Light industrial facilities have developed in these areas in the Township.
- The village center of New Lisbon as been designated as a Pinelands regional growth area. It is a non-sewered village that includes the Burlington County College and Buttonwood Hospital. The Township believes that there is not much growth that can happen in this area due to existing environmental constraints.
- There is continued interest in investing and reinvesting in Pemberton Township’s Brown Mills Urban Enterprise Zone (UEZ) redevelopment projects.

Figure 7.50 - Pemberton Township Overview Map



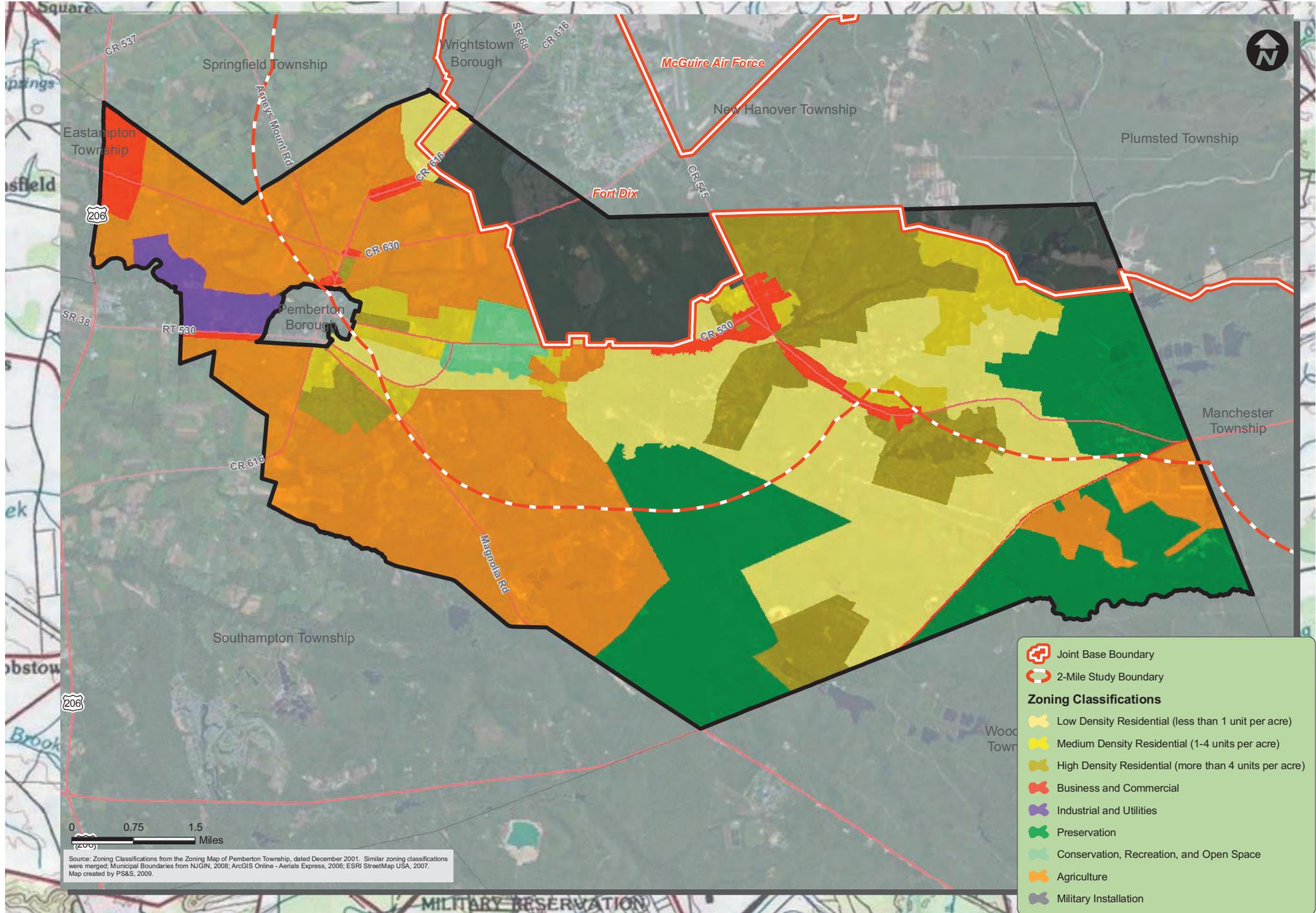
Figure 7.51 - Pemberton Township Land Use Map



Joint Base Boundary	Industrial
2-Mile Study Boundary	Other Urban Land
Land Use	
Agricultural	Recreational and Park
Barren or Altered Land	Reservoir
Brushland and Scrubland	Residential
Commercial/Services	River Channel, Lake or Pond
Deciduous, Coniferous or Mixed Forest	School
Extractive Mining	Transportation/Communication/Utilities
	Wetland

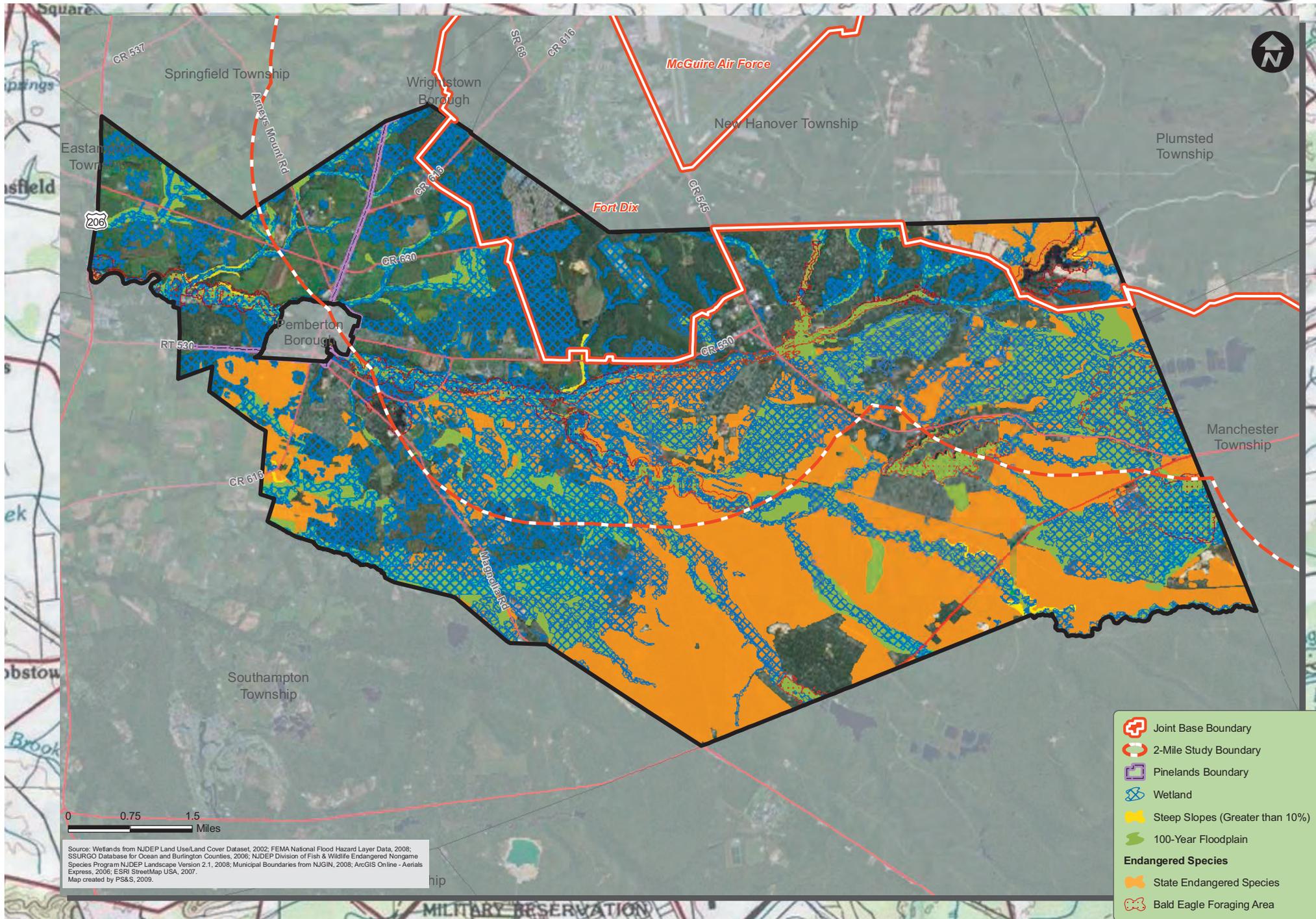
Source: Land Use from NJDEP Land Use/Land Cover Dataset, 2002; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.52 - Pemberton Township Zoning Map



Source: Zoning Classifications from the Zoning Map of Pemberton Township, dated December 2001. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2008; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

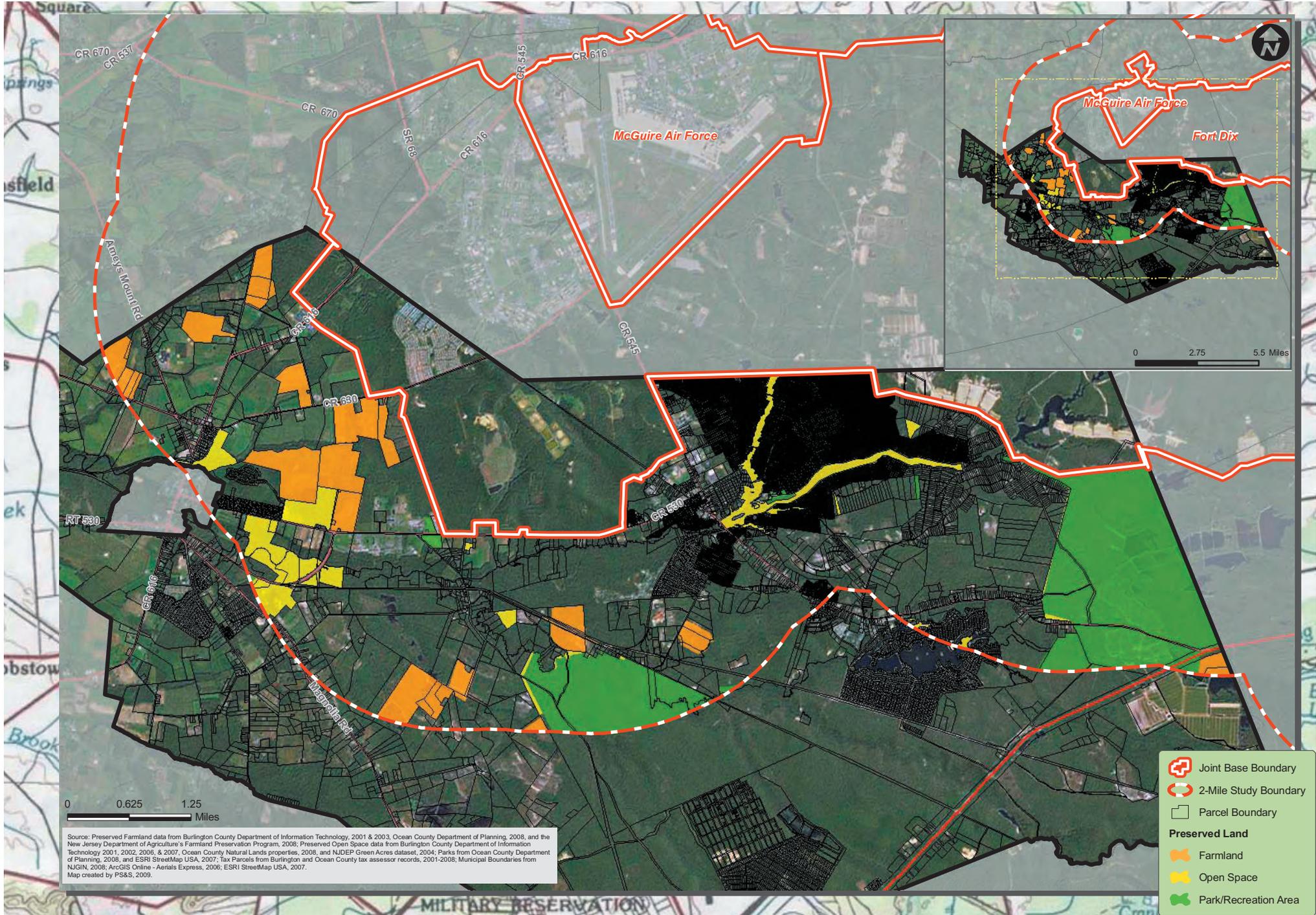
Figure 7.53 - Pemberton Township Environmental Constraints Map



Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by PS&S, 2009.

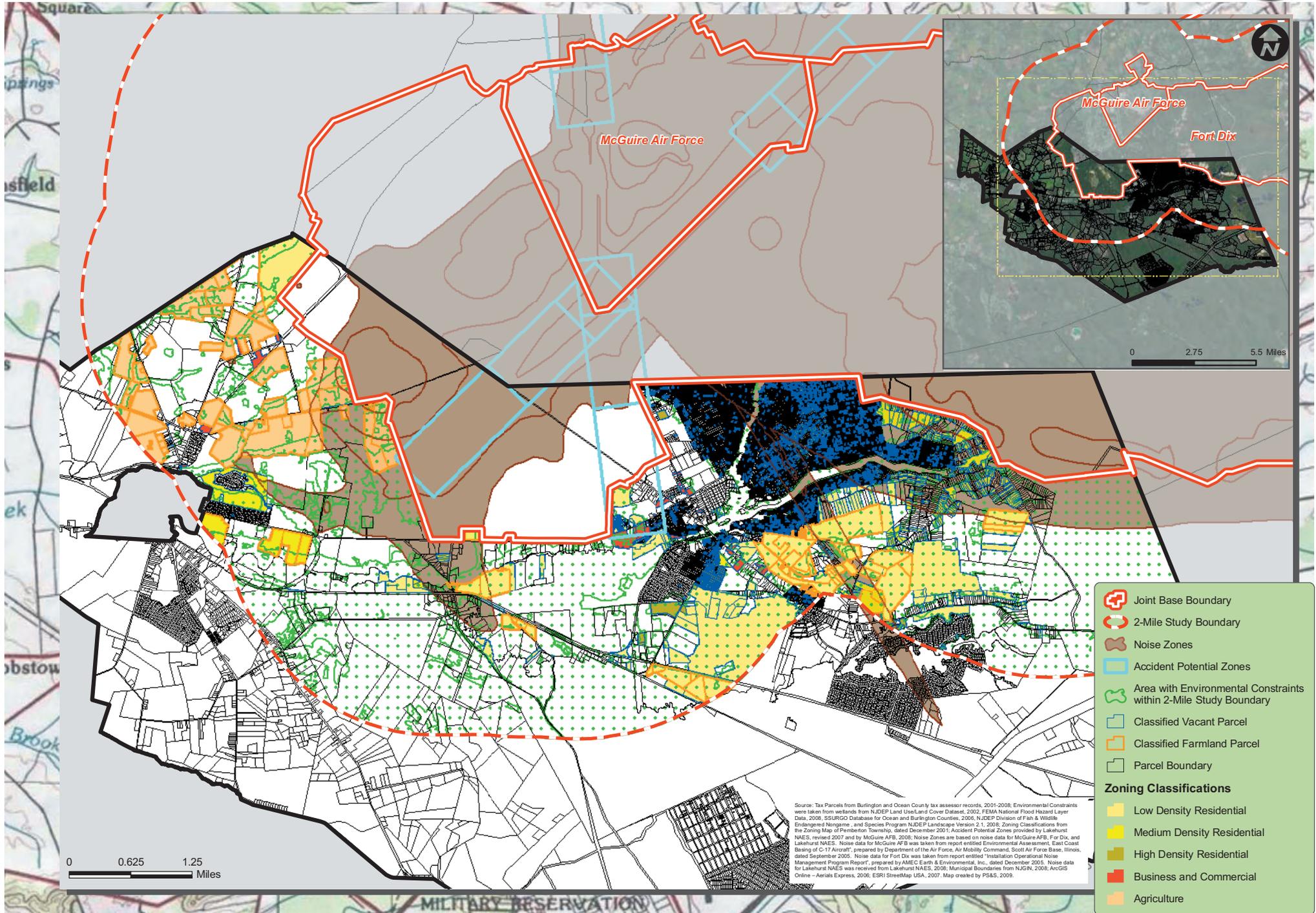
- Joint Base Boundary
- 2-Mile Study Boundary
- Pinelands Boundary
- Wetland
- Steep Slopes (Greater than 10%)
- 100-Year Floodplain
- Endangered Species**
- State Endangered Species
- Bald Eagle Foraging Area

Figure 7.54 - Pemberton Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology, 2001, 2002, 2006, & 2007; Ocean County Natural Lands properties, 2006; and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007.
Map created by PS&S, 2009.

Figure 7.56 - Pemberton Township Build Out Analysis for Vacant and Farmland Assessed Lands



- Joint Base Boundary
- 2-Mile Study Boundary
- Noise Zones
- Accident Potential Zones
- Area with Environmental Constraints within 2-Mile Study Boundary
- Classified Vacant Parcel
- Classified Farmland Parcel
- Parcel Boundary

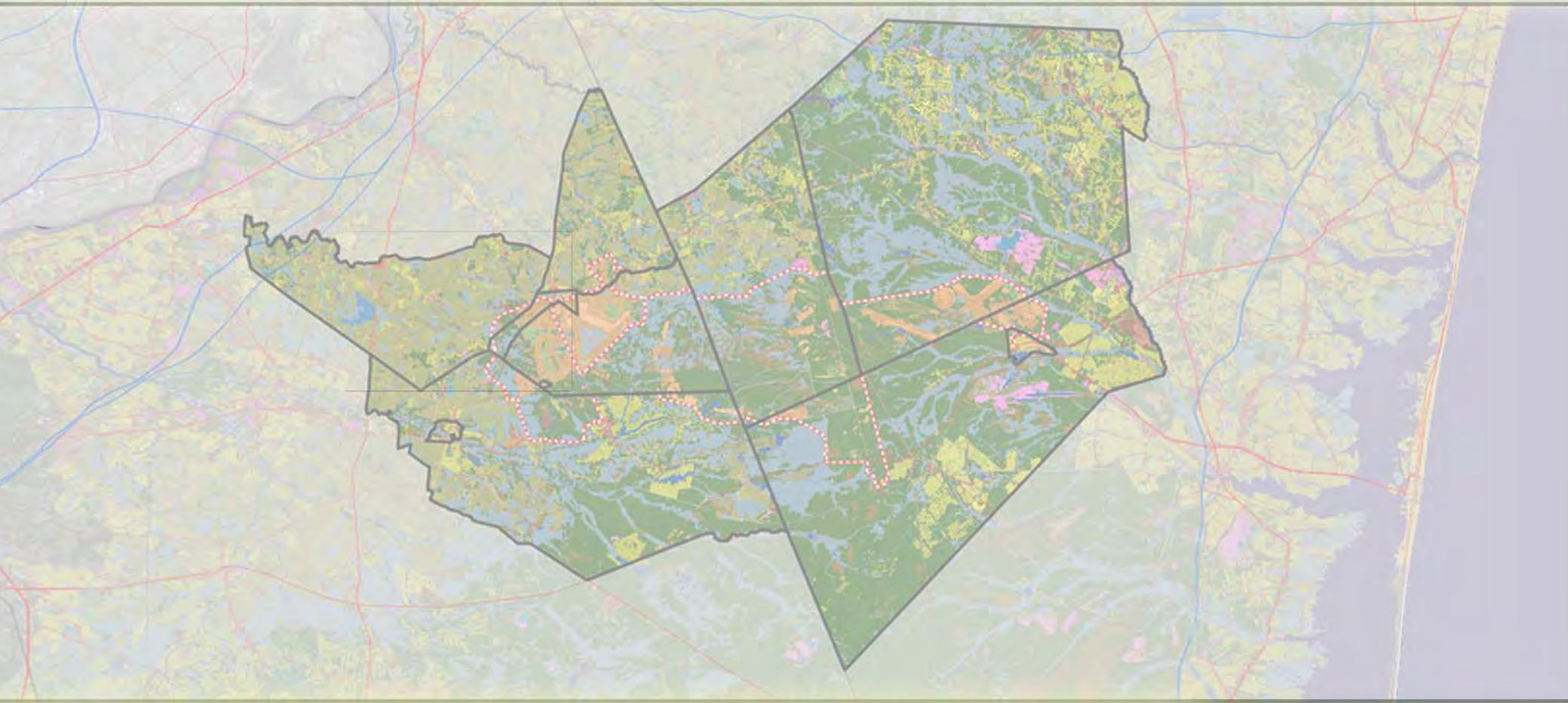
Zoning Classifications

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Business and Commercial
- Agriculture

Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008. Environmental Constraints were taken from wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered/Nongame, and Species Program NJDEP Landscape Version 2.1, 2008; Zoning Classifications from the Zoning Map of Pemberton Township, dated December 2001; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled "Environmental Assessment, East Coast Basing of C-17 Aircraft", prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008. Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2008; ESRI StreetMap USA, 2007. Map created by P&S&S, 2009.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.12 - Springfield Township

Existing Land Use

Springfield Township is actively looking to preserve agricultural land and to promote open space. Burlington County Parks System has already acquired 879 acres for preservation in the Township. Most of Springfield is undeveloped land and agriculture is the Township's major industry. Springfield Township has three main hamlets, Jacksonville, Jobstown, and Juliustown. Jacksonville is a historic crossroad settlement in close proximity to the Animal Kingdom Zoo and the Springfield County Club. Jobstown is located in Northern Burlington County's farm belt region and is home to the Township's municipal building and elementary school. Juliustown is bordered by Fort Dix border and is mostly a low density residential neighborhood. The Township's commercial nodes consist of Chambers Corner, located at Route 206 and County Route 537, Columbus Farmers Market, and Tilghmans Corner, located at County Routes 537 and 545. Springfield is home to the historic Helis Stock Farm which consists of a contiguous 2,500 acres. These lands are still cared for by hired caretakers through family estate funds.

Approximately 33% of Springfield Township falls within the 2-mile JLUS Study Area, which intersects the eastern boundary of the Township. The hamlet of Julistown is located within the study area. There are small pockets of commercial use in the Township, mostly along Route 206, which falls outside of the JLUS study area. Table 7.12.1 displays land uses within the 2-Mile JLUS Study Area.

Table 7.12.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	3,445 acres	55.0%
Barren or Altered Lands	80 acres	1.3%
Brushland and Scrubland	378 acres	6.0%
Commercial Services	31 acres	0.5%
Deciduous, Coniferous, or Mixed Forest	729 acres	11.6%
Extractive Mining	23 acres	0.4%
Other Urban Lands	47 acres	0.8%
Recreational and Parkland	12 acres	0.2%
Reservoirs	9 acres	0.1%
Residential Lands	473 acres	7.5%
Transportation/Communication/Utilities	48 acres	0.8%
Wetland	993 acres	15.8%
Total (excluding Fort Dix lands)	6,268 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Table 7.12.1 indicates that agriculture is the dominant land use within the 2-mile study area. Wetland and forested areas are the second and third largest land uses and comprise over a quarter of the land area within the study area.

Section 7.12 - Springfield Township

Zoning

Table 7.12.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Agriculture	5,898 acres	97.5%
Business and Commercial	21 acres	0.3%
Industrial and Utilities	44 acres	0.7%
Low Density Residential (less than 1 unit per acre)	83 acres	1.4%

Table 7.12.2 displays composite zoning areas within the 2-Mile JLUS Study Area. Most of the lands for Springfield within the JLUS study area are in the AR-10 Agricultural Rural District. Each dwelling must be located on 10 acres and at least three acres shall be contiguous, non-critical acreage. These zones area requirements should work sufficiently to reduce the possibility of residential growth in the area.

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.12.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR-10	Agricultural Rural	435,600	78.4	8	28.9
Low Density Residential	HMR-3	Hamlet Residential	130,680	7.8	3	0.3
				86.2	10	29.2

Table 7.12.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 86 acres of vacant assessed lands within the JLUS study area, of which 29 are considered to be environmentally constrained. According to the existing zoning regulations, 2 residential units are possible on

vacant assessed lands within residential zoning districts and 8 units within the agriculture zoning district. Based on this analysis, Springfield Township has an insignificant amount of vacant assessed lands within non-residential zoning districts.

Table 7.12.4 Farmlands Build Out Scenario: Residential

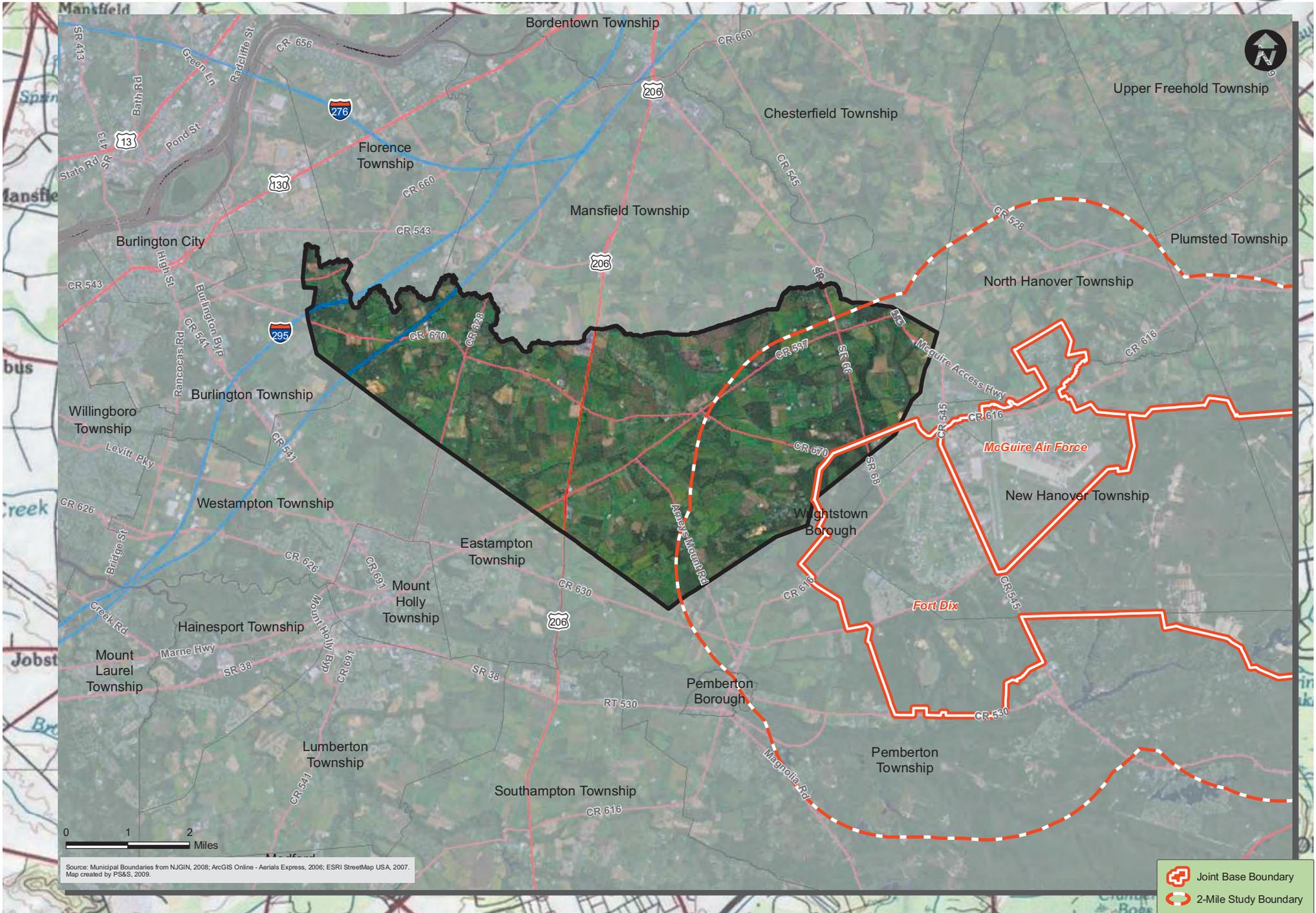
Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Agriculture	AR-10	Agricultural Rural	435,600	3,042.5	304	661.4
Low Density Residential	HMR-3	Hamlet Residential	130,680	2.1	1	0.0
				3,044.6	305	661.4

Table 7.12.4 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 3,045 acres of farm assessed lands within the JLUS study area, of which 661 are considered to be environmentally constrained. According to the existing zoning regulations, 1 residential unit is possible on farm assessed lands within the residential zoning district and 304 units within the agriculture zoning district; however, this is unlikely based upon the objectives stated in the township master plan. Based on this analysis, Springfield Township does not contain farm assessed lands within non-residential zoning districts located in the JLUS study area.

Growth Analysis

- According to the Northern Burlington County GAPP Land Use Concept Map, Springfield Township's residential growth area is located in the western portion of the Township. The lack of sewer and water infrastructure will keep this area as low-density residential development.
- No excess water and sewer capacity is available for new development in the Township.
 - o Small community septic system options were discussed for new development but have not been thoroughly explored.
- The Township is committed to farmland preservation and incorporation of development constraints.

Figure 7.57 - Springfield Township Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary

Figure 7.58 - Springfield Township Land Use Map

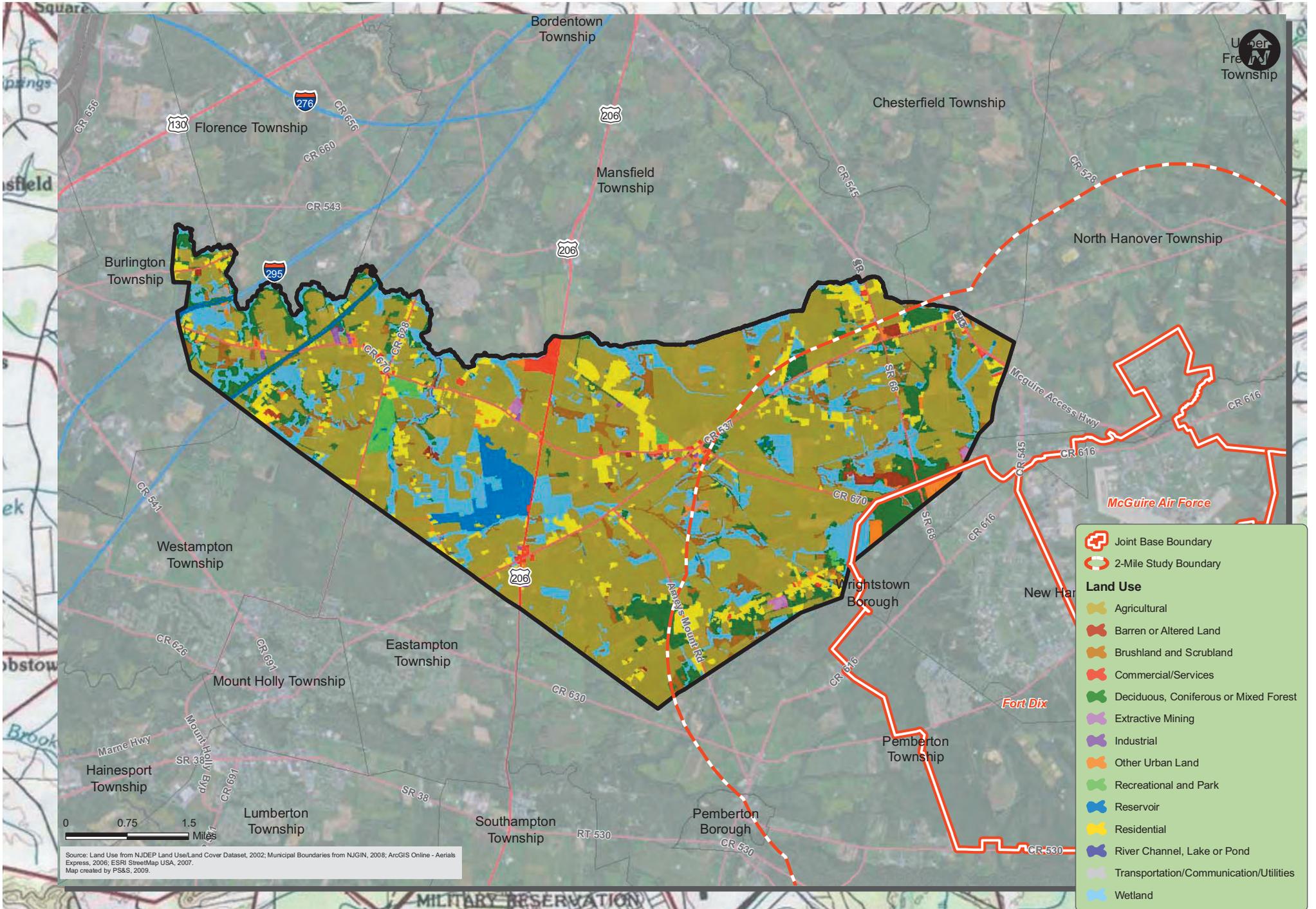
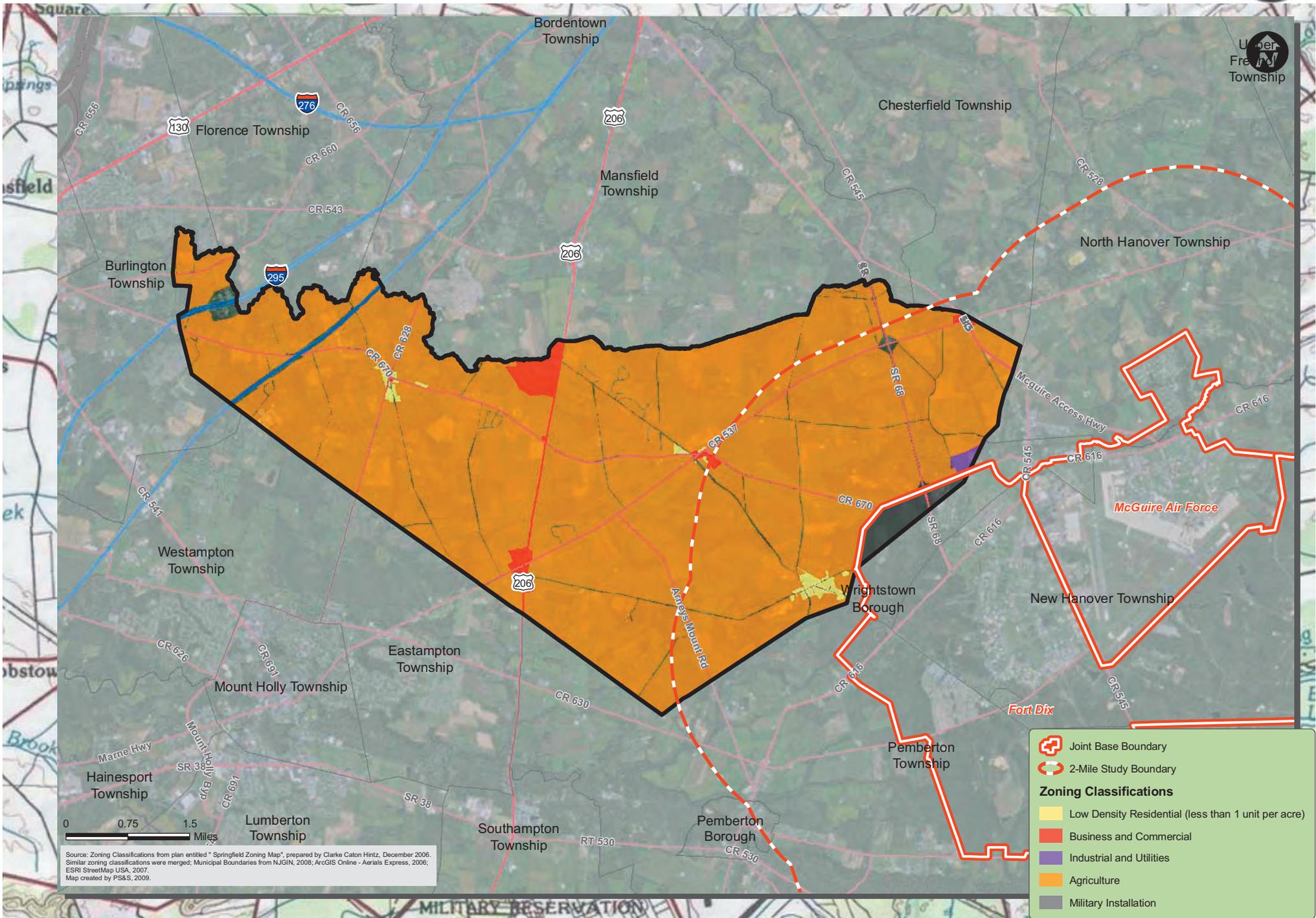


Figure 7.59 - Springfield Township Zoning Map



Source: Zoning Classifications from plan entitled "Springfield Zoning Map", prepared by Clarke Caton Hintz, December 2006. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Legend

- Joint Base Boundary
- 2-Mile Study Boundary
- Zoning Classifications**
- Low Density Residential (less than 1 unit per acre)
- Business and Commercial
- Industrial and Utilities
- Agriculture
- Military Installation

Figure 7.60 - Springfield Township Environmental Constraints Map

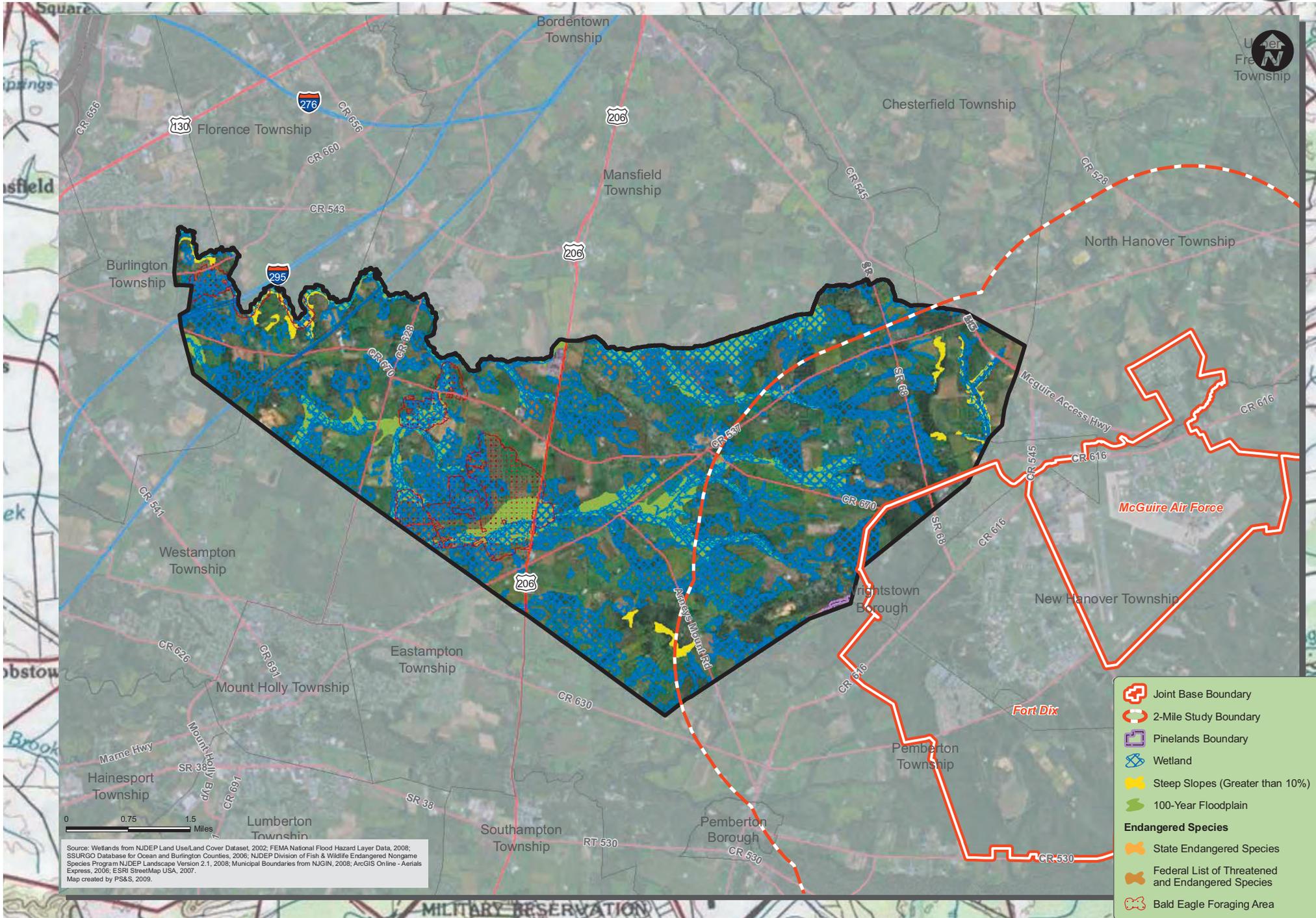
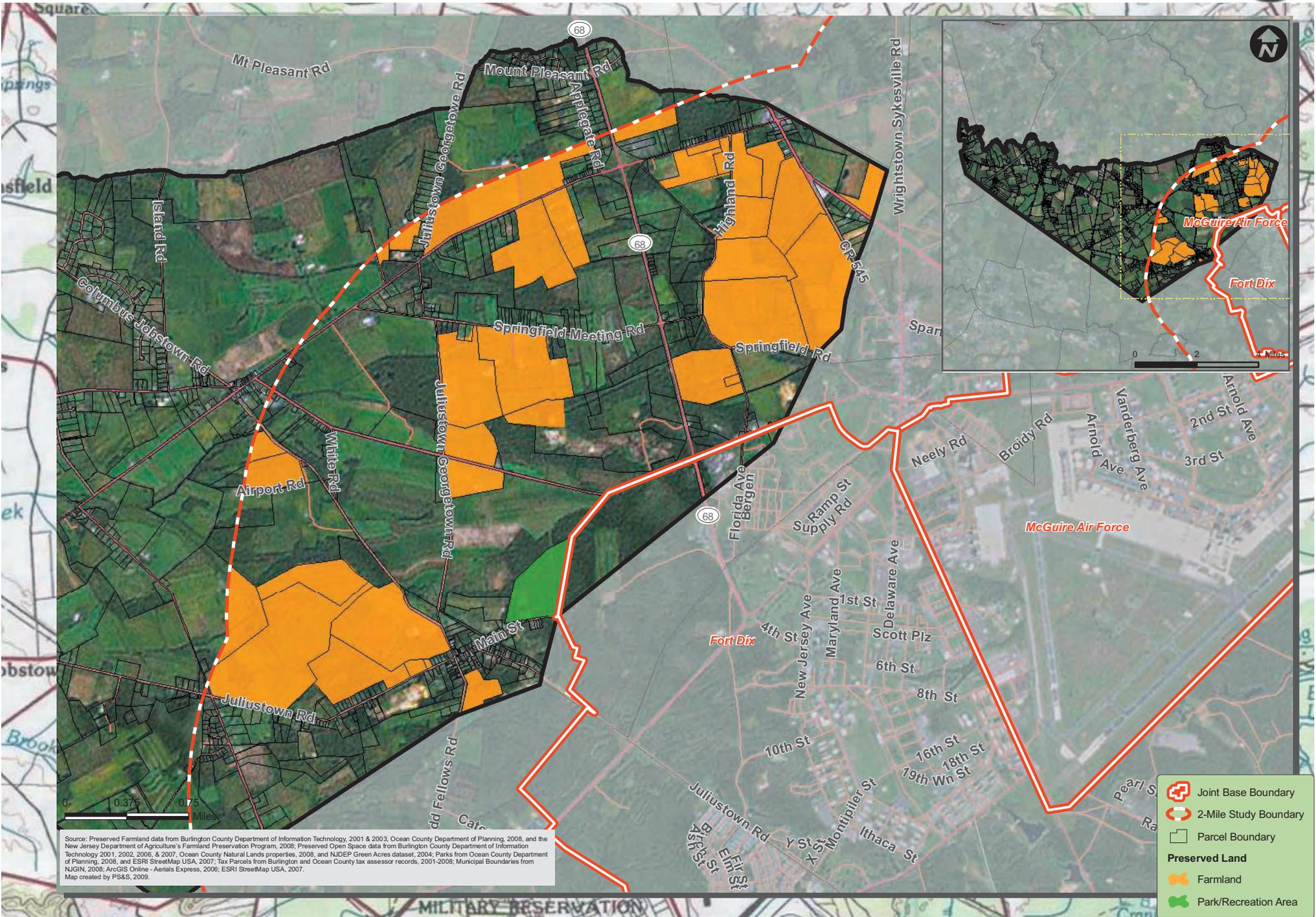


Figure 7.61 - Springfield Township Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2008; Preserved Open Space data from Burlington County Department of Information Technology, 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary
- Parcel Boundary
- Preserved Land**
- Farmland
- Park/Recreation Area

Figure 7.62 - Springfield Township Vacant and Farmland Assessed Lands

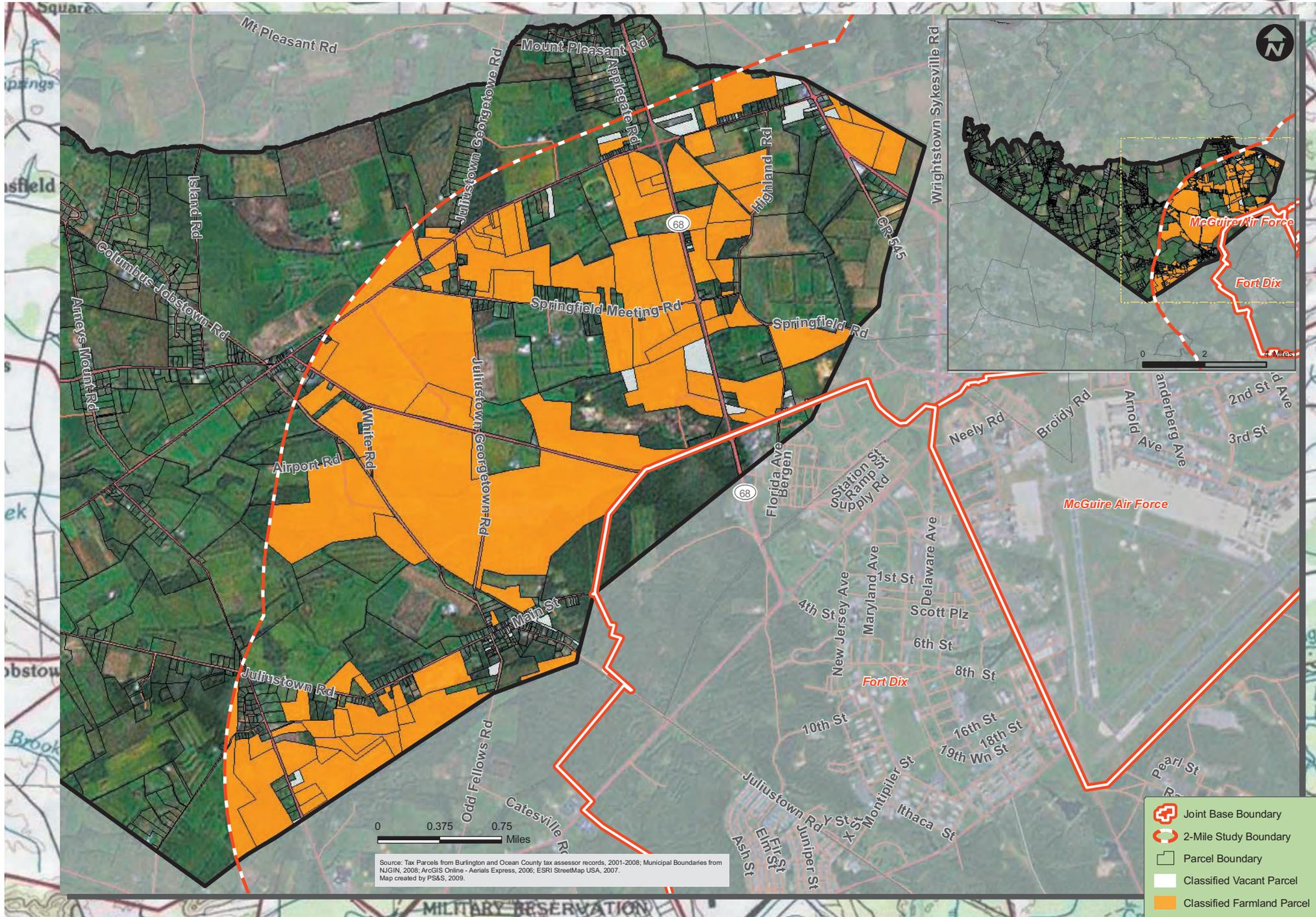
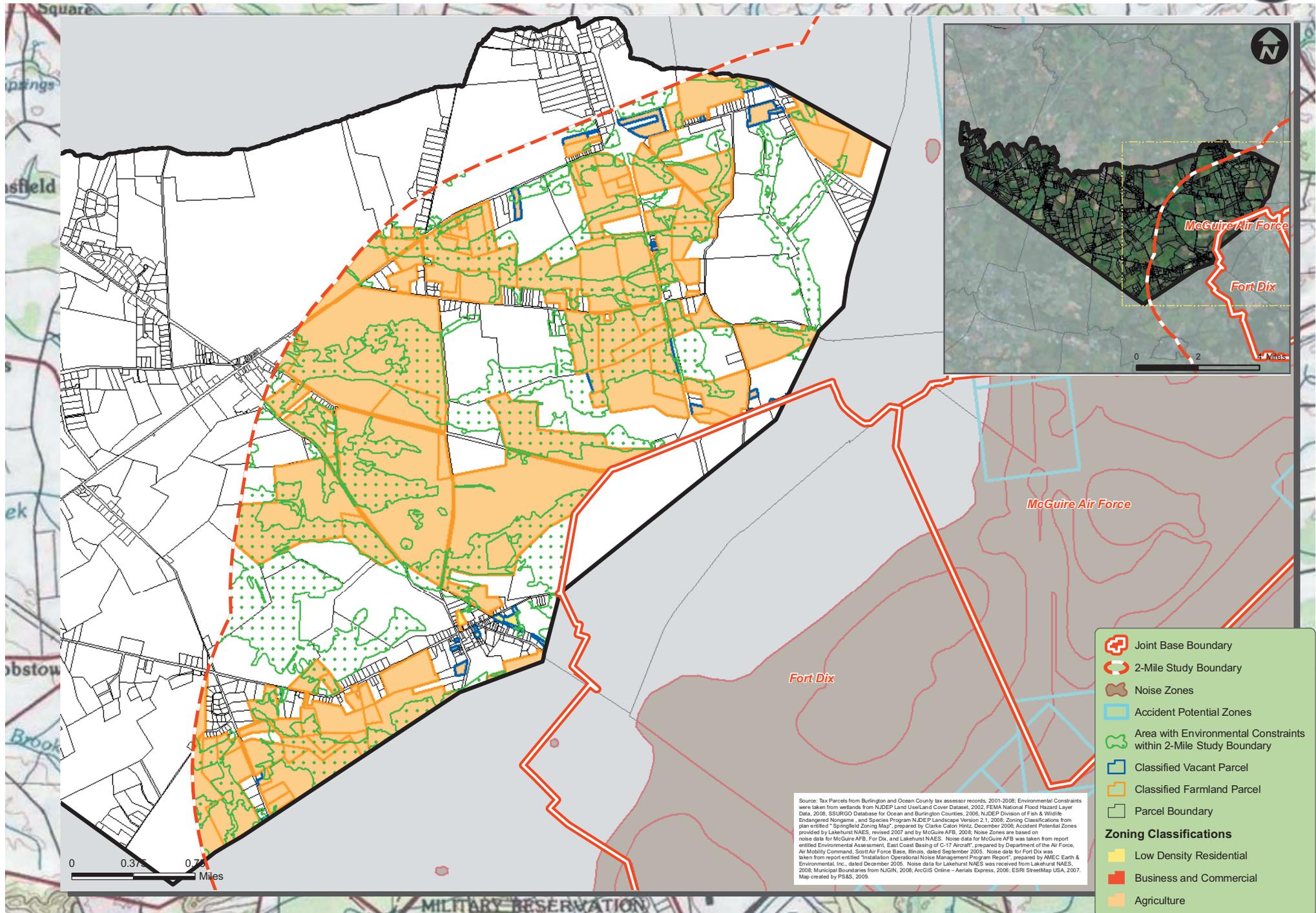
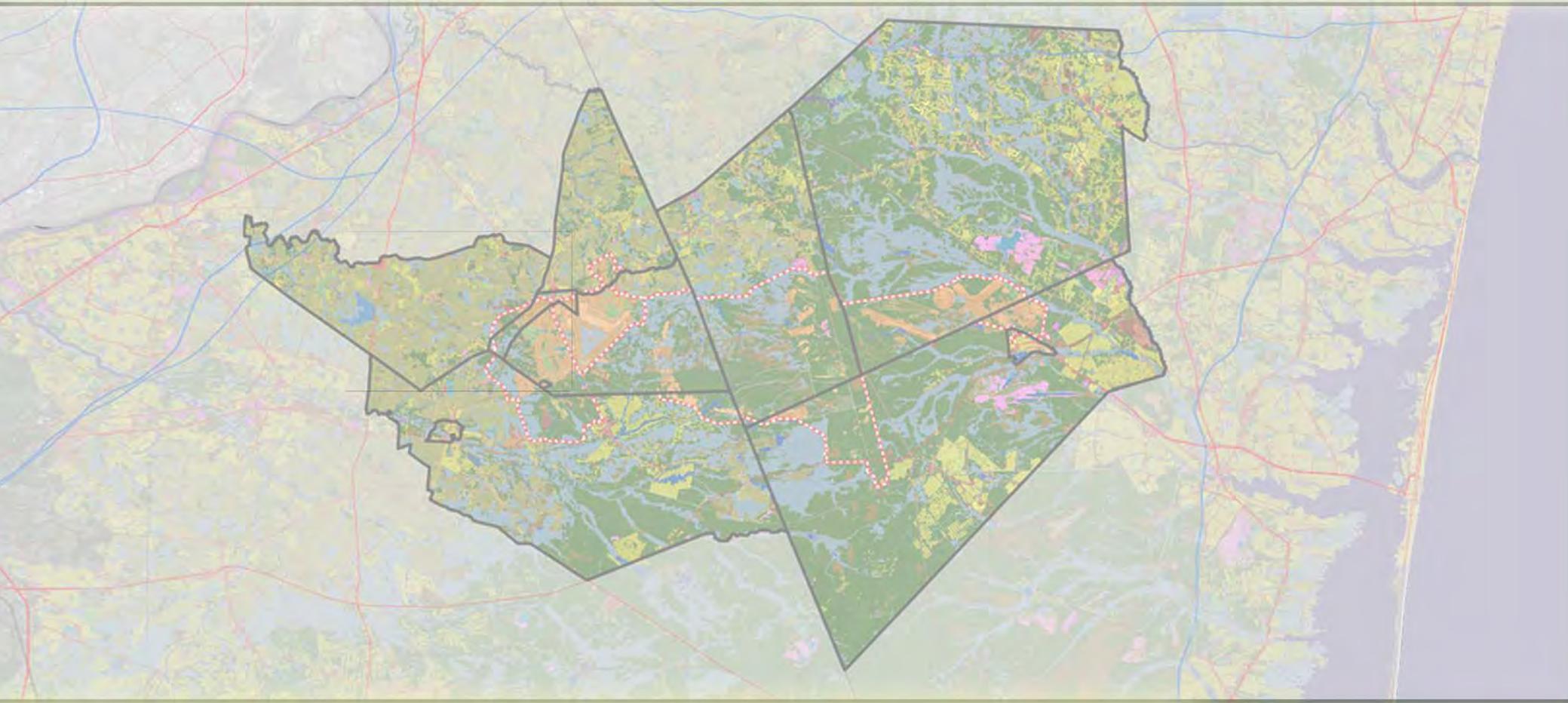


Figure 7.63 - Springfield Township Build Out Analysis for Vacant and Farmland Assessed Lands



Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Environmental Constraints were taken from wetlands from NDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2008; NDEP Division of Fish & Wildlife Endangered Nongame, and Species Program NDEP Landscape Version 2.1, 2008; Zoning Classifications from plan entitled "Springfield Zoning Map", prepared by Clarke Catin Hintz, December 2006; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled Environmental Assessment, East Coast Basin of C-17 Aircraft, prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by P&AS, 2009.

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 7.13 - Wrightstown Borough

Existing Land Use

Wrightstown Borough has historically been directly affected by the activity of the Bases. Many of Wrightstown’s local businesses serve the commuters and residents on the Bases. Wrightstown is seeking to achieve new redevelopment growth that continues to offer services to the nearby Bases and allows the community to be a regional market sector.

According to the Wrightstown 2007 Master Plan re-examination, there are 312 households and less than 800 residents. Rental units occupy 75% of the housing stock.

Wrightstown has historically had more commercial uses than neighboring towns. Fort Dix Road is a commercial center for the Borough and has a mix of fast food and local restaurants that serve the base population. Wrightstown Borough is designated “Wrightstown Village” on the Northern Burlington County GAPP Land Use Concept map. It is also designated as a Proposed Town Center according to the State Plan Map Amendment in Burlington County’s 2004/2005 Cross-Acceptance Report.

The Borough currently has a surplus of water and sewer capacity and is actively moving forward with redevelopment plans. The redevelopment plans include 44 acres of land that were annexed from Fort Dix in 2004. In May of this year a developer was picked for the project and it is hoped for a completion date in two to five years.

Approximately 30% of Wrightstown Borough falls within the 2-Mile JLUS Study Area, which intersects along the northern and southwestern portions of the Borough. Much of the northern portion of the study area is built up with residential development and commercial services. Table 7.13.1 displays land uses within the 2-Mile JLUS Study Area.

Table 7.13.1 Land Use within 2-Mile JLUS Study Area

Land Use Type	Acreage	Percent within Study Area
Agricultural	21 acres	6.1%
Barren or Altered Lands	3 acres	1.0%
Brushland and Scrubland	47 acres	13.7%
Commercial Services	55 acres	16.1%
Deciduous, Coniferous, or Mixed Forest	46 acres	13.4%
Other Urban Lands	50 acres	14.7%
Recreational and Parkland	6 acres	1.7%
Residential Lands	52 acres	15.3%
School	7 acres	2.1%
Transportation/Communication/Utilities	2 acres	0.5%
Wetland	52 acres	15.3%
Total (excluding Fort Dix & McGuire lands)	340 acres	

Source: 2002 NJDEP Land Use/Land Cover Data

Table 7.13.1 indicates a diverse mix of land uses within the study area. Five different land uses cover between 13% to 16% of the total land area. These land uses range from residential development and commercial services to brushland/shrubland and forested lands.

Section 7.13 Wrightstown Borough

Zoning

Wrightstown Borough is located entirely within the JLUS study area. Business and Commercial zones are prevalent. The Business and Commercial summary category represents the mixed use zone from the Borough's zoning map. The redevelopment area falls under this zone using the composite zoning structure. There are plans for more residential uses in the downtown redevelopment area that are not adequately reflected in the below zoning summary table. Table 7.13.2 displays composite zoning areas within the JLUS Study Area.

Table 7.13.2 Composite Zoning within 2-Mile JLUS Study Area

Zoning Type	Acreage	Percent within Study Area
Business and Commercial	79 acres	25.9%
Conservation, Recreation, and Open Space	27 acres	8.9%
Medium Density Residential (1-4 units per acre)	112 acres	36.7%
High Density Residential (more than 4 units per acre)	87 acres	28.5%

Build Out Capacity for 2-Mile JLUS Study Area

Table 7.13.3 Vacant Lands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
High Density Residential	APT-1	Apartment 1	152,460	0.1	0	0.1
	HIST/APT-2	Historic Apartment 2	5,000	0.2	2	0.0
	R-1	Single-Family Residential	9,000	2.5	12	1.6
	MUD	Mixed Use	9,000	46.6	113	0.0
Medium Density Residential	R-3	Single-Family Residential	15,000	12.3	36	9.7
	R/O	Residential/Office	20,000	34.1	74	1.2
				95.9	237	12.6

Table 7.13.3 shows vacant assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 96 acres of vacant assessed lands within the JLUS study area, of which 13 are considered to be environmentally constrained. According to the existing zoning regulations, 237 residential units are possible on vacant assessed lands within residential zoning districts. The Mixed Use District, located on a 47-acre tract recently ceded by Fort Dix, allows commercial/business uses up to 50 percent. For this analysis, 50 percent high density residential use was assumed for the tract, as permitted by the zoning ordinance.

Table 7.13.4 Vacant Lands Build Out Scenario: Non-Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Vacant Land Area by Zone (Ac.)	Environmentally Constrained Lands (Ac.)
Business and Commercial	GC	General Commercial	20,000	0.3	0.0
	OC/R	Office Campus/Retail	43,560	0.0	0.0
	RC	Retail Commercial	5,000	1.1	0.0
				1.4	0.0

Table 7.13.4 shows vacant assessed lands summarized by zoning districts that permit non-residential development. There is little over 1 acre of vacant assessed lands within the JLUS study area, of which none are considered to be environmentally constrained.

Table. 7.13.5 Farmlands Build Out Scenario: Residential

Composite Zoning District	Town Zoning District Code	Town Zoning District	Zoning Density (Minimum Lot Area Sq. Ft.)	Total Farmland Area by Zone (Ac.)	Total Potential Development Units	Environmentally Constrained Lands (Ac.)
Medium Density Residential	R-2	Single-Family Residential	12,000	22.6	82	4.1
				22.6	82	4.1

Table 7.13.5 shows farm assessed lands summarized by zoning districts that permit residential development. Total potential development units were calculated based on the minimum lot areas as designated in the zoning ordinance. There are 23 acres of farm assessed lands within the JLUS study area, of which 4 are considered to be environmentally constrained. According to the existing zoning regulations, 82 residential units are possible on farm assessed lands within the residential zoning district. Based on this analysis, Wrightstown Borough does not contain farm assessed lands within non-residential zoning districts located in the JLUS study area.

Growth Analysis

- Downtown Redevelopment is progressing
 - Planned creation of a pedestrian friendly central business district
 - Multi-use proposed to incorporate a bank, grocery store, apparel, restaurants (Applebee’s, Vegetarian, WWII theme restaurant), doctor’s office, hotel, cell phone store, drug store, art store, and Lady of Lourdes Medical center, are hoped for.
 - Planned Walk of Fame - walking path around the Main St municipal building triangle is proposed.
 - At the time of this report’s release, there are no final projected units for residential construction.
 - Wrightstown Borough development plan has been very thorough and has involved McGuire and Fort Dix input as well as Burlington County, the Pinelands Commission, and state regulatory agencies

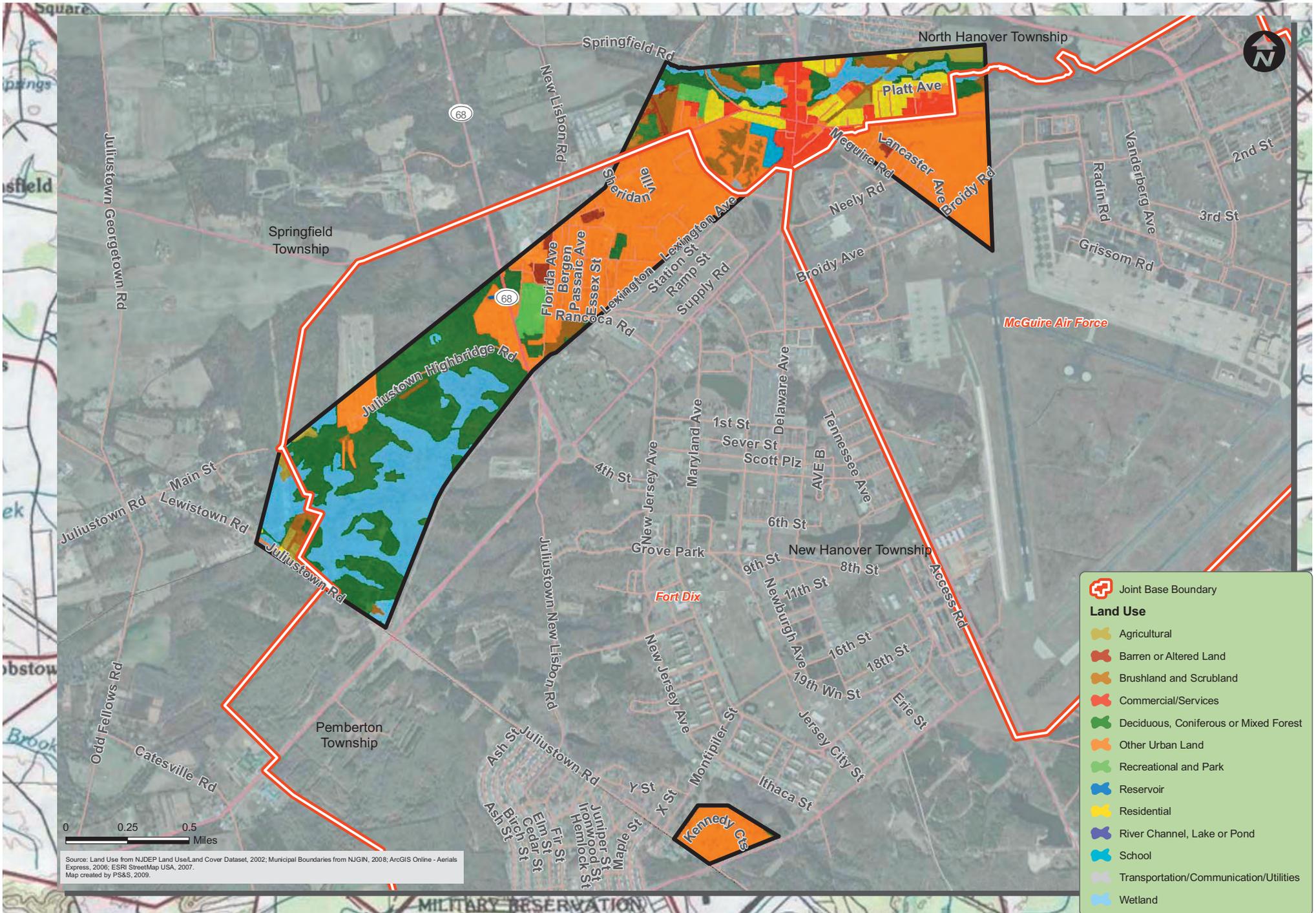
Figure 7.64 - Wrightstown Borough Overview Map



Source: Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

 Joint Base Boundary

Figure 7.65 - Wrightstown Borough Land Use Map



Joint Base Boundary

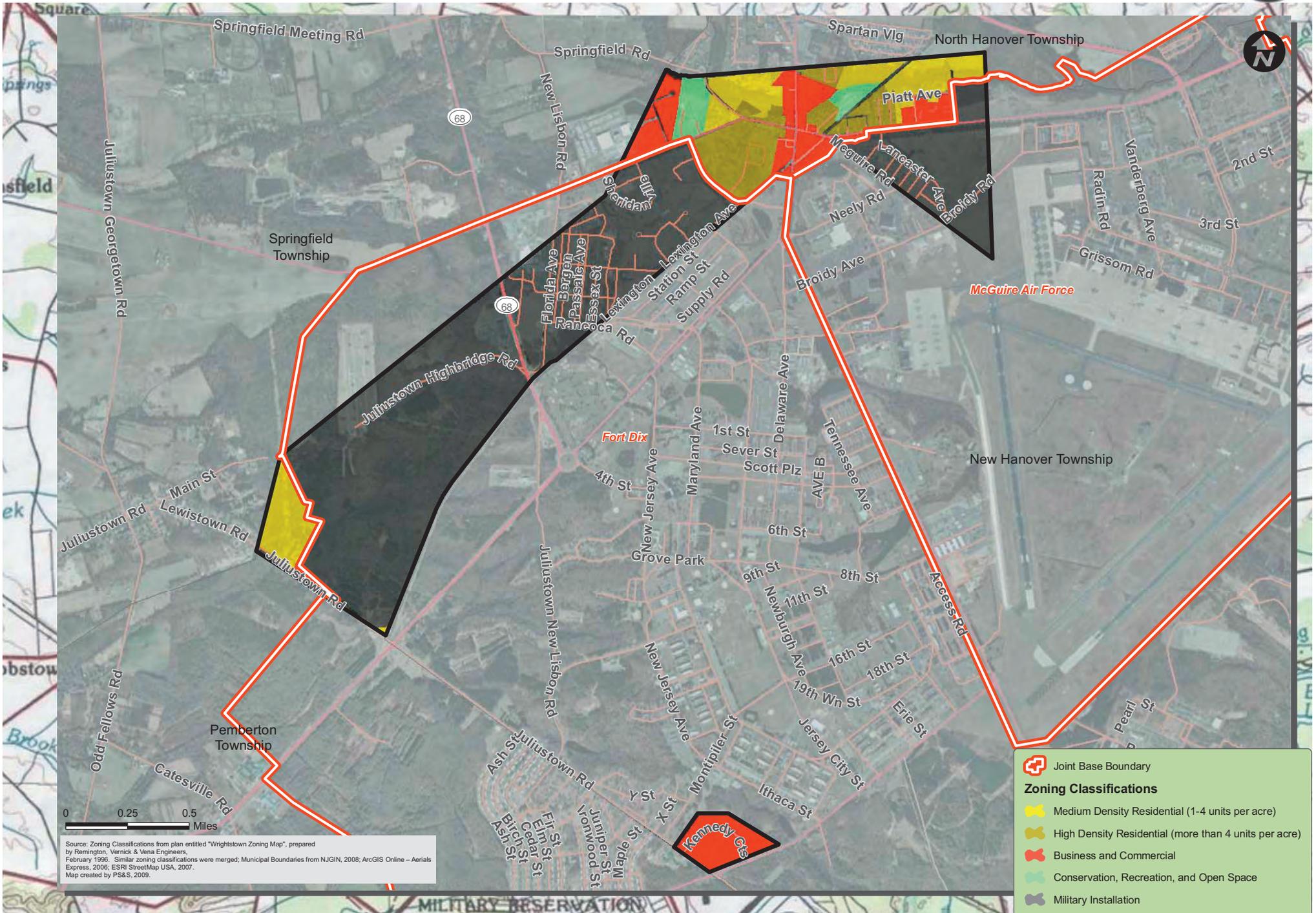
Land Use

- Agricultural
- Barren or Altered Land
- Brushland and Scrubland
- Commercial/Services
- Deciduous, Coniferous or Mixed Forest
- Other Urban Land
- Recreational and Park
- Reservoir
- Residential
- River Channel, Lake or Pond
- School
- Transportation/Communication/Utilities
- Wetland

0 0.25 0.5 Miles

Source: Land Use from NJDEP Land Use/Land Cover Dataset, 2002; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 7.66 - Wrightstown Borough Zoning Map



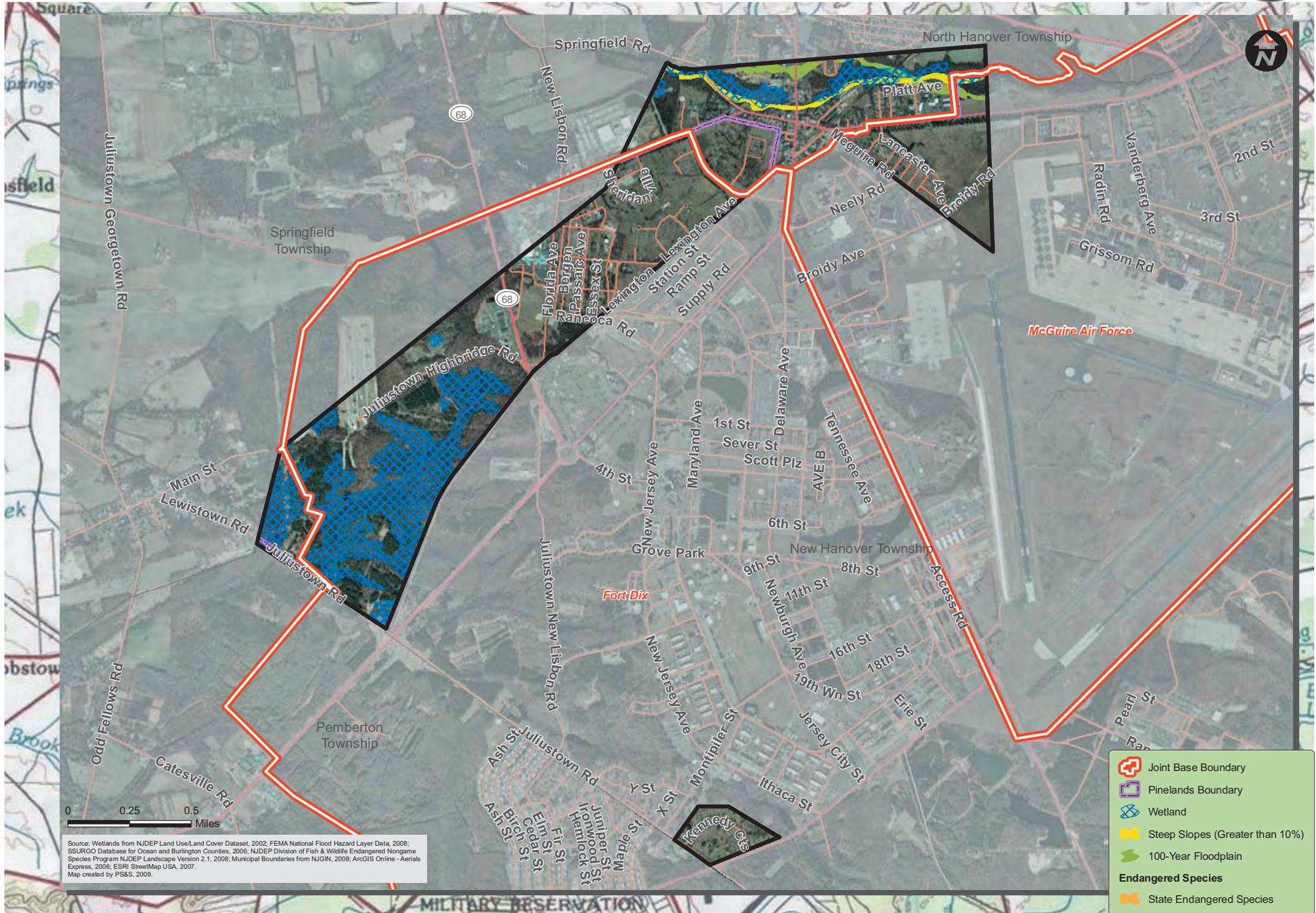
+ Joint Base Boundary

Zoning Classifications

- Medium Density Residential (1-4 units per acre)
- High Density Residential (more than 4 units per acre)
- Business and Commercial
- Conservation, Recreation, and Open Space
- Military Installation

Source: Zoning Classifications from plan entitled "Wrightstown Zoning Map", prepared by Remington, Vernick & Vena Engineers, February 1996. Similar zoning classifications were merged; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

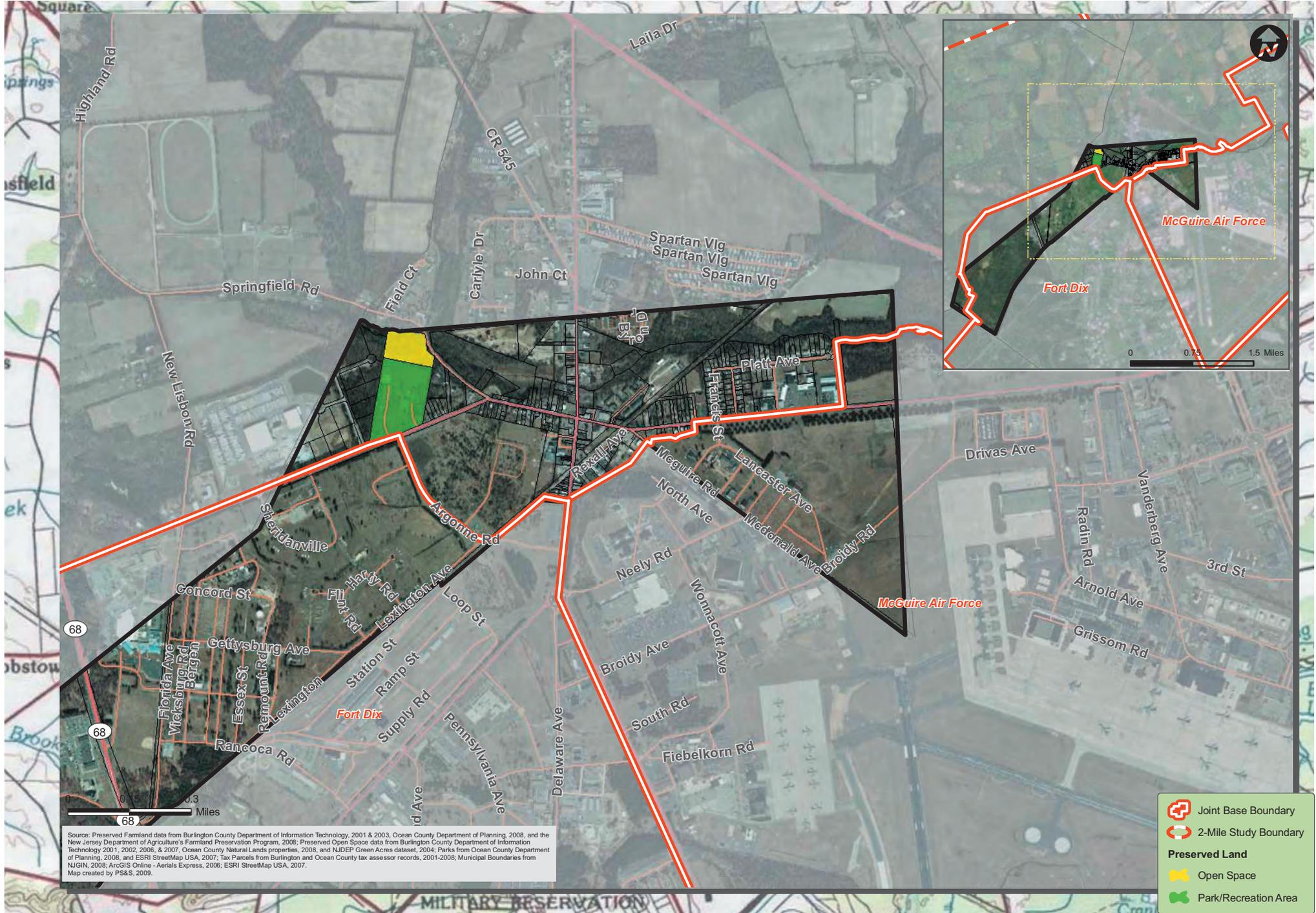
Figure 7.67 - Wrightstown Borough Environmental Constraints Map



Source: Wetlands from NJDEP Land Use/Land Cover Dataset, 2002; FEMA National Flood Hazard Layer Data, 2008; SSURGO Database for Ocean and Burlington Counties, 2006; NJDEP Division of Fish & Wildlife Endangered Nongame Species Program NJDEP Landscape Version 2.1, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2008; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

-  Joint Base Boundary
-  Pinelands Boundary
-  Wetland
-  Steep Slopes (Greater than 10%)
-  100-Year Floodplain
- Endangered Species**
-  State Endangered Species

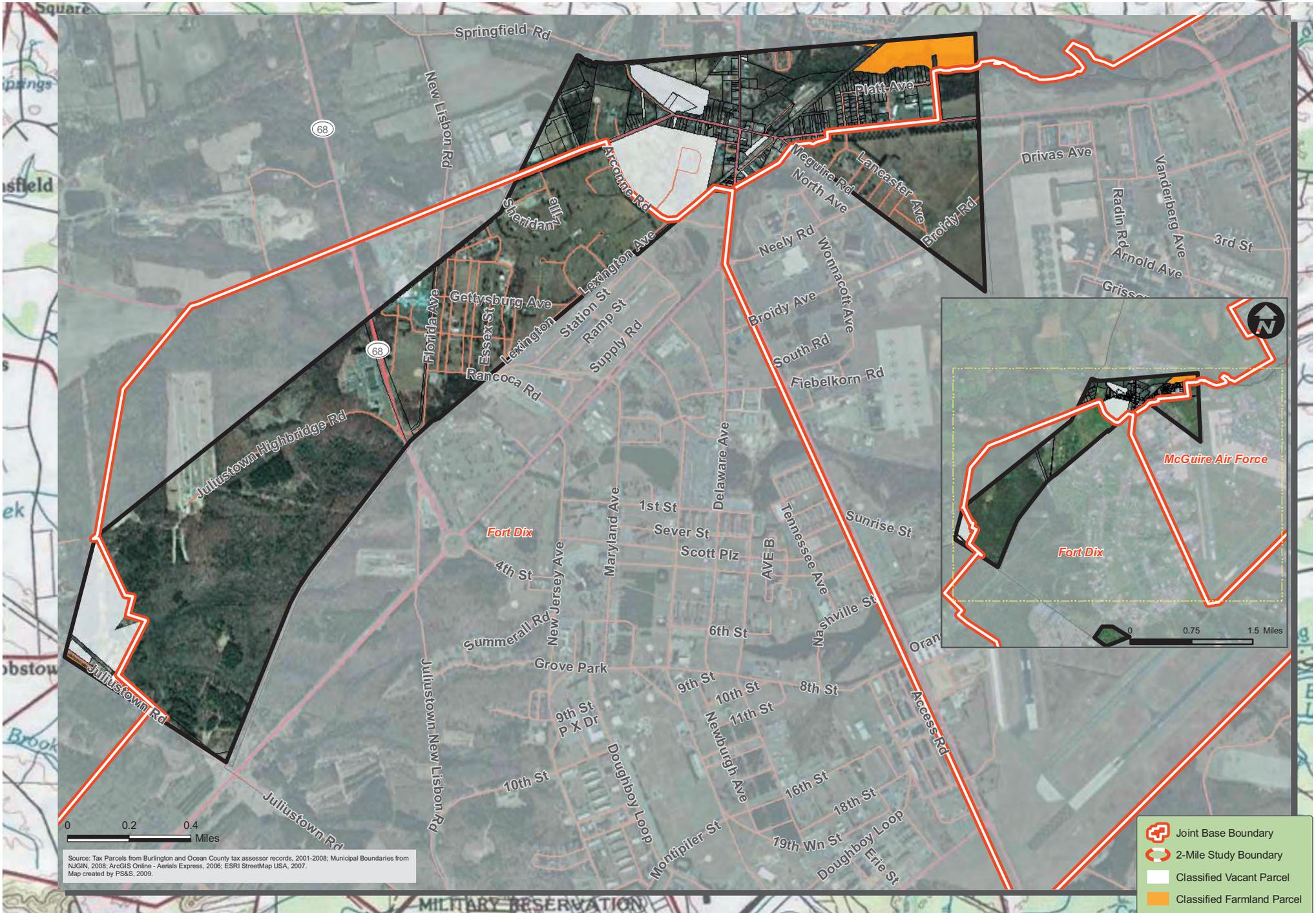
Figure 7.68 - Wrightstown Borough Preserved Lands



Source: Preserved Farmland data from Burlington County Department of Information Technology, 2001 & 2003, Ocean County Department of Planning, 2008, and the New Jersey Department of Agriculture's Farmland Preservation Program, 2006; Preserved Open Space data from Burlington County Department of Information Technology 2001, 2002, 2006, & 2007, Ocean County Natural Lands properties, 2008, and NJDEP Green Acres dataset, 2004; Parks from Ocean County Department of Planning, 2008, and ESRI StreetMap USA, 2007; Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- 2-Mile Study Boundary
- Preserved Land**
- Open Space
- Park/Recreation Area

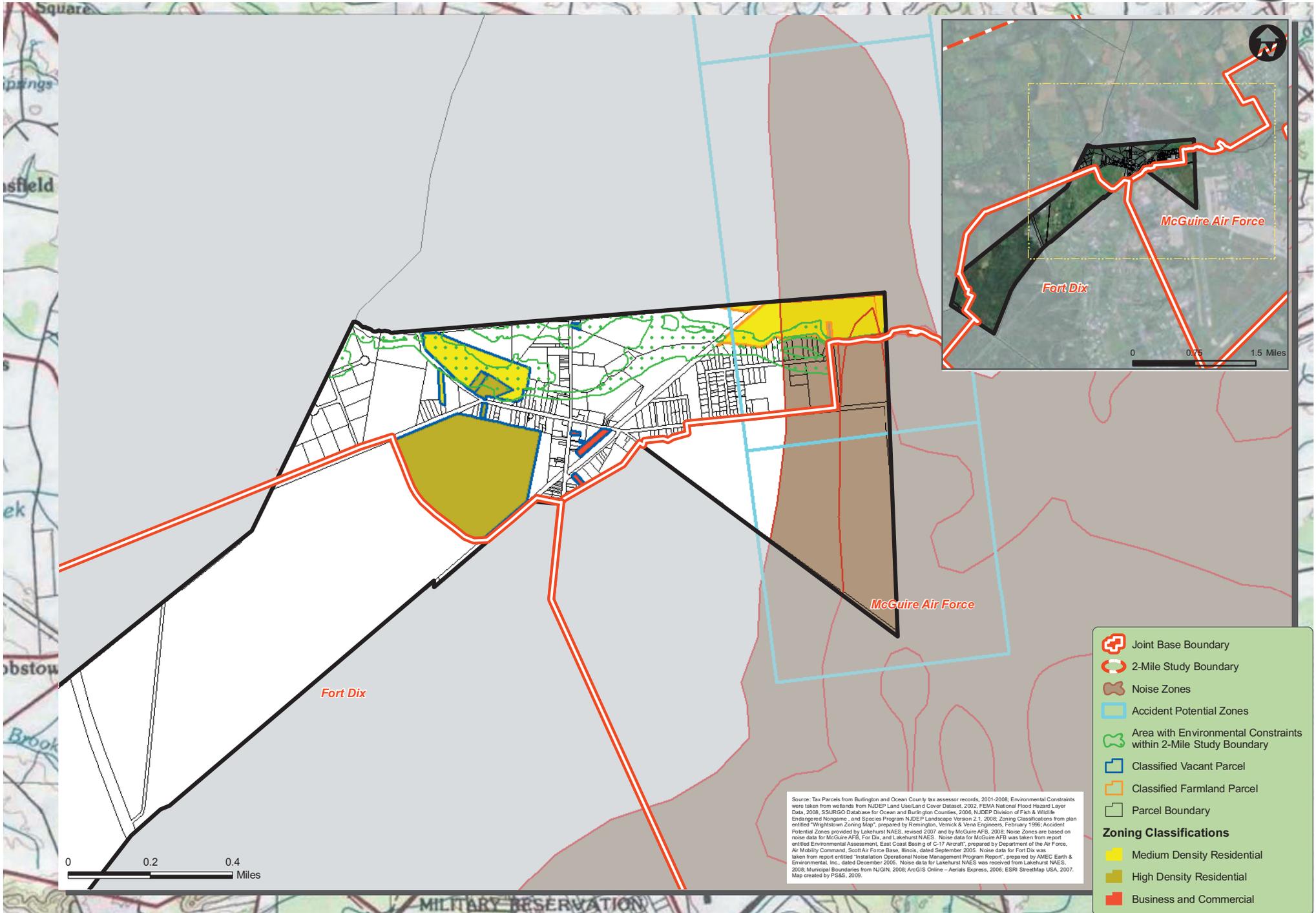
Figure 7.69 - Wrightstown Borough Vacant and Farmland Assessed Lands



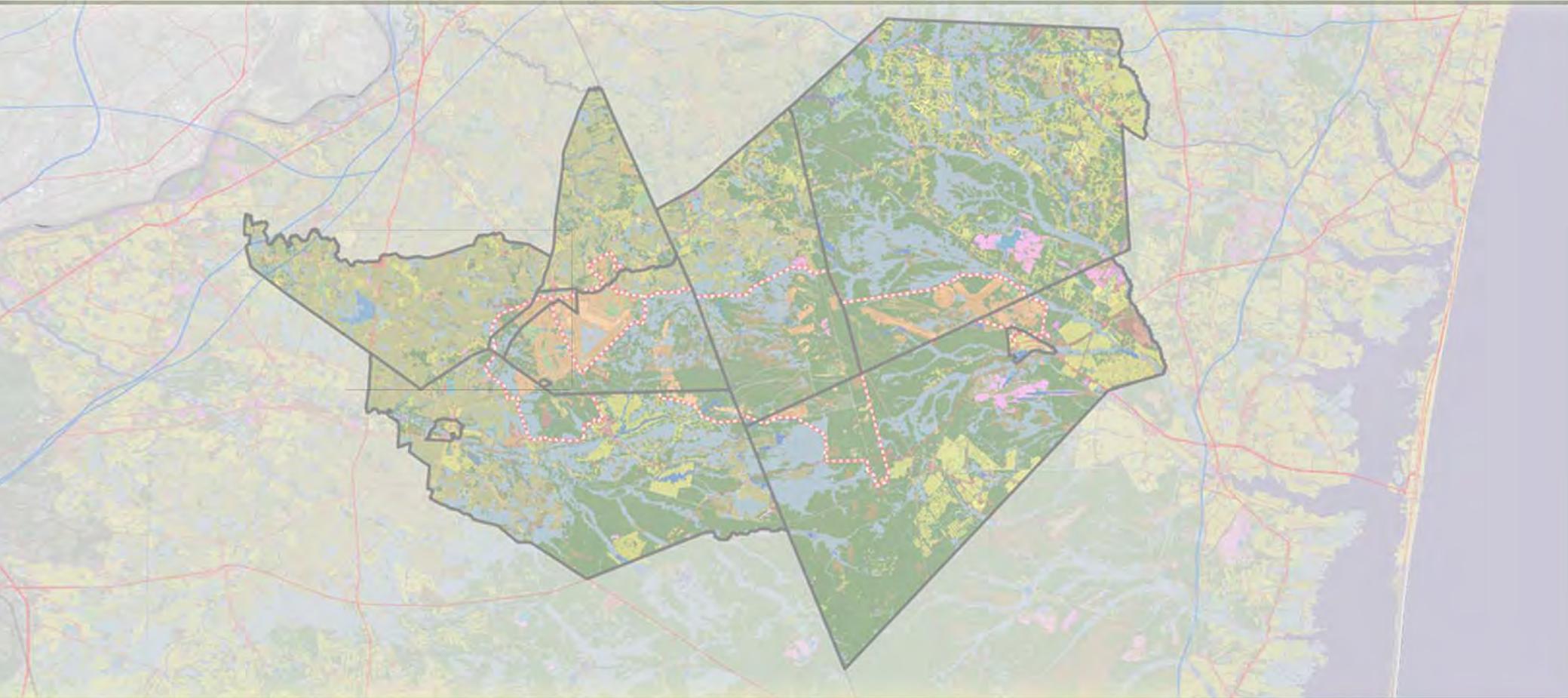
Source: Tax Parcels from Burlington and Ocean County tax assessor records, 2001-2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

-  Joint Base Boundary
-  2-Mile Study Boundary
-  Classified Vacant Parcel
-  Classified Farmland Parcel

Figure 7.70 - Wrightstown Borough Build Out Analysis for Vacant and Farmland Assessed Lands



Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 8 - Compatible Land Use Planning Considerations

State Plan - The New Jersey State Development and Redevelopment Plan (State Plan) is maintained by the State Planning Commission in accordance with the State Planning Act of 1985 to guide state agencies and local government with regard to planning of potential development, infrastructure investment and other public actions that affect and support economic growth and development in the state.

The purpose of the State Plan is to:

“Coordinate planning activities and establish Statewide planning objectives in the following areas: land use, housing, economic development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination (N.J.S.A. 52:18A-200(f)).”

The State Plan designates five general planning areas with two sub-planning categories. These Planning Areas designations are intended to encourage, not only where development should take place and where it should not, but also to guide the character, intensity and nature of the development that should occur within each Planning Area. Factors such as existing land uses, infrastructure capacity, geographic location, the presence or absence of limiting environmental conditions and the availability of resources necessary to support growth were considered in establishing these designations. The planning areas are suitable to serve as an organizing framework for application of the State Plan goals, policies and objectives.

Planning Areas Description

Metropolitan Planning Area 1 (PA1) - Provides for much of the state’s future redevelopment; revitalize cities and towns; promote growth in compact forms; stabilize older suburbs; redesign areas of sprawl; and protect the character of existing stable communities.

Suburban Planning Area 2 (PA2) - Provides for much of the state’s future development; promote growth in Centers and other compact forms; protect the character of existing stable

communities; protect natural resources; redesign areas of sprawl; reverse the current trend toward further sprawl; and revitalize cities and towns.

Fringe Planning Area 3 (PA3) - Accommodate growth in Centers; protect the Environs primarily as open lands; revitalize cities and towns; protect the character of existing stable communities; protect natural resources; provide a buffer between more developed Metropolitan and Suburban Planning Areas and less developed Rural and Environmentally Sensitive Planning Areas; and confine programmed sewers and public water services to Centers.

Rural Planning Area 4 (PA4) - Maintain the Environs as large contiguous areas of farmland and other lands; revitalize cities and towns; accommodate growth in Centers; promote a viable agricultural industry; protect the character of existing stable communities; and confine programmed sewers and public water services to Centers.

Rural/Environmentally Sensitive Planning Area 4B (PA4B) - Some lands in the PA4 have one or more environmentally sensitive features qualifying them for delineation as Rural/Environmentally Sensitive (PA4B). This sub-area contains valuable ecosystems, wildlife habitats or other environmentally significant characteristics. Rural/Environmentally Sensitive Planning Areas are supportive of agriculture and related economic development efforts that ensure a diversity of land uses within New Jersey. Policies should be adopted that support continuing agriculture, yet also should provide adequate protection of environmentally sensitive resources, along with appropriate guidance if agricultural uses are abandoned.

Environmentally Sensitive Planning Area 5 (PA5) - Protect environmental resources through the protection of large contiguous areas of land; accommodate growth in Centers; protect the character of existing stable communities; confine programmed sewers and public water services to Centers; and revitalize cities and towns.

Environmentally Sensitive/Barrier Islands Planning Area 5B (PA5B) - Planning for growth should acknowledge the unique character and history of each barrier island community and the sensitive ecosystem on which it depends. The State Plan’s intent is to strike an appropriate balance that recognizes that it is important to protect and preserve the natural environment, upon which the economic base of these islands directly depends.

Section 8 - Compatible Land Use Planning Considerations

Policy objectives have been specified for each planning area on the State Plan Policy Map. These policy objectives include recognition of Centers, Cores, Nodes, Critical Environmental Sites (CESs), Historic and Cultural Sites (HCSs) and Neighborhoods. Center-based development is the State Plan's most important strategy to encourage and accommodate growth in more sustainable ways. The State Plan also acknowledges that Center-based development may not fit all situations, particularly in places that are already developed, where municipalities may have built out to their boundaries. However, opportunities to retro-fit typical sprawl development into appropriately planned and appropriately designed centers should be identified.

The State Plan identifies five different center-based development types. Each has a unique character and appropriate context for use in planning a community. They include the following:

1. Urban Centers – Generally the largest Centers, offering the most diverse mix of population, industry, commerce, services, residences and cultural facilities
2. Regional Centers – Operating on a somewhat smaller scale than the largest urban Centers, the Regional Centers provide a mix of residential, commercial and public uses serving a large surrounding area and development and intensity that makes public transportation feasible
3. Town Centers – Traditional centers of commerce or government with diverse residential neighborhoods served by a mixed-use Core offering locally-oriented goods and services
4. Village Centers – Primarily residential places that offer a small core with limited public facilities, consumer services and community activities
5. Hamlets – Small-scale, compact residential settlements organized around a community focal point, e.g., civic building, house of worship, restaurant, general store

In the course of deliberations and throughout earlier cross-acceptance processes, the State Planning Commission found it necessary to devise and apply other concepts or tools to the Policy Map. Among these additional concepts or tools are the following:

- Cores – A pedestrian-oriented focus of neighborhood, commercial or civic uses serving the surrounding municipality or Center, generally including housing and access to public transportation. Cores are located in Centers or in the Metropolitan and Suburban Planning Areas.
- Nodes – A concentration of infrastructure, facilities and services which may reflect a range of types, e.g., “agriculture,” “heavy industrial” and “commercial/light manufacturing,” that is not a center and may not fit neatly into a particular Planning Area classification, but is deemed beneficial and may be designated by the State Planning Commission through its Plan Endorsement Process that may require specified conditions in achieving the designation.
- Critical Environmental Sites (CES) – An area of less than one square mile which includes one or more Environmentally Sensitive Features and is recognized by the State Planning Commission through either its Cross Acceptance or Plan Endorsement Processes.
- Historic and Cultural Sites (HCS) – Are sites of local, regional or statewide significance for which protection and enhancement are important. It highlights the need to preserve the connection between the historic and cultural site and New Jersey's historic and cultural heritage.
- Neighborhoods – Are fundamental building blocks of centers. They are found in urban and suburban areas often with a distinct identity based on ethnic identification, distinctive streetscape, or human-made physical boundaries such as a rail line or bridge or some natural feature such as a river or stream.

Summary of Planning Areas within the JLUS Municipalities

Figure 8.1 presents the current State Plan Map for the JLUS municipalities. Figure 8.2, State Plan Map- Preliminary Planning Areas of the Third Cross Acceptance process is also provided. Figure 8.2 shows the three proposed Burlington County Recommended Centers within the Burlington County municipalities of New Hanover Township, North Hanover Township, and Pemberton Borough. In addition, two areas of Manchester Township in Ocean County are mapped as Ocean County Recommended Centers.

A description of the currently adopted Planning Areas as well as the 2009 State Plan Policy Map amendments within each of the JLUS study municipalities follows:

Figure 8.1 - State Plan Policy Map - 2001

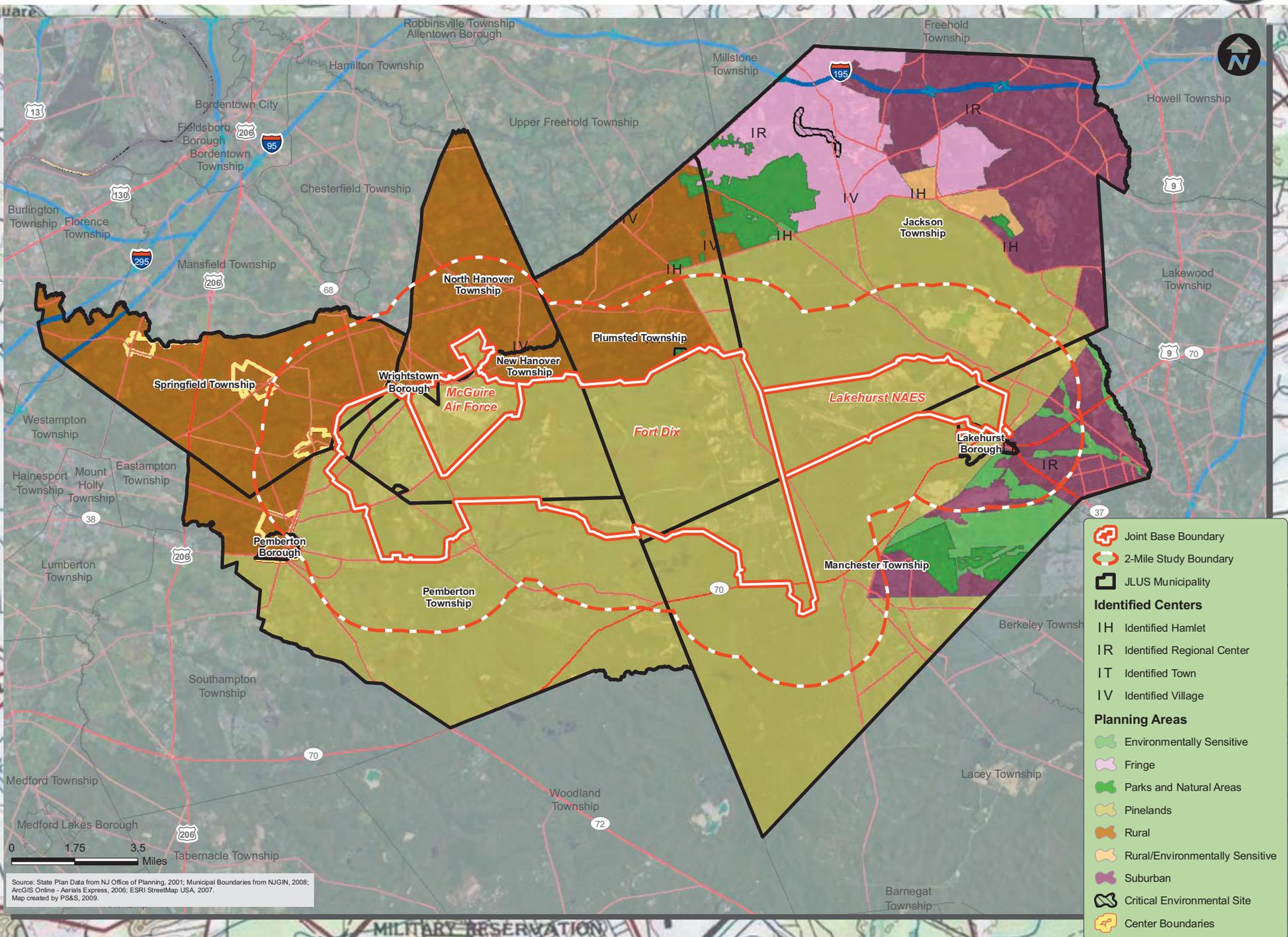
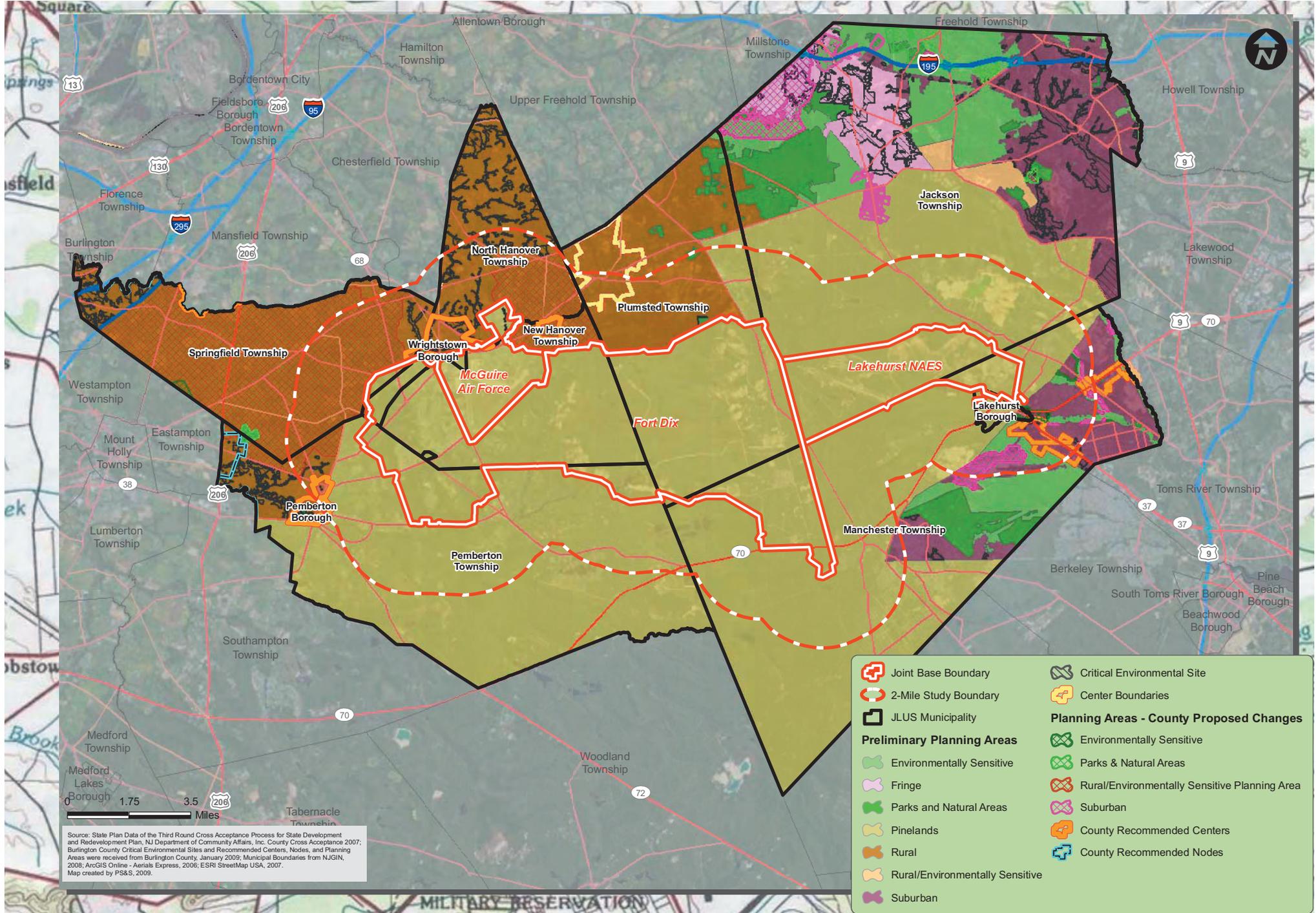


Figure 8.2 - State Plan Map - Preliminary Planning Areas of the Third Round Cross Acceptance Process



Joint Base Boundary	Critical Environmental Site
2-Mile Study Boundary	Center Boundaries
JLUS Municipality	Planning Areas - County Proposed Changes
Preliminary Planning Areas	Environmentally Sensitive
Environmentally Sensitive	Parks & Natural Areas
Fringe	Rural/Environmentally Sensitive Planning Area
Parks and Natural Areas	Suburban
Pinelands	County Recommended Centers
Rural	County Recommended Nodes
Rural/Environmentally Sensitive	
Suburban	

Source: State Plan Data of the Third Round Cross Acceptance Process for State Development and Redevelopment Plan, NJ Department of Community Affairs, Inc. County Cross Acceptance 2007; Burlington County Critical Environmental Sites and Recommended Centers, Nodes, and Planning Areas were received from Burlington County, January 2009; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PSS&S, 2009.

Ocean County

Jackson Township - Jackson Township contains Suburban Planning Area in the northeast part of the township, and Fringe Planning Area. During the Third Round of Cross-acceptance, the State Plan Policy Map was amended, which removed a vast amount of PA2 from the northern portion of the Township. Most of the southern part of the Township is within the Pinelands area. In addition, the Colliers Mills Wildlife Management Area Park is delineated in the northwest quadrant of the Township as a state park. The 2001 State Plan depicts several Identified Centers¹ within the 2-mile study boundary, which are as follows: two Identified Regional Centers, known as the Jackson Regional Center and the Great Adventure Regional Center; one Identified Village Center known as the Cassville Village Center; and three Identified Hamlets known as Van Hiseville Hamlet, the Holmansville Hamlet and the Route 528 Jackson Hamlet.

Lakehurst Borough - Lakehurst Borough is mostly located within the Pinelands National Reserve Area. The Pinelands jurisdiction occurs in the western and central area of the Borough (the area adjacent to the Joint Base). Outside of the Pinelands, the easternmost section of the Borough (east of Route 70) is delineated as PA2. The 2001 State Plan Policy Map depicts this area as an Identified Town Center known as the Lakehurst Town Center, as the area's character reflects a higher residential density than the surrounding lands.

Manchester Township - The western and northern areas of Manchester Township are nearest the Joint Base and are located within the Pinelands National Reserve. The area outside of the Pinelands includes PA2, which is bisected by PA5 and Double Trouble State Park. The 2001 State Plan Policy Map delineates a portion of the eastern part of the Township as an identified Regional Center, known as the Manchester Regional Center. Ocean County has proposed a Recommended Center for the portions of the area located within PA2 adjacent to Lakehurst Borough along the Route 37 corridor.

Plumsted Township - The southern area of Plumsted Township is within the Pinelands National Reserve, while the northern half of the Township is located within PA4, which includes both local and State parkland. According to OSG, the soon to be released 2009 State Plan Policy Map also delineates a small area located within the northeast as PA5. The Township

¹ The 2001 State Plan's Proposed and Identified Centers have been recommended for removal during the Third Round of Cross-acceptance and therefore will not be depicted in the 2009 State Plan. OSG will continue to recognize these areas as potential population and/or employment centers, which can be officially delineated as part of the Municipal Plan Endorsement process.

has a designated Center, known as the New Egypt Town Center and is also a designated Main Street community. The New Egypt Town Center, which was reestablished by the Permit Extension Act of 2008, is the only designated Center within the 2-mile study boundary. The 2001 State Plan also depicts two Identified Villages and two Identified Hamlets, known as the Route 528 Village Center, the Route 539/537 Village Center, the Long Swamp Hamlet and the Marshall's Corner Hamlet, which are located in the northern part of the Township. The Township has submitted a petition for the Municipal Plan Endorsement process and will be examining the potential for a Transfer of Development Rights (TDR) program, as to preserve the vast agricultural lands in the southern part of the Township (adjacent to the Joint Base) and transfer the development rights to the New Egypt Town Center.

Burlington County

New Hanover Township - Most of New Hanover Township is within the Pinelands National Reserve. Approximately 90% of the Township is owned by the Federal government, as it is part of the McGuire Air Force Base and Fort Dix Military Reservations, which is entirely located within the Pinelands. The northernmost part of the Township, which is adjacent to the Joint Base, was delineated as PA4 on the 2001 State Plan Policy Map; the 2009 State Plan Policy Map delineates this area as PA4B is mapped as Rural Planning Area, indicating limited potential for planned growth unless accommodated within a Center.

North Hanover Township - The southern area of North Hanover Township is proximal to the Joint Base. A relatively small portion of North Hanover Township's land area (within the Joint Base boundary) is within the Pinelands National Reserve. Most of North Hanover Township is in a Rural Planning Area. The 2001 State Plan Policy Map delineates the entire Township as PA4; the soon to be released 2009 State Plan Policy Map proposes that the most southeastern portion be delineated as PA4B (which maintains contiguity with New Hanover's proposed PA4B). The Rural Planning area designation reflects the intent to maintain a rural and agricultural character while the Rural/Environmentally Sensitive Planning Area supports continuing agriculture, yet also provides adequate protection of environmentally sensitive resources. The 2001 State Plan Policy Map also delineates an Identified Village Center in the southeastern part of the Township, known as the Cookstown Village Center.

Pemberton Borough - The 2001 State Plan Policy map depicts Pemberton Borough, along

with portions of Pemberton Township, as a Proposed Town Center, known as the Pemberton Town Center, which is wholly located within PA4 with areas in the western edge of the Borough delineated as local parkland. The 2-mile study boundary bisects Pemberton Borough. Development and redevelopment in the borough would occur at a distance approximately 2-miles or greater from the military installation, as the areas adjacent to the Joint Base currently contain recreational facilities and established residential neighborhoods.

Pemberton Township - Pemberton Township is located mostly within the Pinelands National Reserve. The Pinelands area is located nearest to the Joint Base. The western corner of the Township, furthest from the Joint Base, is depicted as PA4. The soon to be released 2009 State Plan Policy Map proposes that the most northern edge of the Township, which is shared by Springfield Township, be depicted as PA4B along with local parkland being established in conjunction with Springfield Township. The 2001 State Plan also delineates two Proposed Centers, known as the Pemberton Town Center, which is shared with Pemberton Borough, and the Juliustown Village Center, which is shared with Springfield Township and Wrightstown Borough.

Springfield Township - The 2001 State Plan Policy Map depicts the area of Springfield Township located outside of the Joint Base boundary as PA4. The 2001 State Plan Policy Map also depicts three Proposed Centers, which are found in the southeastern, central and northwestern parts of the Township. The Center located in the southeastern area, known as the Juliustown Village Center (which is shared with Springfield Township and Wrightstown Borough) is adjacent to the Joint Base. The two other Proposed Centers are outside of the 2-mile study boundary and are known as the Jobstown Village Center and the Jacksonville Hamlet. southeastern area is adjacent to the military base; the remaining two Centers are outside of the 2-mile study boundary.

Wrightstown Borough - Nearly all of Wrightstown Borough is located inside the Joint Base boundary. The 2001 State Plan Policy Map depicted the whole Borough as PA4; however, the 2009 State Plan Policy Map proposes that the majority of the Township be delineated as PA4B. The 2001 State Plan Policy Map also depicts a Proposed Town Center, known as the Wrightstown Town Center, which Burlington County has also recommended for Center designation.

State Plan Discussion

The current State Plan was adopted in 2001. The Office of Smart Growth (OSG) and its partner State agencies are presently synthesizing the data collected from the third round of cross-acceptance. Cross-acceptance is a bottom-up approach to planning, designed to encourage consistency between municipal, county, regional, and state plans to create a meaningful, up-to-date and viable State Plan (N.J.S.A. 52:18A-202.b.). This process is meant to ensure that all New Jersey residents and levels of government have the opportunity to participate and shape the goals, strategies and policies of the State Plan. Through Cross-acceptance, negotiating entities work with local governments and residents to compare their local master plans with the State Plan and to identify potential changes that could be made to achieve a greater level of consistency with statewide planning policy. This important process is intended to provide consistency with the municipal, county, and regional land use plans, infrastructure investment and other public actions that affect and support economic growth and development in the state. There are three phases in the cross acceptance process: comparison, negotiations, and final review.

The State is in the final review stage for the adoption of a new State Plan. Figure 8.2 displays the proposed State Plan Policy Map amendments, which reflect the outcomes of the negotiations held between the New Jersey State Planning Commission (SPC) and the County Planning Departments. The State Plan is intended to serve as a guide for public and private sector investment in New Jersey's future. The State Plan is a policy document for state, regional and local agencies, to guide their functional plans, regulatory processes and investment decisions. The State Plan is different from state agency plans and municipal, county and regional plans. State agencies should review their plans and regulations and make appropriate modifications to reflect the provisions of the State Plan, if such modifications are within the scope of the agency's authority. If the necessary modifications would exceed the agency's authority, it should seek to obtain the authority through normal legislative or rule-making processes. While the State Plan is voluntary for local communities, when municipal, county and regional plans are updated, they should be modified to reflect the provisions of the State Plan. The State Plan is also important when the state of New Jersey makes investment decisions. The State Plan guides when and where state funds should be expended to achieve the goals of the State Planning Act. The principal source of this guidance is provided by the State Plan's Statewide Policies, such as the policies on Public Investment Priorities, as they are applied in accordance with the State Plan Policy Map.

Pinelands Comprehensive Management Plan

The Pinelands Comprehensive Management Plan (CMP) was prepared in accordance with the 1979 New Jersey Pinelands Protection Act. The CMP regulations were prepared to manage development within the Pinelands while protecting the area’s significant natural, agricultural, cultural, recreational and historic resources. While local governments are responsible for implementing the CMP, the Pinelands Protection Act includes a procedure for review of county and municipal master plans and land use ordinances. The Pinelands Commission’s Office of Land Use and Technology Programs is responsible for reviewing and certifying all municipal zoning and land-use ordinances and master plans for consistency with the CMP. Generally, while the local governments can create their own land use and zoning plan, the CMP establishes minimum standards that the municipal and county plans must conform to.

The CMP Land Capability Map establishes nine land use management areas with goals, objectives, development intensities and permitted uses for each management area:

Preservation Area District - The “heart” of the Pinelands, The Preservation Area is a forested wilderness area containing habitat for diverse species, including species listed as “Threatened or Endangered”. Very limited residential or commercial development in certain areas is conditionally permissible.

Special Agricultural Production Area - This area supports berry agriculture and horticulture; farm-related housing and expansion of existing non-residential uses are conditionally permitted.

Forest Area – The Forest Area is largely undeveloped and is similar to the Preservation Area District in terms of ecological value. Permitted residential densities average one home for every 28 acres.

Agricultural Production Area - These are areas of active agricultural use, generally upland field agriculture and row crops, including adjacent areas with soils suitable for expansion of agricultural operations. Farm-related housing on 10 acres and non-farm housing on 40 acres are allowed. Permitted non-residential uses are agricultural commercial and roadside retail within 300 feet of preexisting commercial uses.

Rural Development Area - This is a transitional area that balances environmental and development values between conservation and growth areas. Limited, low-density residential

development and roadside retail is permitted. Residential densities average one home for every five acres.

Military and Federal Installation Area - This area includes the Joint Base. Permitted uses are those associated with function of the installation or other public purpose uses.

Pinelands Villages - Pinelands Villages are small, existing, spatially discrete settlements which are appropriate for infill residential, commercial and industrial development compatible with their existing character. Residential development is permitted on minimum 1-acre lots unless sewer infrastructure is available.

Pinelands Towns - Pinelands Towns are large, existing spatially discrete settlements. Residential development is permitted on minimum 1-acre lots if not sewered and 2 to 4 homes per acre with sewers. Commercial and industrial uses are also permitted.

Regional Growth Area - These are areas of existing growth and adjacent lands capable of accommodating regional growth influences while protecting the essential character and environment of the Pinelands. Residential development of approximately 3 homes per acre is permissible on sewered lots. Commercial and industrial uses are also permitted.

Table 8.1 Summary of Burlington and Ocean County Lands in the Pinelands

County	Total Acreage	Acreage Inside the Pinelands	Acreage Outside the Pinelands	Proportion in the Pinelands	County Pinelands Acreage as % of Total Pinelands Acreage
Burlington	524,166	334,187	189,979	63.8%	35.6%
Ocean	485,569	187,490	298,079	38.6%	20.0%

Source: New Jersey Pinelands Commission, 2008 Annual Report

Summary of Pinelands Land Use Management Areas within the JLUS

Municipalities

A description of the currently adopted Pinelands Land Use Management Areas within each of the JLUS study municipalities follows:

Ocean County

Jackson Township - The southern half of Jackson Township is subject to the Pinelands CMP. The Pinelands land use management areas within Jackson Township are shown on Figure 8.3. The southernmost part of the township is mapped Federal or Military Facility (within the Joint Base boundary). The lands directly adjacent to the military installation are designated Preservation Area and Forest Area. The eastern part of the township is Rural Development Area, with an inclusion of a Regional Growth Area along the boundary with Manchester Township. An additional Regional Growth Area is located in the eastern area of the Pinelands within Jackson Township. Three mapped Pinelands Villages are mapped within the central part of the Pinelands jurisdiction. The remainder of the Pinelands jurisdiction is mapped as Forest Area, with two small inclusions of Rural Development Area near the western township boundary with Upper Freehold Township.

Lakehurst Borough - Lakehurst Borough is mostly within the Pinelands Area, as shown on Figure 8.4 and is designated as a Pinelands Town.

Manchester Township - Figure 8.5 illustrates the Pinelands mapped areas within Manchester Township. The township area within the Joint Base boundary is mapped Federal or Military Facility, while much of the remaining Pinelands jurisdiction is Forest or Preservation areas. A Pinelands Town designation is found in the south-central area. Inclusions of mapped Rural Development, Pinelands Village, and Regional Growth follow development patterns within the township.

Plumsted Township - The southern part of Plumsted Township and parts of the eastern municipal boundary are within the Pinelands area, as shown on Figure 8.6. Most of the Pinelands jurisdiction is within the Joint Base Boundary, and is mapped as Federal or Military Facility. The township also includes Forest, Preservation and Rural Development management areas.

Burlington County

New Hanover Township - Most of New Hanover Township is within the Pinelands. This area coincides with the Joint Base boundary, and is mapped Federal or Military Facility.

North Hanover Township - A relatively small part of North Hanover Township's land area (within the Joint Base boundary) is within the Pinelands, and is mapped Federal or Military Facility.

Pemberton Township - As presented on Figure 8.7, Pemberton Township is located mostly within the Pinelands area. Two areas in the north of Pemberton Township are mapped Federal or Military Facility (within the Joint Base boundary). Much of the eastern half of Pinelands jurisdiction is Forest Area, Preservation Area, Agricultural Production Area, and Special AG Production Area, while the western lands are designated Agricultural Production, Village and Regional Growth Areas.

Springfield Township - The only part of Springfield Township within Pinelands jurisdiction is within the Joint Base boundary (Federal or Military Facility).

Wrightstown Borough - The Pinelands jurisdiction within Wrightstown Borough is shown on Figure 8.8. Most of this area is Federal or Military Facility, while a part of the northern-central area of the borough is Pinelands Town.

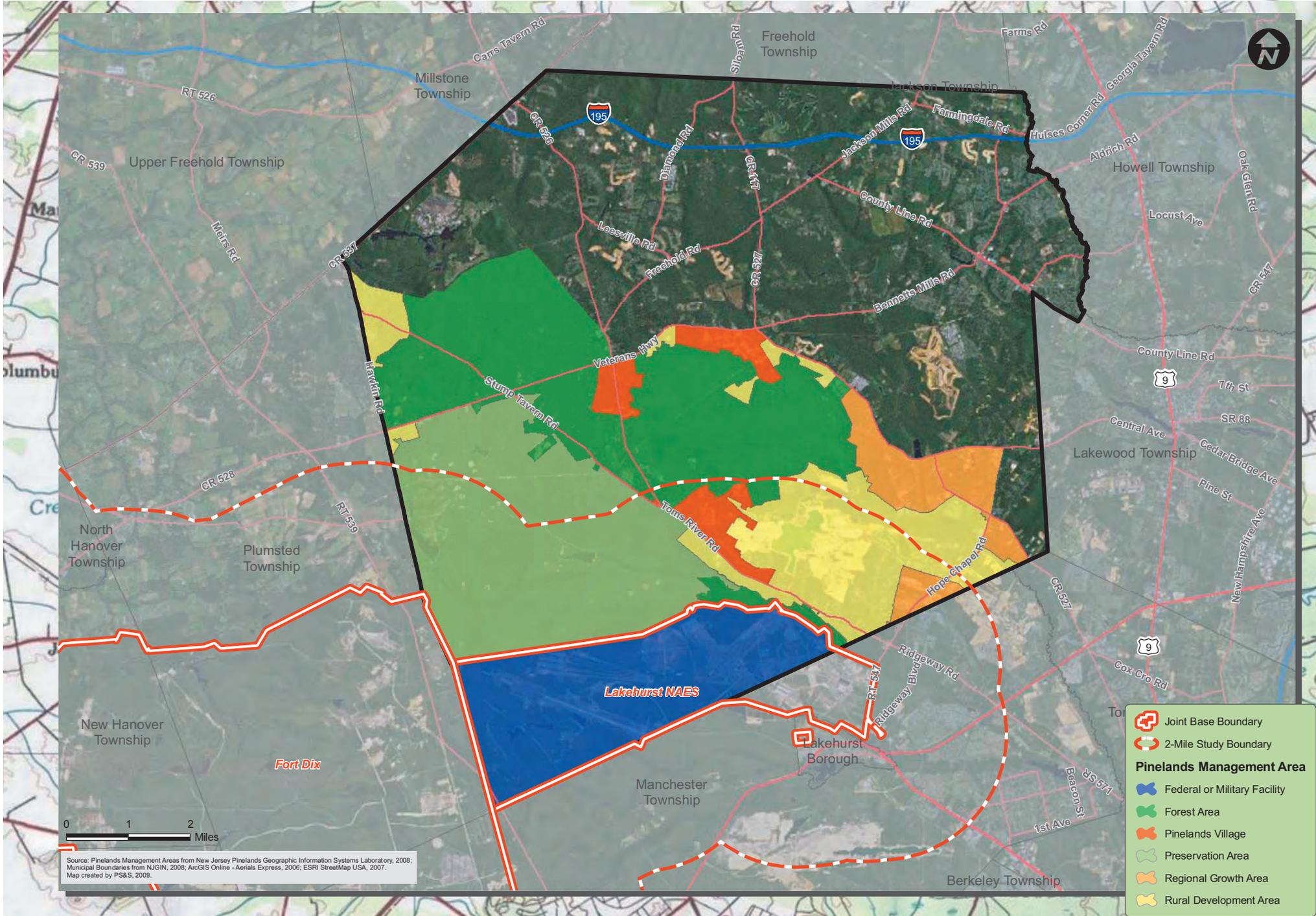
Pinelands Discussion

Implementation of the Pinelands CMP has constrained sprawl and preserved large areas of land with unique ecological integrity within the JLUS municipalities. The Pinelands Commission has been successful in limiting growth in the core of the ecologically sensitive pinelands central area while supporting cranberry or blueberry crops, forestry, recreation and fish and wildlife management areas. During the BRAC process, one of the deciding factors for whether to close, modify or maintain operations at a base is the surrounding encroachment of incompatible land use. Pinelands regulations have certainly had an effect upon land development surrounding the Joint Base and these regulations are in part responsible for the fact that Joint Base will be able to stay in the area.

The New Jersey Pinelands Commission is considering revisions to the boundaries of Pinelands Management Areas based on a comprehensive re-examination of the region's ecological characteristics. Commission scientists recently completed a study, called the Ecological Integrity Assessment, that evaluates the current status of the Pinelands ecology by analyzing landscape and watershed conditions throughout the million-acre region. The Pinelands Commission is using information from this study, among other data, in identifying and considering a series of management area changes which seek to ensure that important natural areas receive the appropriate protection. As of the publication of this JLUS, the management area changes, anticipated to result from the ecological integrity assessment, were still in the draft stages and are therefore not incorporated herein.

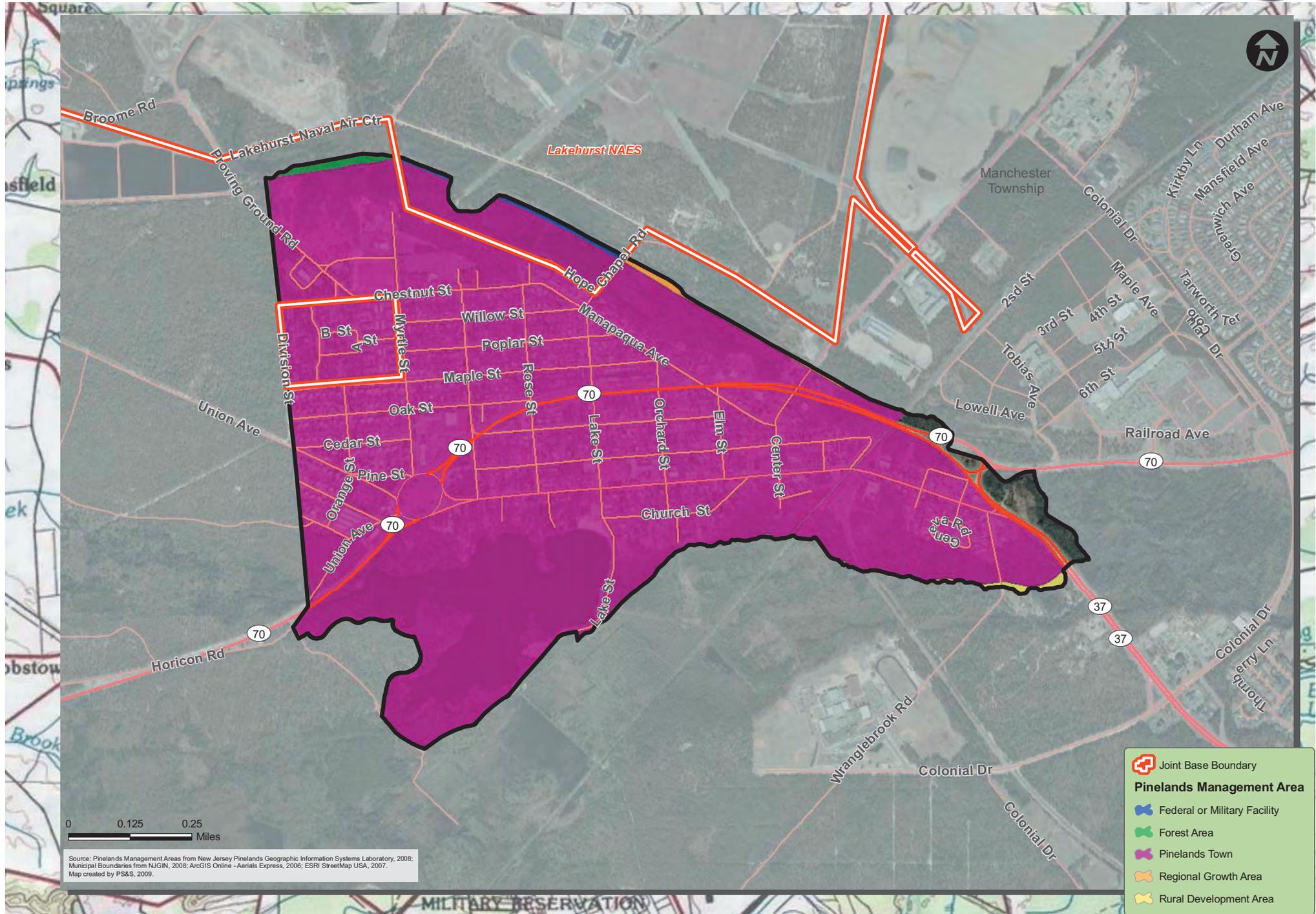
The Pinelands Commission has enacted a development credit program (Pinelands Development Credit (PDC)) that has helped to redirect growth from the Pinelands Preservation Areas into the Regional Growth Areas. The PDC program allocates sending areas and receiving areas. Sending area development credits can be used to increase the amount of residential development on receiving area lands. Conservation or agricultural easements are placed on the sending properties when the credits are transferred. PDCs can be bought and sold privately or through the publicly chartered Pinelands Development Credit Bank. Pemberton, Jackson and Manchester Townships are participating in the PDC program. The PDC program has resulted in the preservation of more than 50,000 acres since its inception in 1985 and has helped to redirect growth from the Pinelands Preservation and Agricultural Production Areas to the designated Regional Growth Areas. This program is considered one of the most successful examples of transfer of development rights (TDR) in the country.

Figure 8.3 - Jackson Township Pinelands Management Areas Map



Source: Pinelands Management Areas from New Jersey Pinelands Geographic Information Systems Laboratory, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

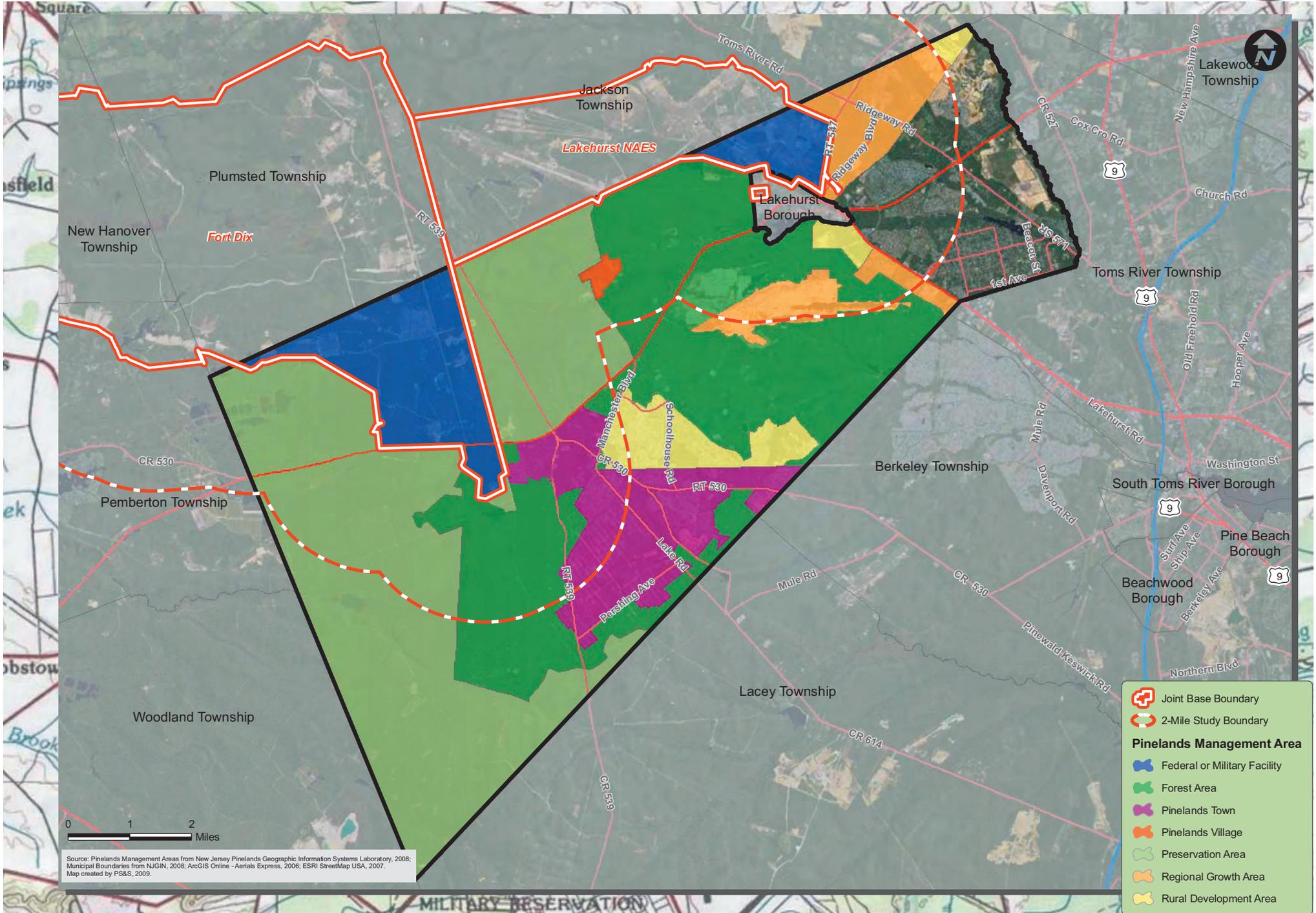
Figure 8.4 - Lakehurst Borough Pinelands Management Areas Map



Source: Pinelands Management Areas from New Jersey Pinelands Geographic Information Systems Laboratory, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

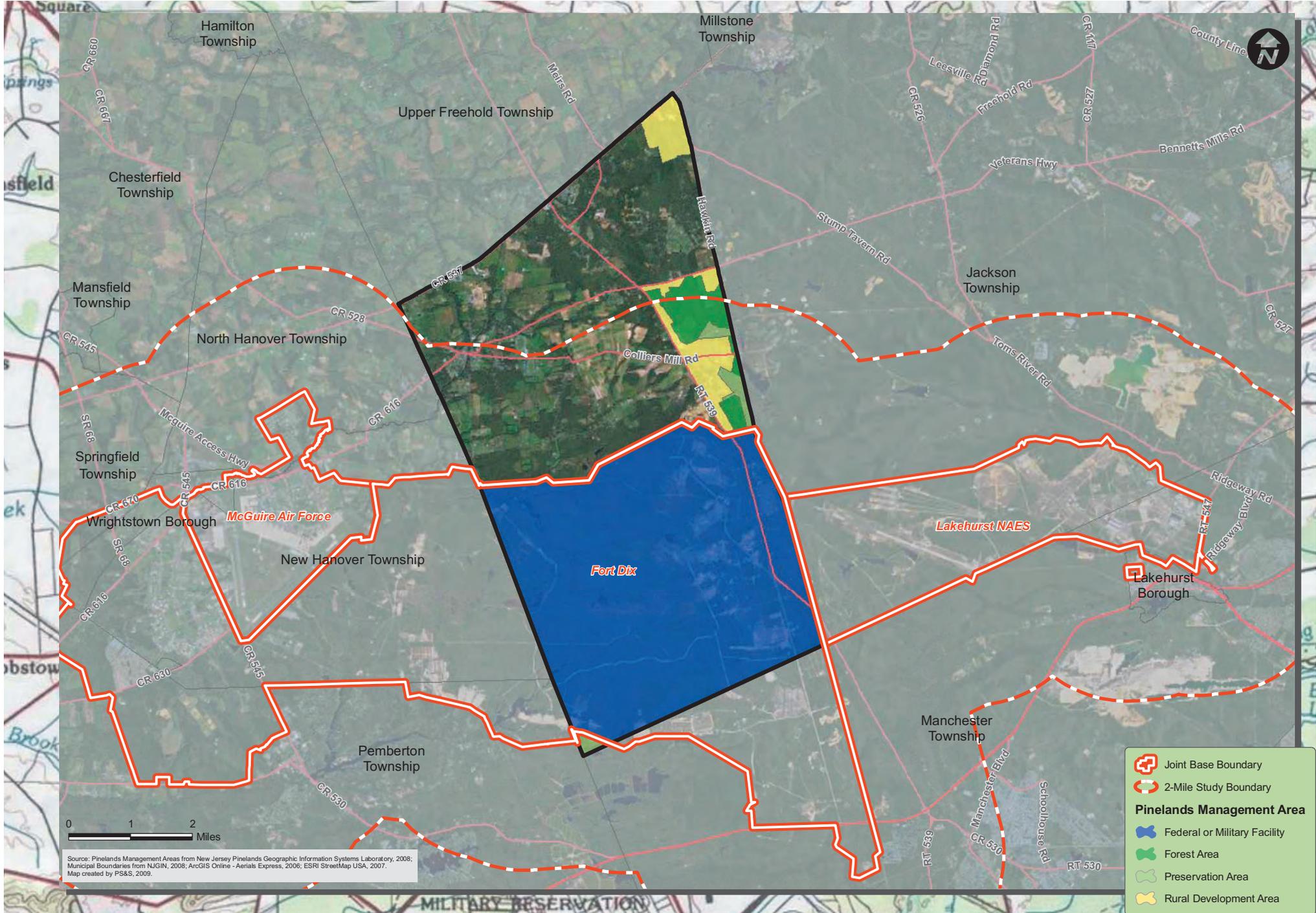
- Joint Base Boundary
- Pinelands Management Area**
- Federal or Military Facility
- Forest Area
- Pinelands Town
- Regional Growth Area
- Rural Development Area

Figure 8.5 - Manchester Township Pinelands Management Areas Map



Source: Pinelands Management Areas from New Jersey Pinelands Geographic Information Systems Laboratory, 2008; Municipal Boundaries from NJGIS, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 8.6 - Plumsted Township Pinelands Management Areas Map



Source: Pinelands Management Areas from New Jersey Pinelands Geographic Information Systems Laboratory, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Figure 8.7 - Pemberton Township Pinelands Management Areas Map

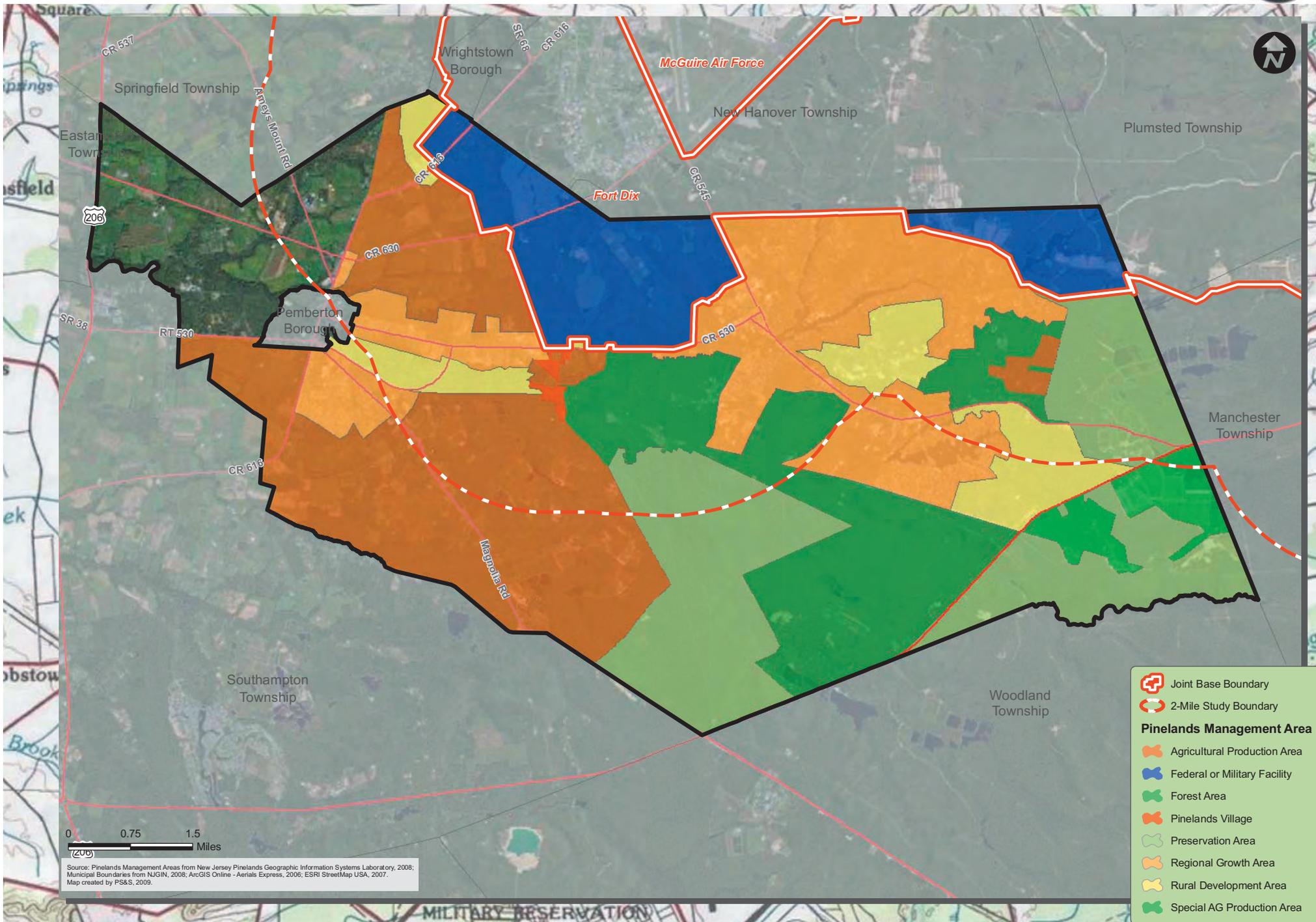
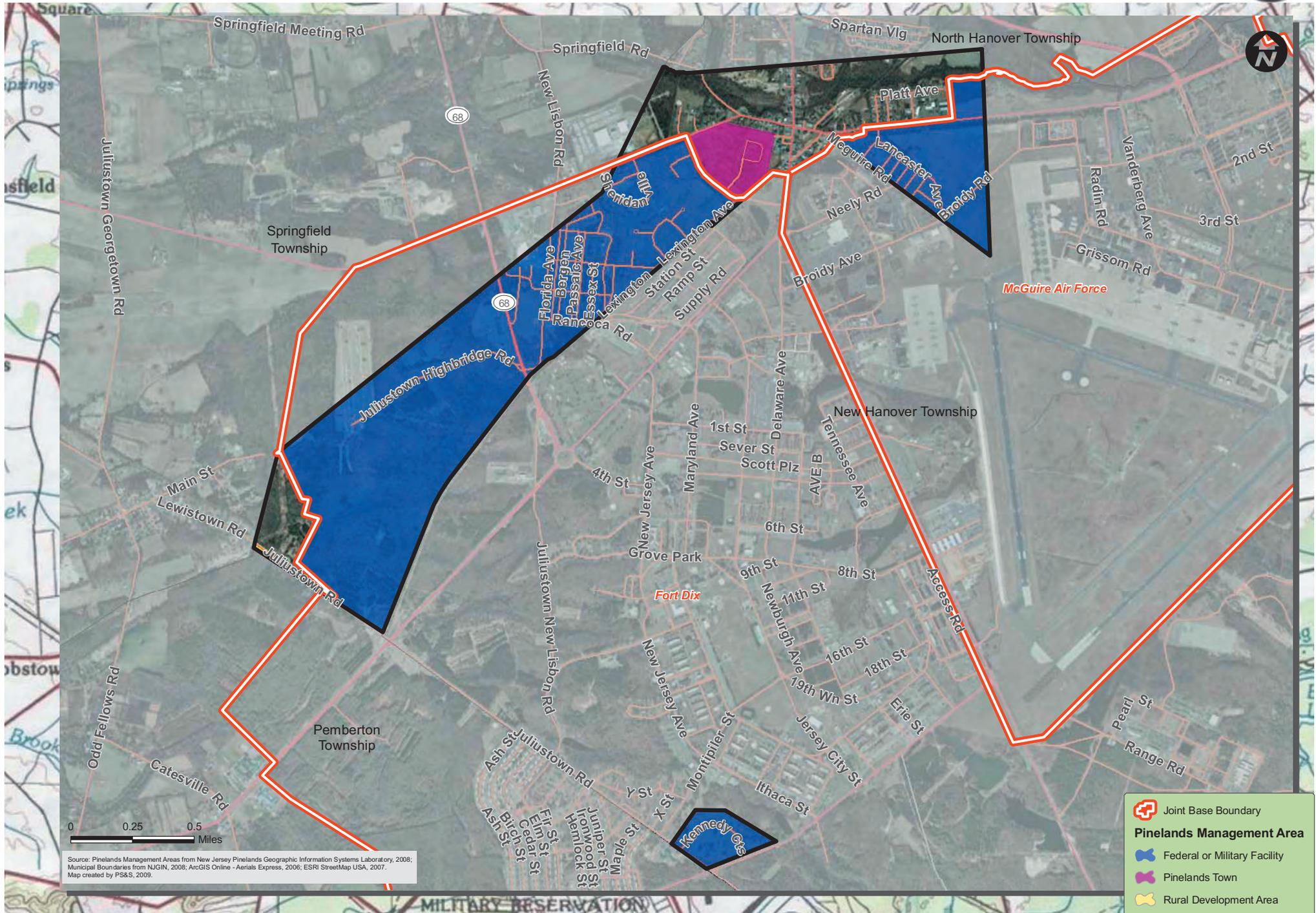


Figure 8.8 - Wrightstown Borough Pinelands Management Areas Map

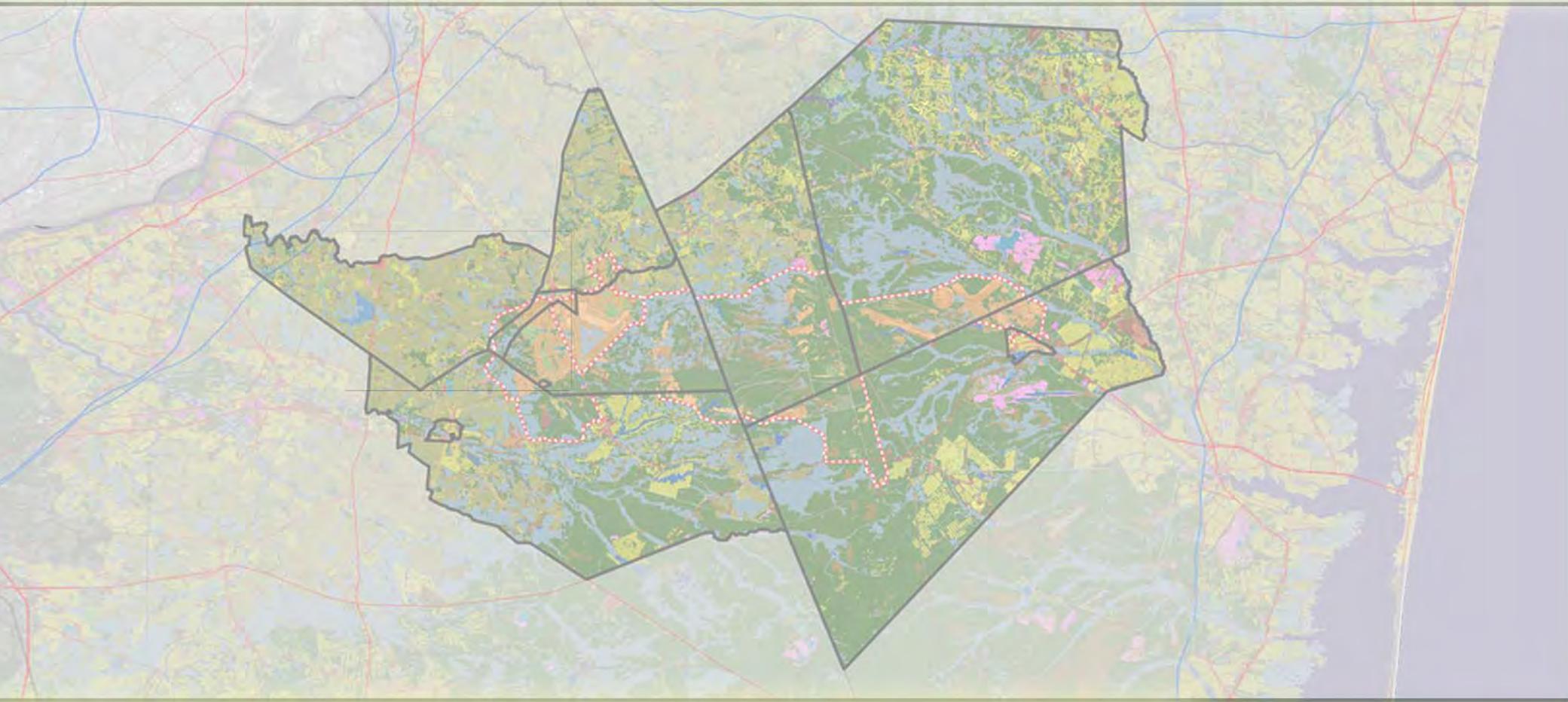


Source: Pinelands Management Areas from New Jersey Pinelands Geographic Information Systems Laboratory, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

- Joint Base Boundary
- Pinelands Management Area**
- Federal or Military Facility
- Pinelands Town
- Rural Development Area

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 9 - Infrastructure Capacity

New Jersey is the most densely populated state in the United States. For at least the last thirty-five years, planning at the state level has been increasingly focused on making investments in the extension and expansion of infrastructure to meet needs of existing development and support the creation of population centers while seeking to retard sprawl. In this section infrastructure can be defined as the essential services that are needed to support municipalities and their residents. In particular, transportation, water supply management and wastewater treatment management are three significant infrastructure considerations that are of concern to the overall health and safety of the JLUS municipalities' populace. The intent of this section is to note areas of infrastructure capacity concern or acknowledge existing or future limitations to such infrastructure.

Infrastructure plays an interesting role in a JLUS. On the positive side, infrastructure can enhance the operations of the installation by providing needed services, such as sanitary sewer treatment capacity and transportation systems. Infrastructure can also be an encroachment issue if enhanced or expanded infrastructure encourages incompatible growth near the installation.

Throughout this JLUS, municipalities lacking infrastructure (or burdened with failing infrastructure) mentioned that available capacity was often located in their political boundaries but was inaccessible because it was on Base lands. The response from the Joint Base has been a general unwillingness to share Base wastewater infrastructure due to security concerns. However, infrastructure availability could become an element to foster additional cooperation between the Joint Base and the municipalities; a memoranda of understanding could be established to enable municipal access to existing capacity but with a growth scenario that is protective of land use compatibility surrounding the Joint Base.

Transportation

New Jersey has approximately 39,000 miles of public roadways. The NJ Department of Transportation estimated that 208,419,000 vehicle miles were traveled each day in 2007. With such high numbers of daily travel and with the overall extent of public roadways, the maintenance and preservation of the existing transportation system is no small task.

Within the JLUS municipalities, there are 966 miles of public roadways. There are 576 miles in the Ocean County JLUS municipalities and 390 miles of roadways in the Burlington County JLUS municipalities. Major routes to the Joint Base include New Jersey State Route 70 and CR 37, CR 68, CR 545 and CR 547. Each of these routes are direct links to the Joint Base; as personnel increases these routes will likely see increase as well. Local roads, such as Fort Dix Road, Cookstown New Egypt Road, and Wrightstown New Egypt Road tend to have base traffic from personnel traveling to the bases as well as base vehicles in transit. Increased base traffic will increase the strains on the capacity of these local roads.

Burlington County is within the Delaware Valley Regional Planning Area. In 2003, the Delaware Valley Regional Planning Commission (DVRPC) sponsored a transportation and circulation study for the Route 130/Delaware River Corridor Extension and Route 206. The Burlington County JLUS municipalities were included in this analysis. Within the JLUS 2-mile study area there were 12 transportation problem locations identified. Closest to the Joint Base, the intersection of Cookstown New Egypt (CR 616) and Meany Road, and the Intersection of Cookstown Jacobstown Road (CR 665) and CR 616 in New Hanover and North Hanover Township were discussed. CR 616 connects with CR 667 to the south leading to the Village of Browns Mills. This route is now the only major through route to Browns Mills now that CR 545 (Texas Avenue) and CR 669 are closed through Fort Dix and McGuire AFB. The roads were closed as a result of September 11, 2001, in consideration of security concerns. Due to this closure, CR 616 and CR 665 have had increased traffic. Identified problems in this area were signage and traffic turning onto Meany Road. The commercial industry in Pemberton Township and Wrightstown Borough along Route 545 has suffered significant impacts from this closure. In New Hanover Township, the intersection of Browns Mills Cookstown Road (CR 667), Hockamick Road and CR 616 can have congestion problems due to the lack of traffic controls at a four way intersection.

In some of the rural areas of Burlington County, Base traffic can cause roadways to be congested. Potential improvements suggested in the transportation and circulation study for these areas was the installation of traffic signals and changing the transition of traffic for better visibility and adding signage that designates route numbers.

Ocean County is within the North Jersey Transportation Planning Authority (NJTPA) boundaries. In 2002, the NJTPA identified access and mobility needs throughout their region. State Route 70 was addressed as having extreme congestion to the east of NAES Lakehurst. Treatments suggested included improved signal progression, turning lane enhancements, signal timing

Section 9 - Infrastructure Capacity

changes, better network connections off the state highway, better access management and spot capacity increases.

Any roads (public and military) that fall within the Pinelands Commission jurisdiction that need to be widened to incorporate increased capacity are subject to Pinelands environmental standards and requires approval by the Commission.

Water Management

New Jersey’s water supply is almost evenly split between surface and groundwater supply. In some cases across New Jersey there are areas that currently are, or are projected to be in, a water supply deficit. There are currently two critical water supply areas (Critical Area 1 and Critical Area 2) designated in New Jersey. In 1982 NJDEP adopted the first NJ Statewide Water Supply Master Plan as required by the Water Supply Management Act. In 1996 the NJDEP issued a follow up statewide water supply master plan, “Water for the 21st Century” to continue the process of estimating individual surface water supply and regional groundwater availability and projecting for future demand scenarios (population growth). The NJDEP has divided the state into 23 Regional Water Resource Planning Areas (RWRPA). The RWRPA’s are based on major surface water drainage basins.

The JLUS municipalities fall mostly within the RWRPA’s 14, 15, and 16. All Burlington County JLUS municipalities fall entirely with RWRPA 14 (Rancocas Creek watershed). Much of Plumsted and a portion of Manchester Township also fall in this RWRPA. The major surface water source that supplies this RWRPA is the Delaware River.

While the Rancocas Creek Planning Area 14 is not projected to have deficits, a critical water supply area is located in RWRPA 14 and recent restrictions by the NJDEP are reducing ground water withdrawals to reduce stress on the aquifer. Large portions of RWRPA 14 are also

Table 9.1 Rancocas Creek Water Supply Planning Area Water Statistics

RWRPA	Net Available Water	1990 Water Demand	1990 Surplus/ Deficit	2010 Water Demand	2010 Surplus/ Deficit	2040 Water Demand	2040 Surplus/ Deficit
14 Rancocas Creek	136 MGD	101 MGD	35 MGD	120 MGD	16 MGD	135 MGD	1 MGD

MGD = millions gallons per day/ Source: Water for the 21st Century: NJ Statewide Water Master Plan

located in the Pinelands which also has water restrictions.

Within RWRPA 14, there are 26 public community water purveyor service areas within JLUS municipalities. Water purveyors are regulated by the NJDEP Bureau of Safe Drinking Water, under the Safe Drinking Water Act. Public Community Water Purveyors are systems that pipe potable water to at least 15 service connections used year-round, or one that regularly serves at least 25 year-round residents. Public purveyors can be government agencies, private companies, or quasi-governmental groups.

Table 9.2 summarizes RWRPA 14 Public Community Water Purveyor Capacity within the JLUS municipalities. The Pemberton Township Department Main Supply shows a firm capacity deficit. This deficit is based on the physical ability of the firm capacity to provide treated water at adequate pressure when the largest pumping unit or treatment unit is out of service. All of the water purveyors within RWRPA-14 that have capacity data are operating with a water supply surplus.

RWRPA 16 is the next water supply planning area to the east. This area encompasses most of Jackson and Manchester Townships and a small portion of Plumsted Township. RWRPA 15 incorporates the northern eastern portion of Jackson Township. RWRPA 16 is the Toms River Watershed and RWRPA 15 is the Metedeconk River Watershed. The major surface water source that supplies these planning areas are the Glendola and Swimming River Reservoirs the Manasquan Reservoir, and the Metedeconk River. The Metedeconk River is only used when stream flows exceed the passing flow. (There is a small portion of Manchester Township that is within RWRPA 19. This analysis did not include this area because it is within preserved lands with no development potential for the JLUS.)

Within RWRPA 16, there are 18 public community water purveyor service areas within the JLUS municipalities. Table 9.4 displays RWRPA 16 Public Community Water Purveyor Capacity. All of the water purveyors within RWRPA 16 that have capacity data within the JLUS municipalities are operating with a water supply surplus and a firm capacity surplus. Table 9.5 summarizes

RWRPA 15 Public Water Purveyor Capacity. All of the water purveyors within RWRPA 15 that have capacity data within the JLUS municipalities are operating with a water supply surplus and a firm capacity surplus.

Table 9.2 RWRPA 14 Public Water Purveyor Capacity within JLUS Municipalities

PWS ID	Water Purveyor	Water Supply Firm Capacity	Daily Peak Demand	Firm Capacity Deficit or Surplus	Yearly Limit	Yearly Demand	Annual Deficit or Surplus	Last Update (yr)
329001	Burlington County Institution							
306001	Burlington Twp Water Department	6.192 MGD	3.762 MGD	2.430 MGD	1130 MGY	834.655 MGY	Surplus	2008
326010	California Village Motor Home							
326001	California Village Motor Home	.040 MGD	.037 MGD	.003 MGD	25.649 MGY	8.806 MGY	Surplus	2007
1518002	Cedar Glen Lakes Water Company	.432 MGD	.238 MGD	.194 MGD	90.000 MGY	63.340 MGY	Surplus	2007
326005	Cedar Grove Apartments							
329007	Deborah Heart & Lung Center							
326002	Deep Well Terrace							
326003	Hanover East Apts							
1523002	Jensen's Incorporated							
329003	Lake Valley Water Company							
326014	Lee Mobile Homes							
340002	Maplewood Apartments							
326012	Millstream North Apts							
326013	Millstream South Apts							
1523003	New Egypt Water Company	.173 MGD	.150 MGD	.023 MGD	50.000 MGY	47.328 MGY	Surplus	2008
329006	NJ American Water Company (Sunbury)	.200 MGD	.071 MGD	.012 MGD	43.100 MGY	22.466 MGY	Surplus	2008
1523004	Oak Grove Mobile Home Park							
328001	Pemberton Borough Water Department	.576 MGD	.221 MGD	.355 MGD	90.000 MGY	61.679 MGY	Surplus	2008
329004	Pemberton Twp Department Main Supply	1.220 MGD	1.239 MGD	-0.019 MGD	465.00 MGY	369.990 MGY	Surplus	2007
329005	Pine View Terrace Incorporated							
333003	Richards Mobile Home Park							
326008	Spartan Village Mobile Home Park							
325001	US Army Fort Dix	8.323 MGD	2.708 MGD	5.615 MGD	1860.000 MGY	568.13 MGY	Surplus	2008
326009	Wagon Wheel Estate							
340001	Wrightstown MUA	.300 MGD	.131 MGD	.169 MGD	60.000 MGY	38.318 MGY	Surplus	2007

MGD = millions gallons per day /MGY = Million Gallons per year/grey = no data/Source: NJDEP Division of Water Supply Public Water System Deficit/Surplus

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Table 9.3 Toms River Watershed and Metedeconk River Watershed Water Supply Planning Area Water Statistics

RWRPA	Net Available Water	1990 Water Demand	1990 Surplus/ Deficit	2010 Water Demand	2010 Surplus/ Deficit	2040 Water Demand	2040 Surplus/ Deficit
16 Toms River	22 MGD	38 MGD	-16 MGD	49 MGD	-27 MGD	62 MGD	-40 MGD
15 Metedeconk River	11 MGD	15 MGD	-4 MGD	19 MGD	-8 MGD	26 MGD	-14 MGD

MGD = millions gallons per day/ Source: Water for the 21st Century: NJ Statewide Water Master Plan

Table 9.4 RWRPA 16 Public Water Purveyor Capacity within JLUS Municipalities

PWS ID	Water Purveyor	Water Supply Firm Capacity	Daily Peak Demand	Firm Capacity Deficit or Surplus	Yearly Limit	Yearly Demand	Annual Deficit or Surplus	Last Update (yr)
1511002	Jackson Estates							
1511004	Maple Glen Mhc C/O Mauro&Bary							
1511005	Oak Tree Mobile Home Park							
1511007	Shady Oak Trailer Park							
1511008	South Wind Mobile Home Village							
1511009	Pleasant Gardens Water							
1511010	Naval Air Engineer Station Lakehurst	.706 MGD	.297 MGD	.409 MGD	198.000 MGY	71.559 MGY	Surplus	2007
1511011	Luxury Mobile Terrace							
1511012	Jackson Twp Water Department (Legler Sup)							
1511014	Concord Village Association							
1511015	Lexington Commons Association							
1511016	Meadowbrook Co-Op Incorporated							
1511017	Jackson Colonial Arms Apartments							
1511019	Dove Mills Apartments							
1513001	Lakehurst Water Department	.763 MGD	.443 MGD	.320 MGD	140.00 MGY	144.360 MGY	Deficit	2007
1518003	Cedar Glen West Water Company	.302 MGD	.160 MGD	.142 MGD	42.700 MGY	42.625 MGY	Surplus	2004
1518004	Crestwood Village Water Company	5.184 MGD	1.925 MGD	3.259 MGD	680.00 MGY	515.183 MGY	Surplus	2007
1518005	Manchester Township MUA	5.551 MGD	4.366 MGD	1.185 MGD	1145.00 MGY	896.561 MGY	Surplus	2008
1523001	Collier Mills Mobile Estates							

MGD = millions gallons per day / MGY = Million Gallons per year/grey = no data/Source: NJDEP Division of Water Supply Public Water System Deficit/Surplus

Table 9.5 RWRPA 15 Public Water Purveyor Capacity within JLUS Municipalities

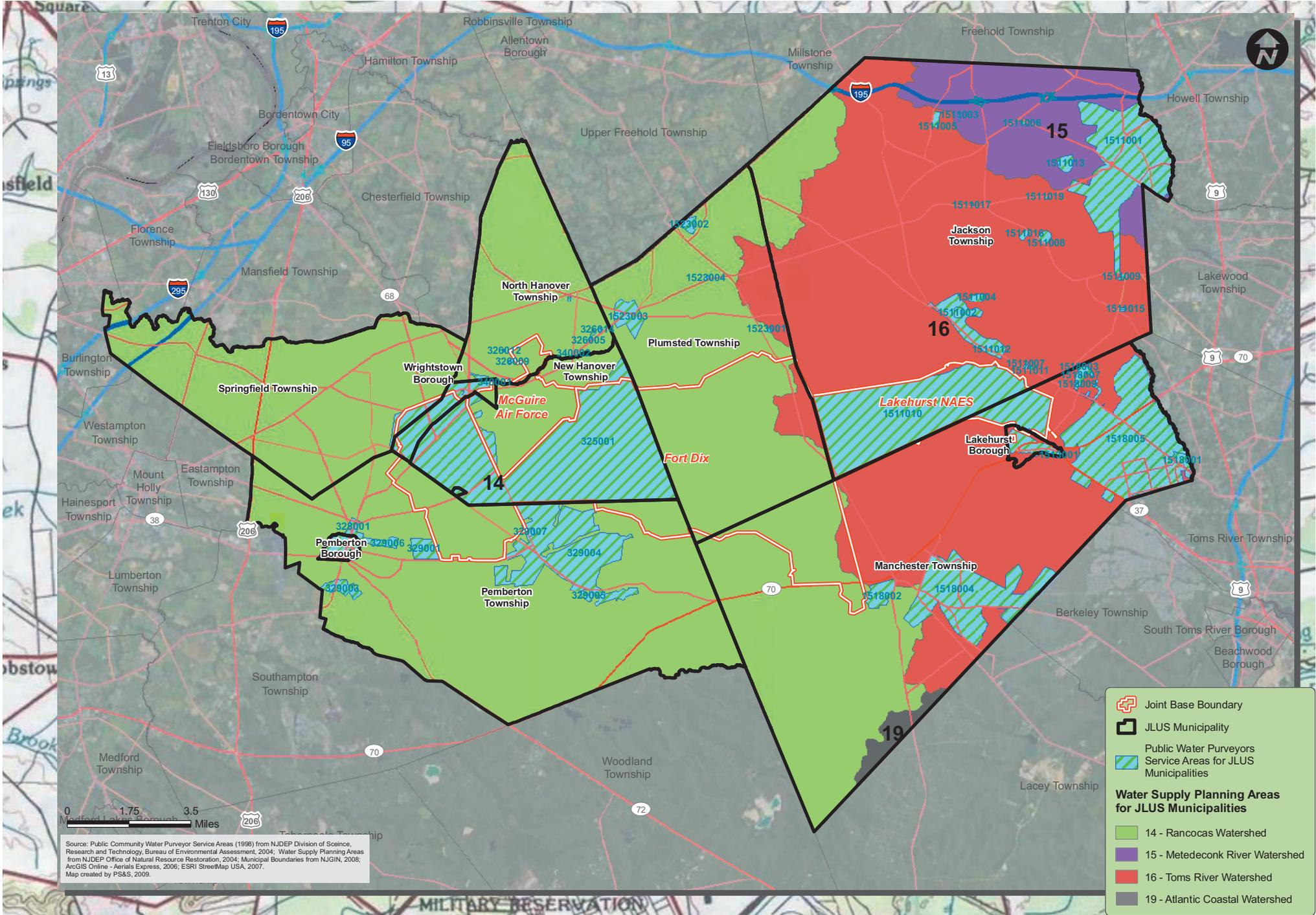
PWS ID	Water Purveyor	Water Supply Firm Capacity	Daily Peak Demand	Firm Capacity Deficit or Surplus	Yearly Limit	Yearly Demand	Annual Deficit or Surplus	Last Update (yr)
1511001	Jackson Township MUA	6.646 MGD	6.007 MGD	.639 MGD	1650.000 MGY	1171.962	Surplus	2007
1511003	Land of Pines Mobile Home Park							
1511006	Shady Lake Trailer Park							
1511013	Fountainhead Parks Incorporated							

MGD = millions gallons per day / MGY = Million Gallons per year/grey = no data/Source: NJDEP Division of Water Supply Public Water System Deficit/Surplus

Figure 9.1 depicts the water supply planning areas and the limits of water purveyor service areas. The water supply planning areas were created to support the 1996 Water Supply Plan. The boundaries mapped are those of the actual water delivery or service area. Franchise areas are not depicted (areas with legal rights for future service once developed). Water sources (wells or surface water intakes) are often located outside the delivery area boundaries. The next update of the Water Supply Plan will not use these planning areas but instead will use watershed management areas (WMAs) as a basis for water-supply analysis. The next update of the Water Supply Plan is anticipated in the near future. The public community water purveyor services areas were published by NJDEP in 2004 but are considered up to date as of 1998.

This evaluation does not include individual well owners (privately owned wells) or other non-public water withdrawal sources such as agricultural registration and private businesses.

Figure 9.1 - Water Supply Planning Areas and Public Water Purveyor Service Area Map for JLUS Municipalities



Water Supply Planning Areas for JLUS Municipalities

- 14 - Rancocas Watershed
- 15 - Metedeconk River Watershed
- 16 - Toms River Watershed
- 19 - Atlantic Coastal Watershed

Public Water Purveyors Service Areas for JLUS Municipalities

- Service Areas for JLUS Municipalities

Other Symbols:

- JLUS Municipality
- Joint Base Boundary

Source: Public Community Water Purveyor Service Areas (1998) from NJDEP Division of Science, Research and Technology, Bureau of Environmental Assessment, 2004; Water Supply Planning Areas from NJDEP Office of Natural Resource Restoration, 2004; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Wastewater Management

For residential homes, wastewater is generated from various sources including sinks, dishwashers, bathtubs, toilets and washing machines. Wastewater is also generated by commercial and industrial users where human waste may be mixed with a wide variety of other wastes emanating from cleaning, processing, or manufacturing operations. When wastewater is improperly discharged to groundwater or into a surface water body it can deplete oxygen, stimulate undesirable growths of plants (algae), and introduce disease producing organisms and toxic chemicals into the environment.

Currently, the majority of the JLUS area is served by individual on-site septic systems, which are regulated by the respective County Health Departments. For those facilities that generate wastewater flows greater than 2,000 gallons per day (gpd), the NJDEP regulates the quantity and quality (mass and/or concentration of pollutants discharged) of wastewater flows under its New Jersey Pollution Discharge Elimination System (NJPDES) Program.

Figure 9.2 displays the planned method of wastewater disposal for specific areas within the JLUS area (i.e. whether the wastewater will be collected to a regional treatment facility or treated on site and disposed of through a Surface Water (SW) discharge or a groundwater (GW) discharge). Areas not mapped represent land areas that default to individual subsurface disposal systems discharging less than 2,000 gpd to the extent that site conditions and regulations allow.

As per Figure 9.2, NJDEP Planned Method of Wastewater Disposal Map, developed by the NJDEP Division of Watershed Management, Bureau of Watershed Regulation mapping data, there are currently 37 NJPDES permitted facilities within the JLUS municipalities. The facility names and NJPDES information are shown in Table 9.6.

Of the 37 NJPDES facilities indicated on the NJDEP Planned Method of Wastewater Disposal Map, 10 have NJDEP flow data records available through the NJDEP NJPDES Database Municipal Flow Data Summary. The estimated flow and permitted flow of the 10 facilities with available data is shown in Table 9.7. Note that the Plumsted Township – New Egypt STP, the Oak Tree Mobile Home Park, and Fountain Head Park, while shown on the table and mapped in Figure 9.2, currently have terminated permits. The Plumsted Township – New Egypt STP reached its permitted term in 1998.

For proposed facilities with flows greater than 2,000 gpd, it is a difficult and expensive process to obtain a new NJPDES permit for a new Wastewater Treatment Plant (WWTP). Therefore for future major development to occur, it is desirable to connect into existing sewer service areas for conveyance of wastewater to an existing WWTP. In sewer service areas where excess WWTP capacity is available, connection into an existing system may be possible by a simple application for connection to the WWTP entity. A Treatment Works Approval (TWA) permit must also be obtained from NJDEP for projects proposing flows of greater than 2,000 gpd. If a property proposing to connect to the WWTP is located outside of a designated sewer service area, as delineated in the applicable Water Quality Management Plan (WQMP) and Wastewater Management Plan (WMP), then a WQMP/WMP amendment will be required from NJDEP to chance the sewer service area boundary. WQMP/WMP amendments often involve a lengthy process requiring various environmental evaluations associated with the development itself. Once a WQMP/WMP amendment is obtained, a TWA permit may be issued for projects proposing flows of greater than 2,000 gpd.

It should be noted that the NJDEP recently adopted Water Quality Management Planning Rules with amendments (NJAC 7:15), which designated all New Jersey County Boards of Chosen Freeholders as the WMP Agencies responsible for developing WMP’s for their respective counties. The updated rules require all New Jersey counties to obtain information from and work with all their respective municipal officials, water and wastewater utilities and other affected entities to update the Wastewater Management Planning documents by April 2009.

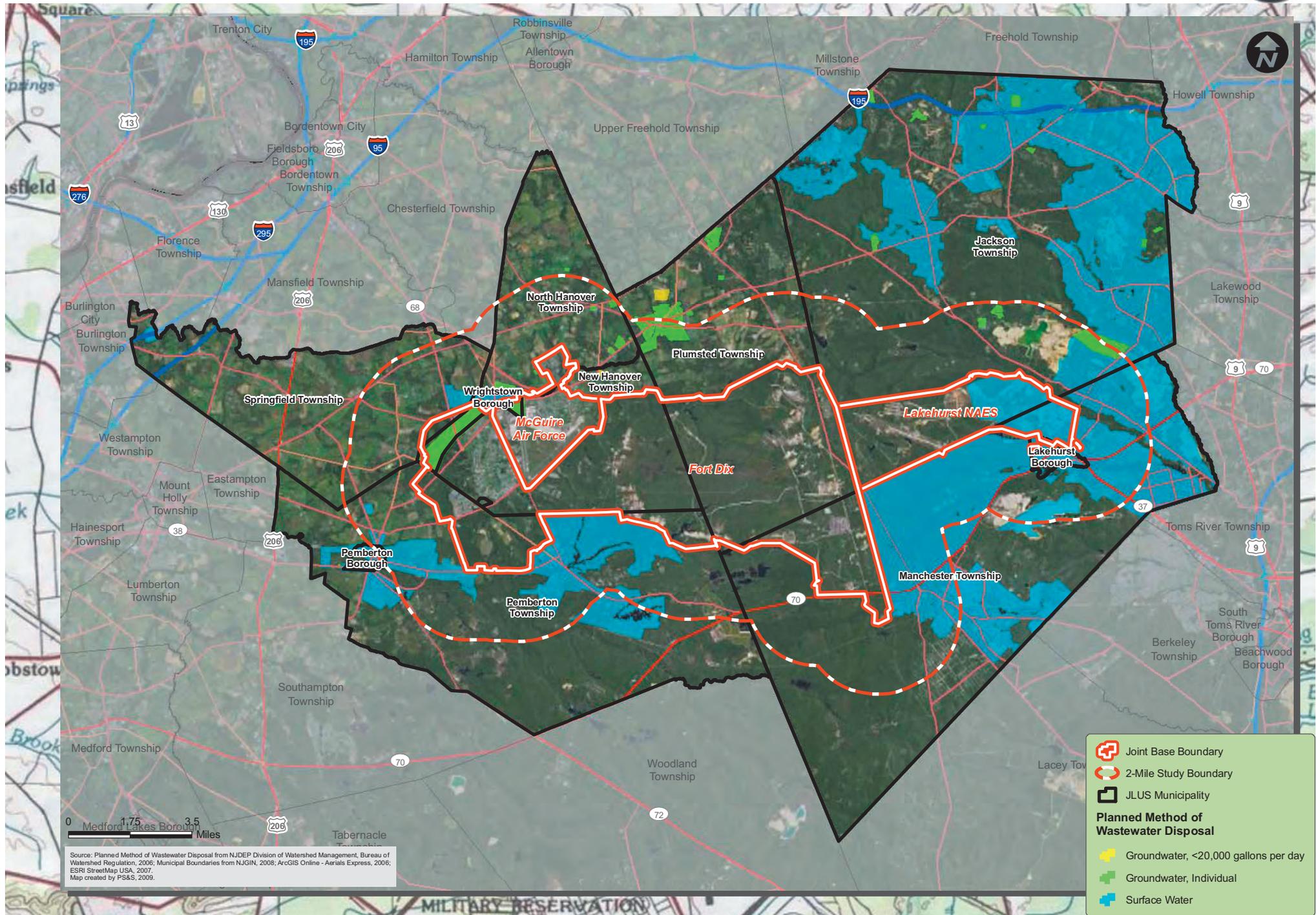
The updated rules also include septic system density requirements based on nitrate dilution analyses using a 2 mg/L nitrate target and annual average ground water recharge. The rules require that the density of systems in undeveloped and underdeveloped areas shall not exceed the nitrate planning standard of 2.0 mg/L of nitrate on a HUC11 basis. This nitrate planning standard will result in required average lot sizes of between 4 and 7 acres per single-family dwelling depending on local conditions. Due to these limitations on non-sewered areas, sewer service area accessibility is a critical consideration in assessing the economic viability of any major new development in the future. In consideration of the impending April 2009 deadline for the Counties to complete the WMP documents, those municipalities that desire modifications to sewer service areas should address requests for modifications to the local wastewater agencies and designated WMP Agency officials as soon as possible.

Section 9 - Infrastructure Capacity

For example, Wrightstown Borough is one of the notable communities in the JLUS that has excess wastewater capacity. Neighboring North Hanover and New Hanover may want to seek an expansion of the Wrightstown Borough sewer service area to service new development in their municipalities.

Plumsted Township is an example of a township that does not have wastewater capacity. NAES Lakehurst has been involved with Plumsted Township's wastewater capacity issues as they look to revitalize the New Egypt Main Street area. Plumsted is in discussions with Ocean County, NAES Lakehurst, and the NJDEP to determine possible solutions. Any resolution to this situation should be included in the WMP document that is currently being prepared by Ocean County.

Figure 9.2 - NJDEP Planned Method of Wastewater Disposal Map



Source: Planned Method of Wastewater Disposal from NJDEP Division of Watershed Management, Bureau of Watershed Regulation, 2006; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

Section 9 - Infrastructure Capacity

Table 9.6 Wastewater Disposal Facilities With A NJPDES Permitted Wastewater Discharge Of Greater Than 2,000 GPD

Water Quality Management Plan	Wastewater Management Plan (WMP)	Type of Discharge	Facility Name	WMP Agency	NJPDES
Ocean County	Plumsted Township	GW < 20,000	General	Ocean County BOCF	NJ0104264
Ocean County	Plumsted Township	GW INDIVIDUAL	Jensens Mobile Home Park	Ocean County BOCF	NJ0080055
Ocean County	Plumsted Township	GW INDIVIDUAL	Plumsted Twp Sanitary Landfill	Ocean County BOCF	NJ0055565
Ocean County	Plumsted Township	GW INDIVIDUAL	New Egypt School	Ocean County BOCF	NJ0021407
Ocean County	Ocean Co Northern Planning Area	SW	OCUA - Northern WPCF	Ocean County BOCF	NJ0028142
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Toby's Hide Away	Ocean County BOCF	NJ0089001
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Indian Rock Campground	Ocean County BOCF	NJ0084794
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Shady Lake Trailer Park	Ocean County BOCF	NJ0086860
Ocean County	Manchester Township	SW	OCUA - Central WPCF	Ocean County BOCF	NJ0029408
Ocean County	Manchester Township	SW	New Beginnings	Ocean County BOCF	NJ0079707
Ocean County	Ocean Co Northern Planning Area	SW	Oak Tree Mobile Home Park	Ocean County BOCF	NJ0031267
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Carl Goetz School	Ocean County BOCF	NJ0069663
Tri-County		GW < 20,000	General	Oakford	NJ0065528
Tri-County		SW	Pemberton Township MUA STP		NJ0024821
Tri-County	North Hanover Township	GW INDIVIDUAL	Cedar Grove Apartments	North Hanover Township	NJ0085022
Tri-County	North Hanover Township	GW INDIVIDUAL	Spartan Village MHP	North Hanover Township	NJ0027596
Tri-County	North Hanover Township	GW INDIVIDUAL	Wagon Wheel Estates MHP	North Hanover Township	NJ0105384
Tri-County	North Hanover Township	GW INDIVIDUAL	Hoffman-LaRoche	North Hanover Township	NJ0090212
Tri-County	North Hanover Township	GW INDIVIDUAL	Townsend MHP	North Hanover Township	NJ0086851
Tri-County	North Hanover Township	GW INDIVIDUAL	California Village MHP	North Hanover Township	NJ0027511
Tri-County	North Hanover Township	GW INDIVIDUAL	Hanover Mobile Village	North Hanover Township	NJ0027464
Tri-County	North Hanover Township	GW INDIVIDUAL	Eager Beaver Car Wash	North Hanover Township	NJ0054364
Tri-County	Wrightstown	GW INDIVIDUAL	Fort Dix STP	Wrightstown MUA	NJ0074284
Ocean County	Ocean Co Northern Planning Area	SW	Westlake Golf and Country Club	Ocean County BOCF	NJ0028142
Ocean County	Ocean Co Northern Planning Area	SW	Fountainhead Mobile Home Park	Ocean County BOCF	NJ0035653
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Tip Tam Camp Ground	Ocean County BOCF	NJ0085278
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Land O' Pines	Ocean County BOCF	NJ0083186
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Jackson Factory Outlet	Ocean County BOCF	NJ0108963
Ocean County	Jackson Township	GW INDIVIDUAL	Maple Glen	Ocean County BOCF	NJ0062090
Ocean County	Jackson Township	GW INDIVIDUAL	Pine Barrens Golf Course	Ocean County BOCF	NJ0132225
Ocean County	Jackson Township	GW INDIVIDUAL	Jackson Estates	Ocean County BOCF	NJ0090158
Ocean County	Ocean Co Northern Planning Area	GW INDIVIDUAL	Metedeconk Golf Club	Ocean County BOCF	NJ0109193
Ocean County	Jackson Township	SW	OCUA - Central WPCF	Ocean County BOCF	NJ0029408
Tri-County	Wrightstown	SW	Wrightstown MUA STP	Wrightstown MUA	NJ0022985
Tri-County		GW < 20,000	General		N/A
Tri-County		GW INDIVIDUAL	Country House Restaurant		NJ0128554
Tri-County	North Hanover Township	GW INDIVIDUAL	Church of the Assumption	North Hanover Township	NJ0168556

grey = no data/Source: NJDEP Division of Watershed Management

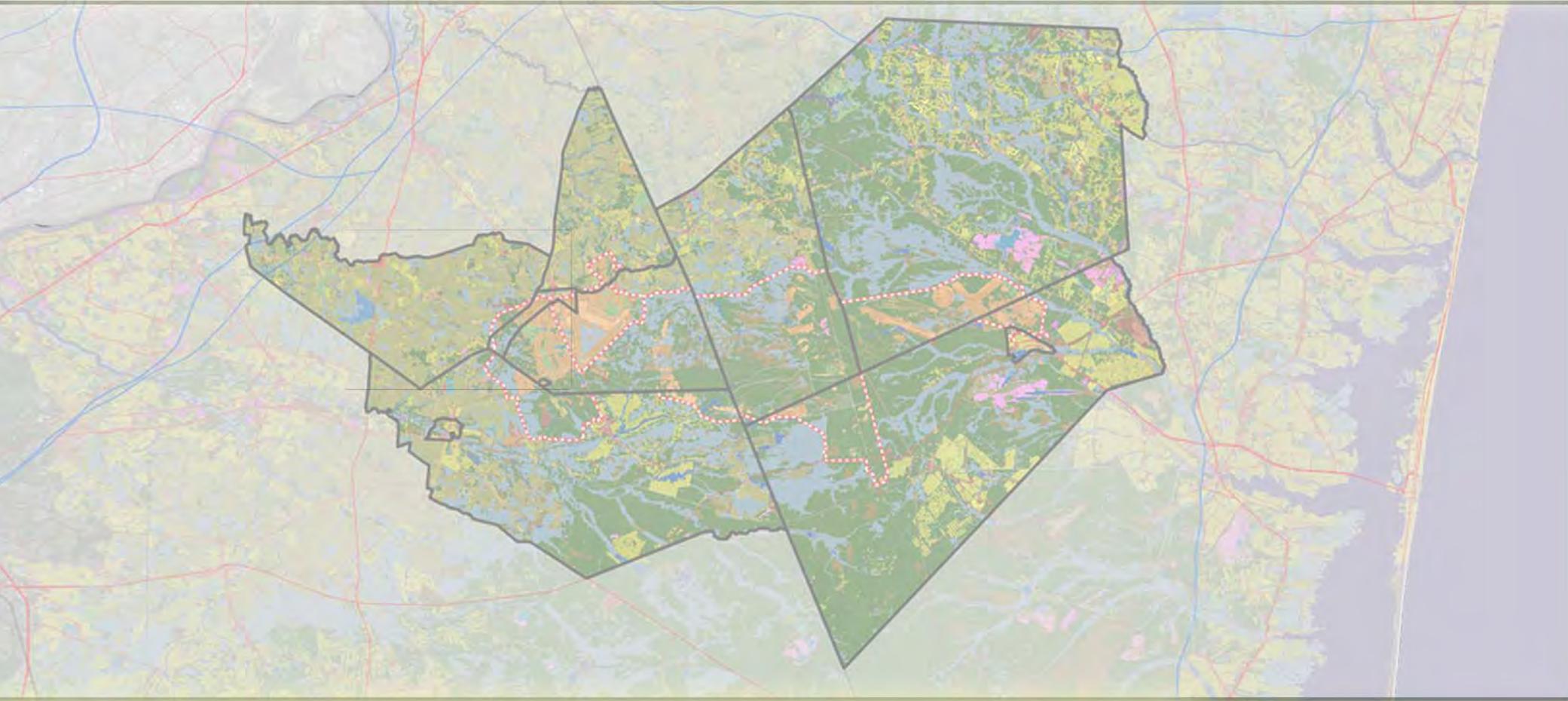
Table 9.7 Facility Yearly Flow and NJDEP Permitted Flow

NJPDES No.	FACILITY NAME	2000	2001	2002	2003	2004	2005	2006	2007	Permitted
NJ0021407	PLUMSTEAD TWP-NEW EGYPT STP									
NJ0022985	WRIGHTSTOWN MUA	0.0866	0.0841	0.0729	0.0838	0.0875	0.0853	0.0813	0.0850	0.33700
NJ0024821	PEMBERTON TOWNSHIP MUA STP	1.5863	1.5828	1.4491	1.8760	2.0524	1.9546	1.8693	1.8207	2.5
NJ0027464	HANOVER MOBILE VILLAGE	0.0122	0.0124	0.0114	0.0138	0.0116	0.0109	0.0101	0.0102	0.02
NJ0027511	CALIFORNIA VILLAGE MHP STP	0.0127	0.0116	0.0100	0.0113	0.0100	0.0114	0.0102	0.0107	0.032
NJ0027596	SPARTAN VILLAGE MOBILE HOME PK	0.0333	0.0298	0.0332	0.0358	0.0318	0.0309	0.0312	0.0310	0.038
NJ0028142	OCUA-NORTHERN WATER POLLUTION	20.7117	21.5167	21.0050	23.5167	22.5042	23.0058	22.3608	22.3567	32
NJ0029408	OCUA-CENTRAL WATER POLLUTION	21.1667	21.1667	22.1667	23.1294	23.9583	23.2233	22.1717	22.6542	32
NJ0031267	OAK TREE MOBILE HOME PARK	0.0321	0.0333	0.0234	0.0059	TERM				0.045
NJ0035653	FOUNTAINHEAD PARK INC (TERM 6/2001)	0.0080	0.0080	TERM						0.008

grey = no data/Source: NJDEP Division of Water Quality, Bureau of Permit Management

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 10 - Economic Considerations

The primary focus of this study is an examination of the land use constraints posed by Joint Base's expansion and their implications for future local growth. Notwithstanding those constraints, as the region's primary economic driver, Joint Base's expansion presents significant opportunities and has rightly been greeted with enthusiasm. This section discusses how Joint Base, the Study Area's demographic characteristics and other regional economic attributes could be leveraged to catalyze economic development within the Study Area.

The section examines the following:

- **Demographic trends** in Burlington and Ocean Counties.
- **Base growth** as a regional economic driver.
- **Economic growth sectors**, defined as those with relatively high projected growth, wages, and/or employment. Four sectors were identified: manufacturing, health care, education, and retail.
- **Economic development strategies** to nurture each of those sectors, including potential development sites for those uses. Joint Base lies at the center of many of these strategies.
- **Summary of conclusions and potential next steps** towards a more cross-the-board economic development assessment and strategy, should that be deemed useful.

Demographic Trends in Burlington and Ocean Counties

Demographics of Burlington and Ocean Counties were examined to identify characteristics that would inform economic development recommendations.

Population Characteristics and Growth

In most respects, the two counties are typical of the state overall. For instance, as of 2006, the two counties and New Jersey have had comparable rates of high school graduation, unemployment, and home foreclosure rates. However, there are notable differences from the state norm. Median household income and median rents in Burlington and Ocean Counties are higher than the state median, and median home values were higher in Ocean, suggesting

Table 10. 1 Similar Demographic Characteristics

	NJ	Burlington	Ocean
% Population with high school diploma or higher	86%	90%	88%
Unemployment	6%	6%	7%
% Homes – Single family units	75%	79%	85%
Foreclosure rate	2.6%	2.6%	2.1%
Mean travel time to work (minutes)	29	27	31

Table 10.2 Dissimilar Demographic Characteristics

	NJ	Burlington	Ocean
Median household income	\$55,000	\$68,000	\$64,000
Median rent	\$970	\$990	\$1,150
Average home value	\$310,000	\$260,000	\$370,000

Sources: US Census, Bureau of Labor Statistics.

the influence of the New Jersey shore resort area.

The most notable difference between the Counties and the State was in terms of population growth: the population of Burlington and Ocean Counties has grown markedly faster than that of New Jersey as a whole. While New Jersey's population grew by nearly 4% between 2000 and 2006, Burlington County saw over 6% growth, increasing its population from 423,000 to 450,000 residents, and Ocean experienced a 10% increase, growing from 511,000 to 562,000 residents in the same period.

Seniors were integral to the growth in Burlington, suggesting that the area is becoming an increasingly desirable retirement location. Between 2000 and 2006, the over 60 age cohort constituted 40% of growth in Burlington County, compared to 31% statewide. By contrast, the senior population growth in Ocean was only 14%. While seniors did not drive growth in Ocean, the county already has a comparatively large senior population, 26% of its residents are 60 or over, as compared to 18% in Burlington and statewide.

Section 10 - Economic Considerations

Joint Base Growth: An Economic Driver of Growing Importance

Joint Base Employment

A discussion of the regional economy must begin with an understanding of Joint Base. Joint Base is the largest employer in Burlington and Ocean Counties; as noted earlier, upon consolidation Joint Base will provide employment to 22,000.

Table 10.3 Joint Base Employment by Manning Levels (2008)

	McGuire ¹	Fort Dix	NAES Lakehurst
Military	5272	17	275
Civilian ²	1274	1339	1839
Contractor	37	1295	302
Guard/Reservists	3306	1185	266
Students/Mobilization ³	0	2563	0
Total ⁴	9889	6399	2682

¹ McGuire numbers based on authorizations

² Civilian numbers include some non-DoD Tenants

³ Students/Mobilizing soldiers numbers will vary based on outside factors

⁴ Totals don't include private businesses/organizations that reside on JB MDL

Job security and competitive salaries and fringe benefits make base civilian employment highly desirable. While the majority of civilian employees reside in Ocean and Burlington Counties, daily commuters travel from points as distant as New York, Delaware and Pennsylvania. The civilian employment distribution of Burlington and Ocean County residents across the Joint Base is presented in the following table.

Table 10.4 Joint Base Civilian Employment Distribution

	Burlington County	Ocean County
McGuire AFB	45%	3%
Fort Dix	71%	4%
NAES Lakehurst	15%	57%

NAES Lakehurst draws a higher portion of its workforce from its neighboring county. This is probably explained by the fact that as a major DoD research and development activity it

offers relatively higher paying engineering jobs. Additionally, the technical mission relocated to NAES Lakehurst from Philadelphia in 1977 and some of the original employees are still employed and have maintained residences in the Philadelphia suburbs.

The Joint Base also provides high wages relative to other earnings in the surrounding area; significant hiring is occurring; and there are substantial contracting opportunities for local businesses. NAES Lakehurst is illustrative of these phenomena. As shown in the graphs below, the NAES Lakehurst average salary is more than double the Ocean County average, and approximately double the State average.

Chart 10.1 NAES Lakehurst, Fort Dix, & McGuire AFB Civilian Median Income Comparison

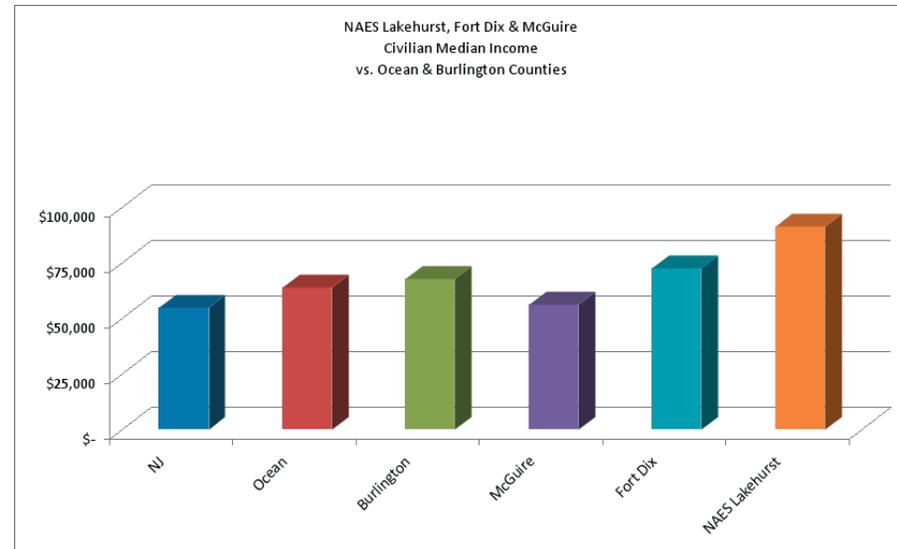
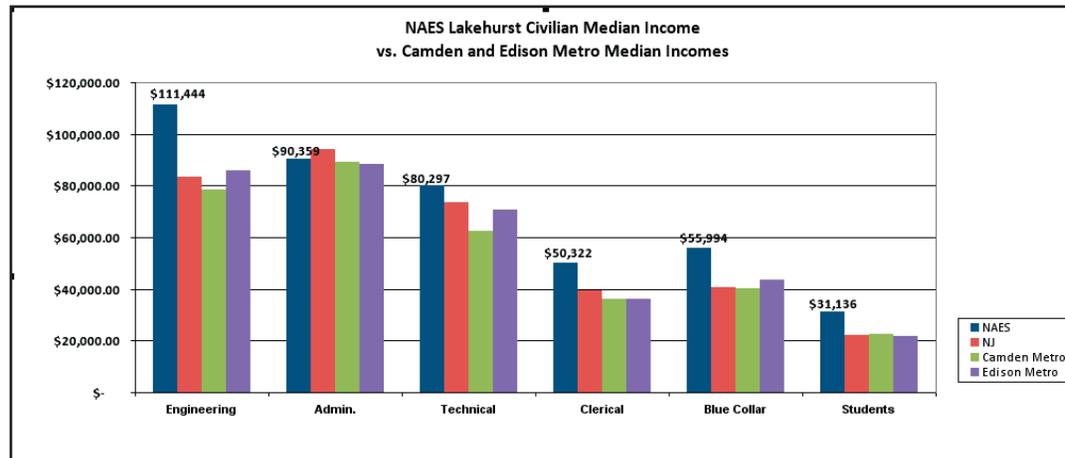
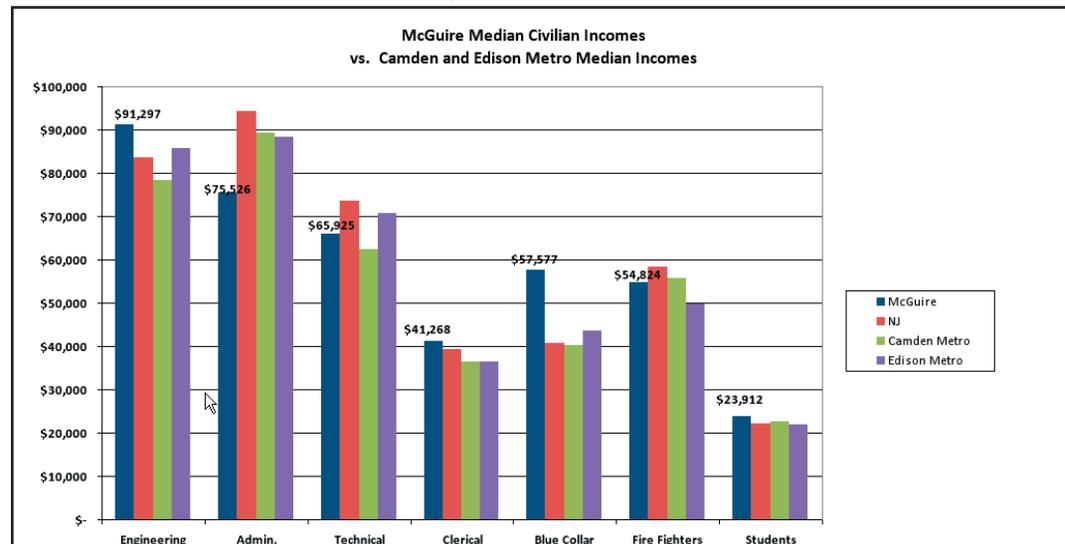


Chart 10.2 NAES Lakehurst Civilian Income Comparison



Sources: Lakehurst NAES personnel (February 2009), Base Data compared to NJ Department of Labor Employment and Wages, Occupational Employment Statistics using the state and metro regions data searches and occupational titles: Professional data compared to managers; all others to data, technical and professional. Engineering data was the average of civil, electrical, environmental, and mechanical median incomes. Administrative data was compared to office and administration for public services. Technical data was compared to architecture and engineering occupations, technical and professional. Clerical was compared to office and administration support workers; other was compared to public services. Blue Collar was compared to manufacturing maintenance and repair. Students were compared to file clerk positions, professional and technical services. ** Does not include Base Tenants

Chart 10.3 McGuire AFB Civilian Income Comparison



Sources: McGuire AFB personnel (February 2009), Base Data compared to NJ Department of Labor Employment and Wages, Occupational Employment Statistics using the state and metro regions data searches and occupational titles: Professional data compared to managers; all others to data, technical and professional. Engineering data was the average of civil, electrical, environmental, and mechanical median incomes. Administrative data was compared to office and administration for public services. Technical data was compared to architecture and engineering occupations, technical and professional. Clerical was compared to office and administration support workers; other for public services. Blue Collar was compared to manufacturing maintenance and repair. Students were compared to file clerk positions, professional and technical services, Fire Fighters were compared to Fire Fighters. ** Does not include Base Tenants.

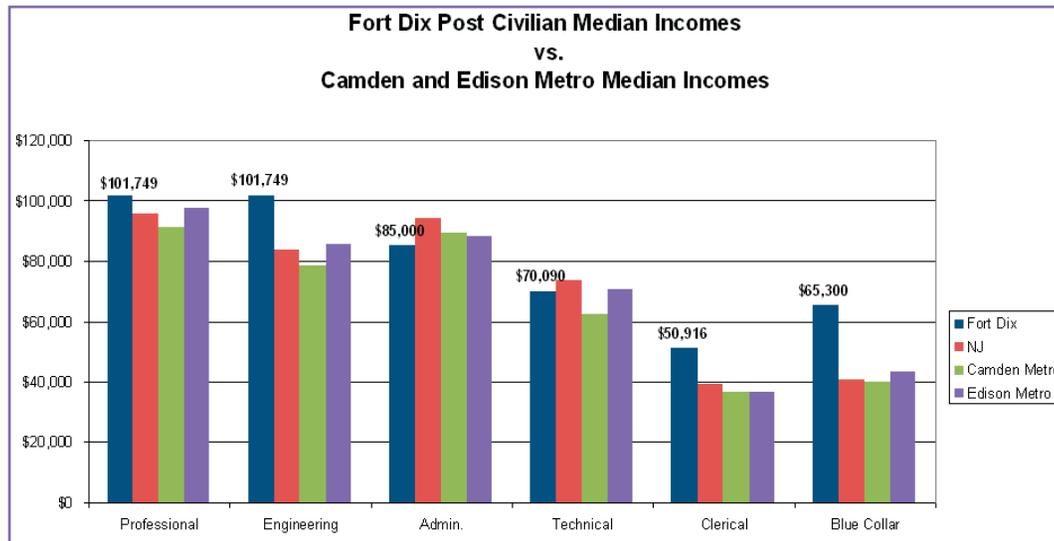
In a difficult market environment, the Joint Base is expected to provide new jobs to the community. In addition to these permanent jobs, significant, BRAC-related construction will take place on Joint Base, with potential opportunities for local businesses to capitalize on Joint Base construction and contracting.

As can be seen from the charts, the military civilian jobs are well paying. It would be advantageous for the two counties to coordinate the development of academic programs with the military to ensure the student population is well prepared to fill these positions in the future. During the JLUS process, it was mentioned during Policy Committee meetings that many of the currently employed civilian workforce at the Joint Base may be approaching retirement. This may introduce additional future job openings above the expected Joint Base estimates.

Ocean and Burlington County have higher education campuses nearby the Joint Base; Ocean County Community College and Burlington County College, respectively. Ocean County is currently working in cooperation with NAES Lakehurst to develop educational programs that prepare students to enter college level engineering programs by enhancing math and science curriculum. Ocean County Community College, Ocean County, and NAES Lakehurst are also researching the possibility of partnering with an engineering college to get a satellite campus into the region.

Burlington County College (BCC) has also partnered with Drexel University in several engineering programs. BCC has campuses in Pemberton Township and Mt. Laurel and has a good number of regional centers and satellite locations. Expansion plans may branch BCC into Wrightstown Borough.

Chart 10.4 Fort Dix Civilian Income Comparison



Sources: Fort Dix Personnel (February 2009), Base Data compared to NJ Department of Labor Employment and Wages (based on U.S. Census data), Occupational Employment Statistics using the state and metro regions data searches and occupational titles: Professional data compared to Managers all others data, technical and professional. Engineering Data was the average of Civil, Electrical, Environmental, and Mechanical Median Incomes. Administrative Data was compared to office and administration for public services. Technical data was compared to Architecture and Engineering Occupations, technical and professional. Clerical was compared to office and administration support workers, other for public services. Blue Collar was compared to Manufacturing Maintenance and Repair. ** Does not include Base Tenants. (Engineering and Professional data from Fort Dix was combined into one median income source and therefore the same number was used twice)

The Impacts of Joint Base Construction

IMPLAN was used to broadly assess the economic benefits of BRAC-related construction projects. IMPLAN is the Impact Analysis for PLANning Input-Output model, which was developed at the University of Minnesota with the U.S. Forest Service’s Land Management Planning Unit. IMPLAN is widely-used for the preparation of economic impact analyses by public and private entities throughout the U.S. IMPLAN traces the pattern of commodity purchases and sales between industries that are associated with each dollar’s worth of a product or service sold to a customer, analyzing interactions among 528 industrial sectors. The model used for this project utilizes data specific to New Jersey. Data sets were adjusted from January 2004 to December 2008 according to the Consumer Price Index.

IMPLAN was used to model the estimated economic impacts associated with the seven major construction projects planned across Joint Base, including leased property of the 108

ARW. These projects include (all construction cost estimates listed in current dollars):

- Hangars and MAG HQ (\$75M construction cost)
- Navy VR Fleet Logistics Ops Facility (\$55M)
- Navy and Marine Corps Reserve Center (\$20.6M)
- C-130 Flight Simulator (\$3.4M)
- Munitions Maintenance Facility (\$1.7M)
- Aviation Support Facility (\$13.1M)
- AIMD/ASD (\$37M)

The reader should note that these impacts are related to construction only, and do not take into account permanent benefits. Three categories of economic impact were modeled:

- *Economic output* – Measures the economic activity, or sales, of each sector throughout the City’s economy resulting from the construction employment activity.
- *Employees (not full-time employee equivalent)* – Measures amount of new employment, regardless of full or part-time status, during construction period.
- *Compensation* – Measures wages and benefits derived as a result of construction employment. Fringe benefits were assumed to constitute 30% of total compensation, and wages the balance.

Table 10.5 Joint Base Construction Summary of Estimated Economic Outputs¹

	Direct	Indirect	Induced
Economic Output	\$ 160,590,000	\$ 39,520,000	\$ 76,720,000
Employees (Not FTE equivalent)	1,264	310	676
Compensation	\$ 52,020,000	\$ 12,558,000	\$ 26,050,000
Average Compensation per Worker	\$ 31,500	\$ 31,000	\$ 30,000

¹ IMPLAN’s job estimates include both full and part time employment. Compensation per worker may be appear low due to the incorporation of both full and part time positions. In addition, the estimates make no direct assumption about the usage of union or non-union labor, only utilizing current trends and patterns.

Each category produces direct, indirect and induced impacts. *Direct* effects are those related to the initial spending in the economy. *Indirect* effects are created when secondary businesses produce goods and services as a result of that initial spending. The spending that employees and their households make from income earned is the *induced* effect.

Based on the proposed program, BRAC-related construction will provide significant economic impacts, detailed in the table below (all estimates in current dollars). These impacts include:

- \$275M in total economic output
- Approximately 2,000 jobs
- \$80M in total wages

The three military installations are increasing their missions; therefore, more construction projects and services will be needed now and into the future. Local Contractors should seek to acquire these contracts. The military and local contractors would benefit from working together due to low overhead costs for both. The military would also benefit from the convenience of having local contractors available to remedy problems quickly and efficiently arising after work

Table 10.6 New Positions to Be Hired At McGuire/Fort Dix and NAES Lakehurst, 2009-2012

Facility	Types of Jobs	Hire Date	Range of Salaries
McGuire/Fort Dix ²	<ul style="list-style-type: none"> • 1,025 military • 25 civilian • 1,600 reservists 	By September 15, 2011	<ul style="list-style-type: none"> • Military: Range from \$19,000 to \$144,000. Most positions likely between \$52,000 and \$118,000. • Civilian: Helicopter technicians range from \$48,000 to \$56,000; others, \$60,000 to \$94,000.
NAES Lakehurst ³	<ul style="list-style-type: none"> • 100 full-time guardsmen • 430 part-time guardsmen • 249 National Guard Technicians • Up to 310 engineers 	Anticipated 2010-2012	<ul style="list-style-type: none"> • Military: Range from \$19,000 to \$144,000. Most positions likely between \$52,000 and \$118,000. • Part-time guardsmen: Range from \$41,000 to \$128,000; most positions likely \$48,000 between \$58,000. • Technicians: Majority most likely between \$63,400 and \$98,800. • Engineers: Range between \$76,000 and \$117,000.

Notes:

1. Annual salary only, calculated based on appropriate Military or General Service pay scale. Does not include fringe benefits.
2. McGuire/Fort Dix positions assumed to include range of E2 to O6 (military) and GS11-12 and WG-10 (civilian). Philadelphia Metro Area (RUS) wage area used to determine range of McGuire GS salaries.
3. Lakehurst positions assumed to include range of E2 to O6 (military); E2-W2 and WG10-WG11 (reserve technicians); and GS12-13 (engineers). New York-Newark-Bridgeport (RUS) wage area used to determine range of Lakehurst GS salaries.

has been completed. Keeping contracts local not only benefits the local contractors but also has a multiplier effect on the local community, because local contractors spend money where they live, benefiting other local businesses. Both counties should provide workshops to educate local contractors about specific federal procedures which need to be complied with in order to secure Federal government contracts.

The Impacts of New, Permanent Joint Base Employment

In addition to BRAC-related construction, Joint Base can anticipate many new employment positions in the coming years, both as a result of BRAC and other factors. These include:

- *McGuire* – As noted in Section 5 of the report, 625 active military, 25 civilian, and over 1,600 reserve positions will be added by the end of September, 2009. These personnel will be relocated to McGuire from Willow Grove, PA; Cambria and Johnstown, PA; and West Trenton, NJ.
- *NAES Lakehurst* – 100 full-time and 430 part-time Guardsmen currently deployed in Iraq will return by 2011. As noted above, up to 310 new engineer positions

are anticipated to staff newly constructed NAES Lakehurst facilities by the end of 2010. Additionally, 164 National Guard technicians will be staffed at the National Guard Combined Logistics Training Facility (CLTF) upon completion of phase one, in 2010. Phase two has been approved but construction funds have not been released so a completion date has not been determined. The staffing increase associated with phase two is an additional 85 National Guard technicians.

- *Fort Dix* – The substantial assets to be moved here as a result of the BRAC process (discussed in Section 5) are likely to drive job increases. Detailed Data for these jobs was not available.

As discussed in Section 5, it is expected that BRAC-related

Section 10 - Economic Considerations

relocations will result in minimal job loss at Joint Base, as well as negligible increased demand for housing, local government services, and school services.

A detailed breakdown of the various types of and pay grades for each position was not available at the time this report was drafted. However, the likely range of positions and overall compensation for new McGuire/Fort Dix and NAES Lakehurst positions were available. Based on an analysis of 2009 Federal pay grades, salary ranges are summarized in the table below.

While a detailed breakdown of job types and salaries would be required for projecting indirect and induced economic impacts, the above data provides sufficient information for a preliminary estimate. If one assumes approximately 1,500 permanent jobs, characterize them as military engineering/technical positions, and apply an average salary of \$80,000, the indirect and induced economic impact of these new hires, according to IMPLAN input-output modeling, would include:

- Economic output: \$32M indirect, \$48M induced
- New jobs: 220 indirect, 430 induced
- Compensation: \$9.7M indirect, \$20M induced.

While the exact economic impact of these permanent jobs is not known at this time, they will certainly be of substantial value to the community. Besides the current economic climate, the average salaries in growth industries identified below makes clear the importance of Joint Base employment.

Economic Growth Sectors

Based on an analysis of Bureau of Economic Analysis and Census data, four industries in Burlington and Ocean Counties are characterized by high absolute employment, high forecasted job expansion, and/or high wages:

² The analysis for much of this study was undertaken in 2008. While it is clear that key industries identified in this study will most likely not see the growth forecasted by the Bureau of Labor Statistics in the short term, we believe these sectors will be integral to the two counties' eventual economic recovery.

³ Cushman and Wakefield (C&W) defines Central New Jersey as Hunterdon, Mercer, Middlesex, Monmouth, Somerset, and Union Counties. It also includes activity in Burlington County. Since Burlington is not closely monitored by C&W, and Ocean County is not included in their market data, additional interviews were used to supplement this information and provide a regional context.

- *High wages, limited growth potential in the Manufacturing.* With a relatively high average salary of \$47,600 in New Jersey, and with the third largest employment in Burlington, this is clearly a sector to protect. But as is the case in many parts of the nation, manufacturing is in decline; the Bureau of Labor Statistics forecasted a loss of 2,350 (12%) jobs between 2000 and 2014.²
- *High employment, high growth potential in Health Care.* This is a sizable sector in the study area: as of 2004, it was the largest sector in Ocean (27,700 jobs), and the second-largest in Burlington (23,300). While relatively low-paying, with an average annual wage of \$33,000, it was projected to grow the most rapidly of any industry with an estimated 16,000 new jobs between 2004 and 2014.
- *High employment, modest growth potential in Education.* With over 34,000 existing jobs, this cluster was expected to generate 3,000 additional jobs from 2004 to 2014. It is, however, relatively low-paying, with an average annual wage of \$26,000. Moreover, educational uses contribute to overall workforce quality, and should therefore be encouraged as an economic development strategy in itself.
- *High employment, limited growth potential in Retail.* This has been an important sector in both counties. It is the largest combined industry with 56,500 jobs, and retail jobs are projected to grow by 7,500. However, retail has a low average salary of \$22,700 per year. Additionally, as of September 2008, 1.4M SF of retail inventory was set to come on-line in Central New Jersey, according to Cushman & Wakefield.³ Because this new inventory is coming on line in an uncertain economic climate, significant additional retail growth in the region is not anticipated in the short term.

Economic Development Strategies

Methodology & Context

To begin to think through how local policymakers might grow each critical sector noted above, local brokers and other experts in the regional market were consulted to review site requirements, market demand, and overall attractiveness of both counties and the region. This information was then used, along with familiarity with the regional real estate marketplace, and key land use findings from other aspects of the JLUS, to prioritize potential development parcels for

public sector attention. Economic development strategies and case studies are presented for each sector and its potential development sites, as relevant. Potential development sites are properties that were considered for development industries by their proximity to the Joint Base. These sites are representative examples of economic growth that is compatible with the Joint Base and located within the JLUS 2-mile study area. In some instances, growth is proposed within a Joint Base noise zone. The proposed type of growth is compatible with DoD land use guidelines for considering noise in land use planning (see Appendix 13.5) and compatible with existing or planned land use within the communities.

Before discussing each sector, the following points concerning the overall development climate are worth noting:

Potential real estate development must be considered in the context of the current recession. In an environment where private capital is scarce, the Federal government is poised to act as investor in many economic development projects. Those development projects which have completed planning work, have significant public support, and are ready to implement will be most effective in competing for public funding, and will be the first private projects developed when the markets improve.

However, the current economic climate does not entirely preclude private development. For example, Cushman & Wakefield noted in their fourth quarter, 2008 report for the Central and Northern New Jersey industrial market that, while industrial construction had fallen overall during 2008, it had recovered somewhat by the end; and that manufacturing, while still experiencing a long-standing decline, was a bright spot for investors seeking companies to turn around. And while the report forecasts rising vacancy rates in 2009, projects with anchor tenants that can be custom-built on vacant sites are projected to move forward.

Manufacturing

Development Requirements and Sector Context

Manufacturing and light industrial companies seek a flexible development model that can adjust to administrative, R&D, light manufacturing, and warehousing needs as the company grows and the market changes. As can be seen in Monmouth County's Logan business park, development consists primarily of built-to-suit space that has the infrastructure, parking

and HVAC capability to be used as entirely office or entirely manufacturing as needed. These companies have a wide range of space needs from 2,500 – 100,000 SF in one or multiple buildings. Developers prefer greenfield sites that can accommodate this mode of development at minimal cost. While a single manufacturing use may only need 1-2 acres, manufacturing is often successful as a cluster of uses on a large site.

Light industrial sites must also be close to major transportation arteries to access regional markets. Western Burlington County has potential for additional light manufacturing uses because of its proximity to both the base and I-95. The portions of the two counties south of the base are significantly constrained due to lack of transportation access; the condition of Route 70 as a two lane road is prohibitive to distribution uses within the JLUS study area because it slows traffic considerably. Widening the road would connect this area with regional JLUS industry centers. Road expansion projects are subject to Pinelands environmental standards

Case Study: Cumberland Valley Business Park Letterkenny, PA

This 1,200-acre business park mixes light industry and distribution, and is located on the portion of the Letterkenny Army Depot decommissioned through BRAC. A business planning process that included market analysis and an infrastructure investment strategy guided the creation of the Park in the late 90s. The development authority that manages the Park has experienced steady success; having sold or leased the vast majority of buildings transferred from the Department of Defense, the authority has moved on to development of remaining raw land.



and require approval by the Commission. To date, the market tendency for Ocean County growth and circulation has

been northward, not westward. Within Burlington County, the state has widened NJ Route 38 from Vincentown to I-295 to facilitate the Philadelphia market flow. Additional manufacturing and industrial development

potential outside of the JLUS 2-mile study area could include Pemberton Township growth along Route 530 and lands in Southampton Township east of US Route 206.

Section 10 - Economic Considerations

Industrial development, within certain height thresholds, is appropriate in all Accident Potential Zones, and can accommodate high levels of noise.

Potential Development Sites

One site that fits the above criteria is Site A (107 acres), in the Northwestern side of the study area. It is located near the McGuire Air Force Base entrance, in North Hanover Township. Of all potential development sites, it is closest to I-95. It is currently vacant, and within APZ1. It is privately owned.

Site B is a much larger site, nearly 500 acres, in the Northeastern portion of the study area. Formerly the location of a use with relatively high soil pollution, this site is best-suited for industrial purposes. Close to Lakehurst Base, it is appropriate for manufacturing that could benefit from proximity to base needs. Two parcels comprise this site, one of which is in APZ1. It is privately owned.

The large size of both sites present opportunities for development. At 100 and 500 acres, the sites are too large for development of most individual industrial facilities. However, they both provide a sufficiently large area for an industrial park. If local policymakers decide this warrants further exploration, and an in-depth feasibility analyses yields positive conclusions, plans for an industrial park could be developed including a mater plan and phasing schedule; a remediation and infrastructure program; and the creation of an entity to oversee the project and conduct management and marketing activities.

Strategies to Encourage Growth

Local public sector should help position businesses to compete for Joint Base-related contracting. The Federal government is under no obligation, and there is no mechanism for it, to set aside a portion of its contracting work – construction-related or otherwise – for local businesses.

However, there is a growing recognition among local policymakers and Joint Base officials that there are opportunities for business and mission collaboration. NAES Lakehurst plans to let approximately \$800M in research and development, and manufacturing contracts over the next year. If historical patterns hold true, at least \$50M of this amount will be captured within New Jersey. For instance, NAES Lakehurst staff has noted that a significant portion of their upcoming purchasing will be for precision-manufactured, high-tolerance machinery.

Burlington County has a substantial manufacturing presence, with a noteworthy electronics manufacturing cluster, and there may be opportunities for just-in-time manufacturing to service Joint Base needs.

A collaborative process has already begun. On October 16, 2008, the Ocean County Board of Chosen Freeholders held an economic workshop to inform local businesses about Joint Base contracting opportunities, as well as requirements and procedures related to federal procurement. While only 50 people were projected to attend, more than 300 took advantage of the opportunity.

Our analysis makes clear that Joint Base will continue to be a (if not the) major economic driver in the near term. Local economic developers will be well-served by holding additional workshops, and more are in the planning stages. Such workshops and other meetings should include discussions of where local businesses could be at an advantage based on their proximity to the base. Additional forums should also serve to discuss opportunities for focusing local educational curricula and expansion on serving workforce needs (discussed below).

Education

Development Requirements and Sector Context

The educational sector supports growth in other vital sectors. While some major universities have significant economic impacts on the surrounding towns and cities, *educational uses* are generally not viewed as economic engines or dynamic real estate developments, but rather as an essential factor in creating a highly trained workforce that can garner healthy wages. Educational planning efforts should seek alignment with base mission-related contracting needs, as well as back office and light manufacturing for the greater Philadelphia and New York City areas. To this end, new educational opportunities should have a specialized vocational focuses and be located near Joint base, existing light industrial clusters, and/or near major corridors to population centers. Educational development could come in many forms, whether

a new campus, or an adaptive reuse within an identified redevelopment area. A new facility could be a small vocational program or a new campus of a community college.

Potential Development Sites

Site C, composed of two parcels totaling 42 acres, in the northeastern portion of the study area, is a potential future site for an expansion of a major educational institution. Close to the Lakehurst entrance, as well as to Site B (see above), the area presents an opportunity for vocational and mission-related instruction. It is near Hope Chapel Road. Ocean County

has expressed a desire for educational expansion, perhaps as a satellite of Ocean

Case Study: Guilford Technical Community College (GTCC), Greensboro NC

- Hosts regular “industry symposia” to encourage collaboration in local industry clusters: automotive, aviation, logistics, and health care.
- Offers “Quick Jobs” programs, many less than 90 days, in partnership with local employers. Programs are tailored to specific jobs with essentially guaranteed employment .
- Local employers and public entities pay for customized training programs to ‘upgrade’ their employees’ skills.
- “National Career Readiness Certificate” testing and courses provide job seekers without a High School equivalent degree with credentials for basic workplace skills.
- Ensures all credits from GTCC classes are transferrable to 4-year State schools.



County College. These two parcels are indicative of where such expansion might occur. It is outside of APZ and noise zones. Site C is privately owned.

Strategies to Encourage Growth

Educational institutions can provide a pipeline of local talent for base and health care jobs, as well as related contracting opportunities and start-ups. Local policymakers should convene working groups to unite (1) high level base staff and (2) key businesspeople involved in the health care and manufacturing sectors with leaders of local educational institutions such as Burlington County Institute of Technology and Ocean County Vocational Technical School. The purpose of these working groups would be to:

- Ensure that vocational curriculum aligns with base mission/health care needs.
- Encourage a pipeline of graduates to jobs and contracting opportunities.
- Create a venue for graduates to vet mission-related start-ups with base and hospital staff.
- Establish a mentoring program for businesspeople to coach young entrepreneurs.

Health Care

Development Requirements and Sector Context

Demand for elderly housing and health care sites depends on proximity to major health care institutions and to the potential resident’s current home. The Counties have a significant aging population, as discussed above, which drove demand for assisted living housing development in recent years. Given the current economic climate, it is unclear if unmet demand exists for additional new development in the short term, although the industry will likely revive as the population continues to age. As is true of all but a few climate-favorable areas of the country, the current population in assisted living centers in the Counties is drawn from local residents and long time vacationers to the area.

An economic strategy for the senior health care industry must take into account both the potential benefits and risks of an industry cluster. Health care institutions with significant reimbursements from Medicaid/Medicare, including Veterans’ Health Administration (VHA), are important social institutions but do not catalyze significant additional economic activity, and moreover can become a burden on local hospitals and health care institutions. These institutions are only viable if they are part of a healthy mix of health care services including private-pay elderly care.

Section 10 - Economic Considerations

The newest model of private-pay health care provides several levels of service on a unified campus, from independent living with minor housekeeping and cooking assistance to group homes with full-time medical care and assistance. Such campuses typically require 15-30 acres. The integrated health care model has the potential to generate additional economic activity as well as to create skilled high paying jobs. While additional senior living campuses may not be feasible in the short term, they should be encouraged in the long term.

Integrated private-pay health care institutions often cost more than \$60,000 a year, making them less than ideal for seniors on fixed incomes who currently own their homes and are in relatively good health. For this population segment, in-home health aides can provide a similar or higher level of service for a fraction of the cost. Health aides are skilled, well paying jobs which should be supported in the area. Moreover this sub-industry is decentralized and does not require significant investment in physical structures aside from training and supply shipping/warehousing needs. Therefore investment in vocational training programs could have a

significant impact on industry growth in the short term.

Case Study: Ocean County Vocational-Technical School, Practical Nurse Program

OCVTS students can obtain training for nursing positions through two programs: the Licensed Professional Nursing Program, and the Medical Assistance Program. Approximately 120 students are currently enrolled in the two programs, which have a total budget of just over \$650,000 for the current fiscal year. The Medical Assistance Program provides students with reimbursed tuition from nursing homes that hire them after program completion. OCVTS staff reports that demand for graduates is increasing.



Potential Development Sites

In close proximity to the Deborah Heart and Lung Center and the Pemberton Township Town Center Redevelopment Area, Site D (over 20 acres), in the southwest portion of the study area, presents an opportunity for major health-related growth when demand returns. The Deborah Heart and Lung Center has significant land available for future expansion – over 20 acres of land with minimal existing development. If the Center proceeds with institutional expansion, Site D would be well-positioned to provide related services. Site D is privately owned.

Strategies to Encourage Growth

Public sector can partner with local partners (colleges, hospitals). For health care and educational uses, there are a number of existing partners that would likely drive development, including the Deborah Heart and Lung Center. Currently, Deborah is in the process of opening a new Emergency Room to treat regional needs.

Senior needs will drive services. Seniors will require specific services – especially in the health care sector – and may drive certain retail product mixes. Policymakers should focus growth on higher-paying health subsectors by establishing linkages and relationships with Philadelphia-area hospitals and the Deborah Heart and Lung Center. Unmet demand can be further pinpointed by:

- Quantifying seniors' spending power
- Inventorying regional attributes attractive to seniors
- Identifying seniors' desired lifestyle amenities and target submarkets
- Understanding the role of veterans in the elderly population

However, broker feedback indicated that growth in this area is unlikely to occur in the near future. Workforce development for jobs that will service the area's aging population – through the educational forums discussed above – are likely to be more worthwhile than attempts to develop specific parcels. Future initiatives should also build on existing efforts, such as the case study discussed below.

Retail

Development Requirements and Sector Context

Retail demand depends overwhelmingly on proximity to residential uses. Industry experts suggest that a minimum of 3,000 housing units is needed to create a critical mass to support neighborhood retail. Retail is also successful along major traffic corridors and in town centers. Retail is not ideal for areas where residential development hindered due to poor transportation access or environmental constraints such as Pinelands restrictions.

Case Study: La Crosse, WI

Investment (1993-2007)

- Created downtown TIF.
- 65 blocks of streetscaping and wayfinding.
- 100 façade and building restorations through loan pool.
- 96 buildings designated historic.
- Riverside Park Riverwalk and Levee reconstruction

Benefit

- \$125M in public and private investment
- 170 new residential units
- Property values increased \$26M within TIF district and \$40M throughout downtown



Because retail uses require smaller floor plates than the uses discussed above, can more easily reuse existing structures, and is more successful near existing economic activity, retail is almost by definition ideal for infill development.

Potential Development Sites

Near new development in the southeastern portion of the Study Area in Ocean County, Site E (over 20 acres) on Route 37 would be appropriate for a small retail center catering to recent retirees. There has been substantial residential development nearby, including retiree

housing.

A notable soft (underutilized) site is a mostly vacant shopping center in North Hanover Township. Approximately 10 acres in size and privately-owned, Site F includes several empty storefronts (including the former anchor tenant). The complex was constructed over 45 years ago, and the parking lot shows deterioration. Site F is also in close proximity to the Wrightstown Borough Redevelopment Area. A developer was recently designated for a significant portion of the Redevelopment Area; while the program is still in flux, this major new development is slated to include a medical center, hotel, and chain retail. Both Sites E and F are privately owned.

Strategies to Encourage Development

Brokers and planners can identify submarkets and locations with demand for accommodation, food and retail growth that can help bring retail in line with industry growth and demographic changes. There may be additional types of retail that the public sector might explore subsidizing to provide services to base workers and contractors or the local senior population.

Localities can make targeted investments to catalyze redevelopment. In the case studies below, local governments used Tax Increment Financing (TIF), façade

Case Study: Franklin, VA

Investment (1985-1997)

- Streetscaping
- 4% loans for interior and exterior improvements
- Downtown marketing and business recruitment
- Programming and events

Benefit

- 200 building renovations
- 101 new businesses
- Vacancy rate decreased from 47% to 3%



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renovation program, and other investments to kick-start retail redevelopment. Study Area localities might consider similar strategies based on detailed study of individual markets and business needs. For example, a Revenue Allocation District could support project-related infrastructure improvements by using incremental revenues.

Summary and Potential Next Steps

Joint Base offers a great deal of opportunity for local businesses. A partnership among local businesses, government officials, key educational institutions, and Joint Base officials will allow local businesses to compete for contracts, and local colleges to supply new talent in line with mission needs. Efforts to bring these parties together to discuss mutually beneficial opportunities are underway, and should be expanded.

Demographic trends will drive health care and retail needs. While both sectors have recently cooled, an aging population will be a major determinant of which health care jobs are in demand, and which retail mixes succeed. Local governments will be well-served by understanding the needs of the retiree population as they decide which kinds of retail to encourage. Additionally, local colleges should partner with the Deborah Heart and Lung Center and other area hospitals to understand the level of demand for various health care positions, and consider aligning their curricula accordingly.

Even in the current constrained environment, local governments have compelling tools that they can use to move deals. Public involvement in the private development process can take a variety of forms ranging from low-level of public control and low level of public risk to high-control/high-risk. These include:

- Market priority sites and areas.
- Invest in the public realm, such as streetscapes and open spaces.
- Alter zoning, relax development regulations and fees, or create zoning bonuses.
- Provide development incentives including tax breaks, revenue allocation districts, grants and low-interest loans.
- Facilitate or create and manage incubator spaces for high-priority industries.
- Assist in readying sites for development including environmental cleanup and investment in roads and infrastructure.

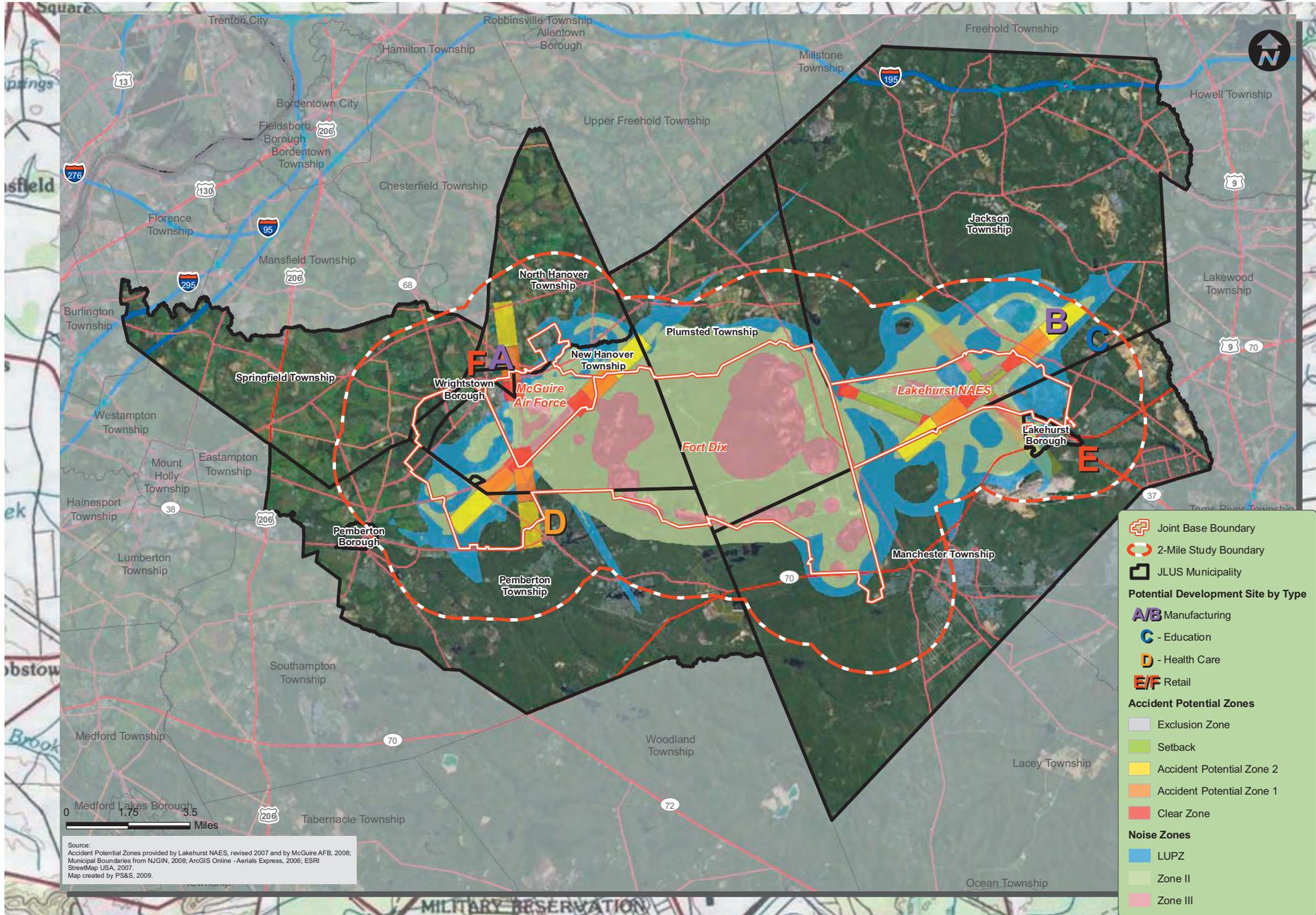
- Pursue public-private partnerships such as redevelopment agencies authorized to purchase properties and enter into development agreements.
- Publicly acquire sites via purchase, condemnation, or eminent domain, followed by an RFP or public-private partnership for development.

All the sites identified in this segment of the JLUS are privately owned. Many of the above strategies could be used to guide the development of these or other parcels.

Future study could refine these findings and tee up site-specific strategies. A JLUS is a land-use study at its heart, and is not primarily concerned with economic development strategy. A comprehensive economic development strategy could provide for more finely-tuned policy prescriptions based on more involved analysis. Such a study could involve:

- Economic overviews of the current and past composition of the local economy, including additional economic analysis of Joint Base; detailed retail market analysis including employment indicators, consumer demographics and lifestyle profiles; market share analysis; and assessment of manufacturing subsector strength and weaknesses.
- Evaluation of comparative local advantages and disadvantages including natural resources and assets; real estate, construction and labor markets; infrastructure and utility capacity; housing affordability; and/or government incentives and tools.
- Likely impact of future infrastructure projects, such as possible NJ Transit MOM line extension.
- Market demand analysis of targeted growth and redevelopment centers (towns, villages and nodes) for growth industries.

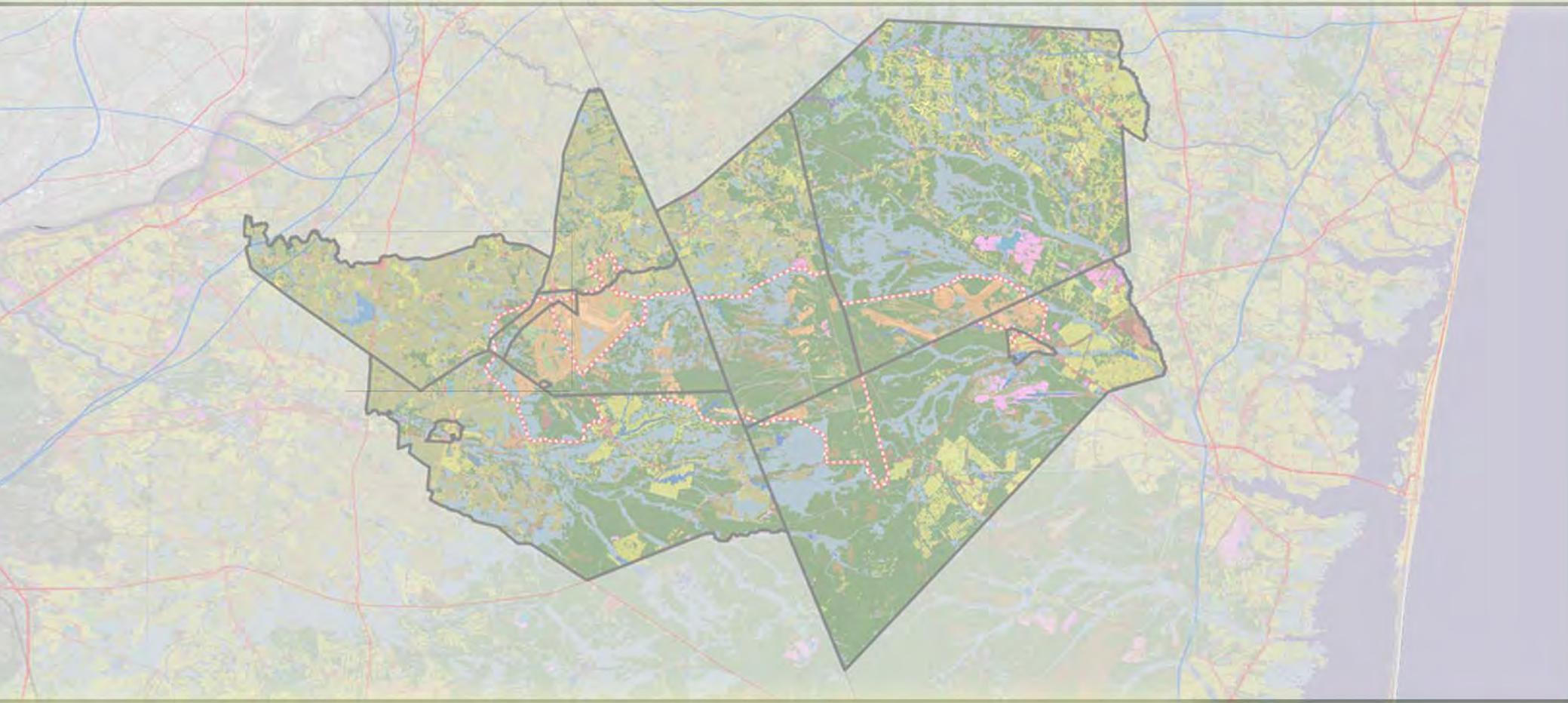
Figure 10.1 - Potential Development Sites by Economic Growth Sectors



Source:
 Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008;
 Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI
 StreetMap USA, 2007.
 Map created by PS&S, 2009.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 11 - Existing Land Protection Strategies

The Joint Base is fortunate to be located proximate to significant areas of state protected open space (Colliers Mills to the northeast and Lebanon State Forest to the south). These preserved lands serve as a natural buffer to the Base.

Further land preservation around the Joint Base has been a cooperative effort. Ocean and Burlington County have been working with the State Agriculture Development Committee (SADC), the Pinelands Commission, NAES Lakehurst, McGuire AFB and the local municipalities to preserve lands around the Joint Base.

In 2008, Joint Base McGuire-Dix-Lakehurst won the New Jersey Governor's Environmental Excellence Award. The Joint Base along with state, county, regional, and local officials have been working together to identify emerging land use conflicts before they manifest and to secure land use preservation around the Joint Base. This effort began in 2007 and 246 acres of lands were successfully preserved the same year. Lakehurst Base signed a 5 year memorandum of agreement with Ocean County that allows the base to provide up to 50% funding for land preservation actions, providing the balance is made up with county or state dollars.

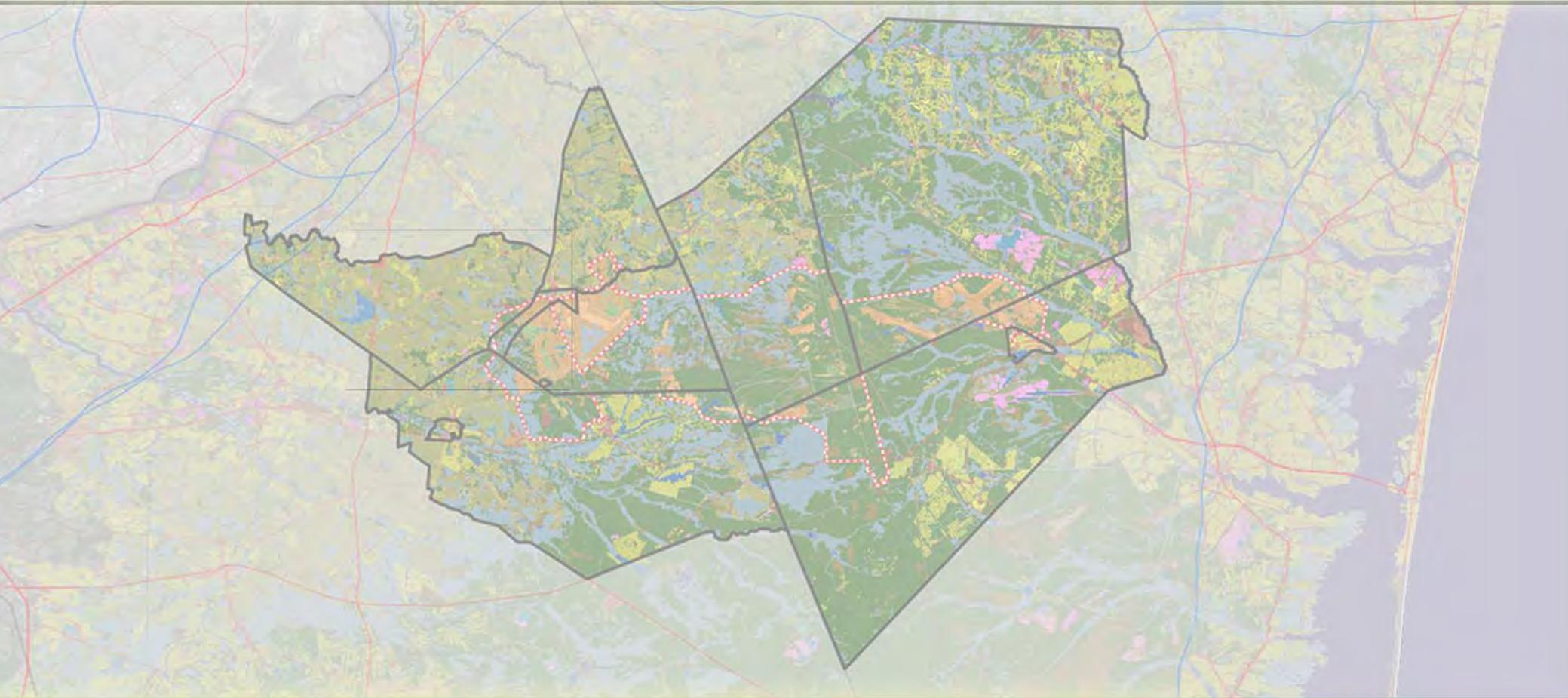
As part of the Joint Base program, McGuire Air Force Base applied for a federal grant in 2008 and received \$1 million that was awarded to Burlington County for farmland preservation. Burlington County has already preserved 6,673 acres of farmland in the 2-mile JLUS study area and is hoping to preserve an additional 26,000 acres of farmland within the study area. In 2008, the effort had over \$3 million in DoD funds and more than \$9 million in partner funds. In February of 2009, Burlington County auctioned off eight preserved farms in six towns, raising \$3.5 million for future farmland preservation. Some of the parcels were located in North Hanover, Pemberton, and Springfield Townships near Joint Base McGuire-Dix-Lakehurst. The County purchased the farms for \$16 million, then restricted the deeds to allow only agricultural use and provided the transfer of the lands to local farmers for agricultural use.

The Pinelands Commission, using monies from the Pinelands Conservation Fund, has also targeted 100,000 acres of land for protection within their management areas. The Pinelands

Conservation Fund was created in 2004 as part of an agreement with the New Jersey Board of Public Utilities to permit the construction and upgrade of an electric transmission line through eastern portions of the Pinelands. Under the agreement, the special fund was established to further the Pinelands protection program and ensure a greater level of protection of the unique resources of the Pinelands Area. The utility that built the transmission lines, Atlantic City Electric (formerly Conectiv), provided \$13 million to establish the Fund. The Fund is dedicated to three types of projects: \$6 million for permanent land protection (\$4.2 million of which has been allocated); \$3.5 million for conservation planning and research projects; and \$3.5 million to support community planning and design initiatives. The Pinelands program works in partnership with local governments and nonprofit organizations to preserve lands.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 12 - Recommended JLUS Strategies

The following recommended strategies were developed to help to resolve land compatibility issues, strengthen base and local government relationships, and provide a suggested footprint for future Joint Base and Community growth. These strategies were created to directly meet the study's goals of:

- protecting the installation operations,
- securing local community quality of life,
- protecting the ability of the local communities to have a viable economy,
- maintaining health and safety of community residents, and;
- protecting the private property rights of local landowners.

The suggested strategies were designed to meet multiple objectives, to be relatively low in cost, politically and legally viable, and accomplishable in a short timeframe.

The recommended strategies are categorized in a hierarchal fashion, presenting identified issues and then the more detailed implementation component(s) as applicable. The strategies list the proposed approach, geographic area(s) affected, suggested implementation team, and the anticipated implementation timeframe.

The level of concern for each identified issue ranges from high (red), to moderate (yellow), to low (green) concern. Issues identified in red should be considered for immediate implementation. The execution of the charter and implementation committee as identified and discussed in the JLUS Review and Ongoing Support section should be considered a priority in the next few months to continue the JLUS process and to formalize the course of action for enactment of the proposed implementation strategies.

Example Strategy Guide

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
A-1	JLUS Review and Ongoing Support		Execution of a charter that addresses the needs of all participants and defines future participation and goals					X	<u>Lead:</u> Ocean and Burlington Counties <u>Partners:</u> JLUS Policy Committee	X		X

Main Categories Grouped According to Issues of Concern

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A. JLUS Review and Ongoing Support 211

- A-1 Execution of a charter that addresses the needs of all participants and defines future participation and goals
- A-2 Create a Joint Base JLUS Implementation Committee
- A-3 Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination
- A-4 Determine when an updated JLUS is warranted

B. Communication/Coordination 213

- B-1 Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings
- B-2 Create a Joint Base JLUS Implementation Committee
- B-3 Increase dialogue and collaboration between Joint Base, business, and educational communities
- B-4 Develop & Maintain a JLUS website link on Municipal, County and Military Website
- B-5 Update JLUS website

C. Land Use Approval Process 215

- C-1 Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones.
- C-2 Rezone or incorporate an overlay district for high conflict zoning areas
- C-3 Create an APZ Overlay Zoning District
- C-4 Create a Noise Zone/AICUZ Overlay Zoning District
- C-5 Use Cluster Development Techniques and Planned Unit Development in LUPZ
- C-6 Use of Noise Attenuation Techniques
- C-7 Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas

D. Noise and Safety 219

- D-1 Determine Comprehensive Joint Base Impacts by performing an updated AICUZ and ICUZ
- D-2 Make available either by website or by pamphlet voluntary noise attenuation options for home builders and existing homeowners
- D-3 Update and Maintain Regional HUD Noise Map
- D-4 Establish Joint Base Priority Locations for Possible Acquisition.
- D-5 Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders

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E. Community Development 222

- E-1 Develop JLUS Housing and Community Development Subcommittee to address incoming military issues
- E-2 Incorporate JLUS Municipal Transfer of Development Rights (TDR) Program
- E-3 Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas
- E-4 Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)
- E-5 Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities

F. Affordable Housing Development 225

- F-1 Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones
- F-2 Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience

G. Economic Development 226

- G-1 Develop JLUS Economic Development Subcommittee

H. Infrastructure 228

- H-1 Further analyze wastewater solutions for JLUS Municipalities
- H-2 Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic within residential neighborhoods
- H-3 Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges
- H-4 Explore transit opportunities for military and civilians
- H-5 Improve Community Design for Base Entrances

I. Natural Environment 230

- I-1 Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation
- I-2 Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns
- I-3 County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step
- I-4 Continue environmental impact studies in communication with Joint Base as additional information on base missions becomes available and work with Steering Committee to address future issues for natural resources

- I-5 Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities
- I-6 Distribute BASH Educational Materials to local farmers to promote awareness on reducing the potential for bird and wildlife attractions that may impede safe air operations
- I-7 Develop trespass avoidance procedures with local governments and adjacent property owners

J. Regional and State Planning Influences..... 234

- J-3 Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar non-residential zone
- J-2 Utilize PDC program
- J-3 Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible
- J-4 Apply for State Plan Endorsement to Establish TDR program and COAH certification

A - JLUS Review and Ongoing Support

The completed JLUS signifies a major milestone between the three Joint Base components and the neighboring communities. The JLUS was a major commitment by the stakeholders and the stage has been set to preserve the military mission in conjunction with compatible land use planning and development. The best way to perpetuate this study is to garner stakeholder buy-in through establishment of a Joint Land Use Implementation Team and execution of a charter that formalizes the roles of all participants.

Formalization of the way ahead is best accomplished by creation of a charter which is signed by the stakeholders. A representative charter is included in Appendix 13.8 for consideration. A public signing of the charter will demonstrate all leaders' commitment to collaborative planning to their constituency. Media coverage of the event is highly desirable. With the recent establishment of the 87th Air Base Wing and appointment of the new Joint Base Commander the timing for the signing ceremony is ideal.

Institutionalization of the JLUS is dependent on both leadership commitment and designation of personnel who will keep the process "alive." It is recommended that the leadership corps be comprised of Freeholders from Ocean County and Burlington County, the mayors of all ten surrounding Joint Base municipalities and the Joint Base McGuire-Dix-Lakehurst Commander. Recognizing that elected officials and military commanders change periodically, and to ensure continuity and constancy of purpose, it is important that permanently appointed senior civilian planning officials from the Joint Base and the counties be designated as process stewards who are responsible for ensuring that follow on actions are scheduled and executed. It is recommended that a process be implemented in which the county and joint base process stewards formally brief future joint base commanders and newly elected mayors on the JLUS process and the Charter obligations within 90 days of their assuming command or office. If several mayors took office at approximately the same time they could be briefed together. This step is critical to maintain leadership commitment and constancy of purpose.

The issues and concerns discussed in this study are not static. With the upcoming formal establishment of the Joint Base (October of 2009) and the subsequent changes in management structure along with the ever-changing regulatory environment in New Jersey, this document

should be periodically reviewed for relevance in the years ahead. It is suggested that the JLUS be reviewed for relevancy within the next two years as the Joint Base is formalized. After the initial two year review, as Municipal Land Use Law requires the reexamination of local master plans every six years, a six year timeframe for reviewing and updating the JLUS appears to be an appropriate schedule.

A. JLUS Review and Ongoing Support

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1- 2 Years	3- 5 Years	Ongoing
A-1	JLUS Review and Ongoing Support		Execution of a charter that addresses the needs of all participants and defines future participation and goals					X	<u>Lead:</u> Ocean and Burlington Counties <u>Partners:</u> JLUS Policy Committee	X		X
A-2	JLUS Review and Ongoing Support		Create a Joint Base JLUS Implementation Committee <ul style="list-style-type: none"> Comprised of existing members of the JLUS Team and Policy Committee to monitor and guide implementation of JLUS recommendations 					X	<u>Lead:</u> Ocean & Burlington Counties <u>Partners:</u> Joint Base JLUS Municipalities Pinelands Commission SADC DCA Office of Smart Growth Department of Military and Veterans Affairs	X		X
A-3	JLUS Review and Ongoing Support		Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination					X	<u>Lead:</u> Ocean and Burlington Counties Joint Base <u>Partner:</u> JLUS Municipalities	X		X
A-4	JLUS Review and Ongoing Support		Determine when an updated JLUS is warranted					X	<u>Lead:</u> Ocean & Burlington Counties <u>Partners:</u> Joint Base JLUS Municipalities	X		

B - Communication/Coordination

The military's ongoing coordination and consultation on zoning and land use issues is important to overall mission viability, especially as the separate bases become integrated as Joint Base McGuire-Dix-Lakehurst. Although notified of potential zoning changes or development proposals within 3,000 feet of the installation boundary, there are currently no formal methods for military involvement or development review at either the local or Pinelands Commission levels. It is the recommendation of the JLUS team that base planning professionals fully participate in municipal planning and maintain a working relationship with the Pinelands Commission. Over the past several years military participation in local planning boards has increased and the working level dialogue has improved. It is important the military planners attend all municipal planning board meetings. While this may appear burdensome, it is, the best way for military planners to fully appreciate the development interests, restrictions and concerns characteristic to each municipality. It also provides a forum for the planner to express Joint Base concerns. The agenda should be provided to the military planner several days in advance of the meeting so that, the Joint Base commander can be briefed and, if appropriate, his guidance on positions can be expressed.

Past relationships with military and community leaders have not been consistent due to commanding officer and political office changes. Recognizing that elected officials and military commanders change periodically, and to ensure continuity and constancy of purpose, it is important that permanently appointed senior civilian planning officials from the Joint Base and the counties be designated as process stewards who are responsible for ensuring that follow up actions are scheduled and executed. The creation of a procedural manual for incoming military and community leaders would also be an asset in assisting the ongoing relationship process. A procedural manual could incorporate, at a minimum, key contact information, the schedule for upcoming meetings, and the history of implemented strategies and outstanding issues of concern to help with an incomer's introduction to the ongoing Joint Base/JLUS municipalities relationship.

Throughout the course of this JLUS the primary means of communication has been the JLUS website www.jointbasenj.org. This mode of communication has served the needs of the study, but needs to be expanded in the future. Under the JLUS contract PS&S will host the JLUS

website for one additional year after completion of the study. Beyond that, website hosting can be provided by Joint Base McGuire-Dix-Lakehurst or either Ocean County or Burlington County depending on resource availability, capability and interest. Agreement on which entity will ultimately be the host should be reached by July 2009 so that the transition can be accomplished in an efficient manner. Meanwhile all municipal and county websites should be linked to the JLUS website. Additionally, the local military websites should also be linked. The JLUS website in an excellent vehicle to announce:

- Municipal planning board meetings
- Semi-annual Joint Base Land Use Meetings
- Major military events with potential public interest (e.g. contracting workshops, retiree seminars, air shows)
- Upcoming exercises which may impact the public
- Increased air operations
- Off post vehicle convoys
- Heavy arms training
- Weapons training
- Increased catapult test operations

When the military is expecting increased operations, it is important that website notices be consistent in terms of clarity (layperson terms), the general time period of increased operations, and define what the possible side effects may be to the local residents.

B. Communication/Coordination

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
B-1	Communication/Coordination		Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings					X	<u>Lead:</u> Joint Base <u>Partners:</u> JLUS Municipalities	X		X
B-2	Communication/Coordination		Create a Joint Base JLUS Implementation Committee <ul style="list-style-type: none"> Comprised of existing members of the JLUS Team and Policy Committee to monitor and guide implementation of JLUS recommendations 					X	<u>Lead:</u> Ocean & Burlington Counties <u>Partners:</u> Joint Base JLUS Municipalities Pinelands Commission SADC DCA Office of Smart Growth Department of Military and Veterans Affairs	X		X
B-3	Communication/Coordination		Increase dialogue and collaboration between Joint Base, business, and educational communities <ul style="list-style-type: none"> Promote base-related production & research and development Promote educational process of federal contracting paperwork for local businesses 					X	<u>Lead:</u> Ocean & Burlington Counties Department of Military and Veterans Affairs <u>Partners:</u> Local Businesses	X		X
B-4	Communication/Coordination		Develop & maintain a JLUS website link on municipal, county and military websites					X	<u>Lead:</u> Joint Base Ocean and Burlington Counties JLUS Municipalities	X		
B-5	Communication/Coordination (JLUS website)		Update JLUS website <ul style="list-style-type: none"> Maintain phone directories to clearly identify appropriate numbers to call for noise concerns Provide updated information on aircraft operations and large arms (e.g. artillery) operations 					X	<u>Lead:</u> Joint Base <u>Partners:</u> Ocean & Burlington County	X		X

C - Land Use Approval Process

Master Plan

The Municipal Land Use Law (MLUL) allocates planning and regulatory authority to municipalities and counties. The MLUL establishes parameters to enable municipalities to plan for the future; among these parameters is the requirement to prepare a Master Plan, and to periodically update this plan. In order to effectively integrate the JLUS with local master planning efforts, each municipality adjacent to the Joint Base should take into account the presence of the Joint Base and land use compatibility considerations during the preparation of local master plans and regional policy documents. Clear recognition of the AICUZ in all local master plans is a simple but critical first step and provides a framework to guide subsequent policy and zoning decisions.

The Noise Zone (AICUZ/ICUZ) and APZ zone maps are the minimum recommended acceptable areas where land use controls are needed to protect the health, safety, and welfare of those living near a military airfield and to preserve the Joint Base mission. Contours that define noise zones should be viewed as a planning tool, not as a series of discrete lines that sharply divide noise-affected land from non-noise affected areas. These compatibility zones are a guideline to be used for land use planning to minimize conflicts with noise-sensitive land uses, such as housing, schools, and medical facilities. The purpose of land use recommendations within these zones is not to preclude productive use of the land around air facilities, but to recommend uses of the land that are protective of human health, safety, and welfare. Local governments may have an opportunity in the planning process to structure capital improvements so as to promote land uses that are compatible with the noise and air safety zones of the Joint Base.

Zoning

In New Jersey the zoning ordinance governs “the nature and extents of the uses of land and of buildings and structures thereon”. Zoning is the set of standards that controls the type, intensity, and location of development on a site.

Each JLUS municipality’s zoning ordinance should consider the APZ and noise zones. Overlay

districts should be considered for JLUS municipalities that incorporates APZ 1 and noise zones II and III. This recommendation would affect the JLUS municipalities that have noise zones and APZ impacts. Of the 10 JLUS municipalities, Springfield Township and Pemberton Borough do not currently have noise zone or APZ impacts.

An overlay district is an additional zoning requirement that is placed on a geographic area but does not change the underlying zoning. Overlay districts have been used to impose development restrictions in specific locations in a watershed in addition to standard zoning requirements. Common requirements may include building setbacks, density standards, lot sizes, impervious surface reduction and vegetation requirements. Structure requirements could include building floor height minimums.

An APZ overlay district should be established that defines land use by the APZ designation. Using DoD Compatible Land Use Guidelines (Appendix 13.6) within the Clear Zone and APZ 1, residential uses should be prohibited. APZ 2 uses can include single family dwelling units with a suggested maximum density of 1-2 units per acre. In APZ 1, certain types of industrial, transportation, utilities, mining, and open space are acceptable uses. Hospitals, schools, and religious establishments should not be situated on APZ lands. Commercial and retail trade is generally acceptable in APZ 2. People-intensive uses (e.g. shopping malls, theaters, etc.) should be placed outside APZs. Included in the APZ overlay district should be consideration of new heights whether by structure or vegetation that will interfere with, diminish, change or obstruct the airspace or landing and take-off area.

The New Jersey Administrative Code, Chapter 62, (N.J.A.C. CH 62) regulates air safety and zoning for non-military airports and the standards for land use adjacent to airports. This administrative code in conjunction with the DoD Compatible Use guidelines may be used to determine the most appropriate land use provisions for an APZ overlay district.

A noise zone overlay district should also be adopted that takes into consideration noise zones II and III from the AICUZ noise contours. Noise sensitive uses (e.g. houses, churches, amphitheaters, etc.) should be placed outside the high noise zones (zone II and III). Noise-impacted areas that contain incompatible uses can be zoned to more compatible categories, such as commercial or industrial.

The creation of the two overlay districts within the JLUS municipalities would provide a uniform

standard in the geographical areas directly affected by activities at the Joint Base.

Figure 12.1 displays residential zones that are currently in conflict within APZ and Noise Zones. These zones have been ranked by their designated residential density and their location within these conflict areas. These residential zones conflict with recommended zoning and should be considered a priority when addressing this JLUS. Figure 12.1 displays the entire residential zone boundaries and have been ranked by the permitted density of the zone and the how much of the zone falls within the designated noise zones and APZ. (Lakehurst Borough zoning conflicts address just noise zones and not APZ. Should NAES Lakehurst have increased operations on Runway 15/33 the residential zoning within the APZ should be readdressed.)

- Zones of low concern are low - medium density residential and may fall within a small portion of Noise Zone II and/or APZ 2.
- Zones of medium concern are medium-high density residential and have a larger geographic area within Noise Zone II and/or APZ 1;
- Zones of high concern are medium to high density residential and are mostly within Noise Zone II and/or APZ 1 and located in direct vicinity of the Joint Base boundary.

In areas where zoning is in conflict with recommended land use, the creation of an overlay zone and/or down zoning should be considered.

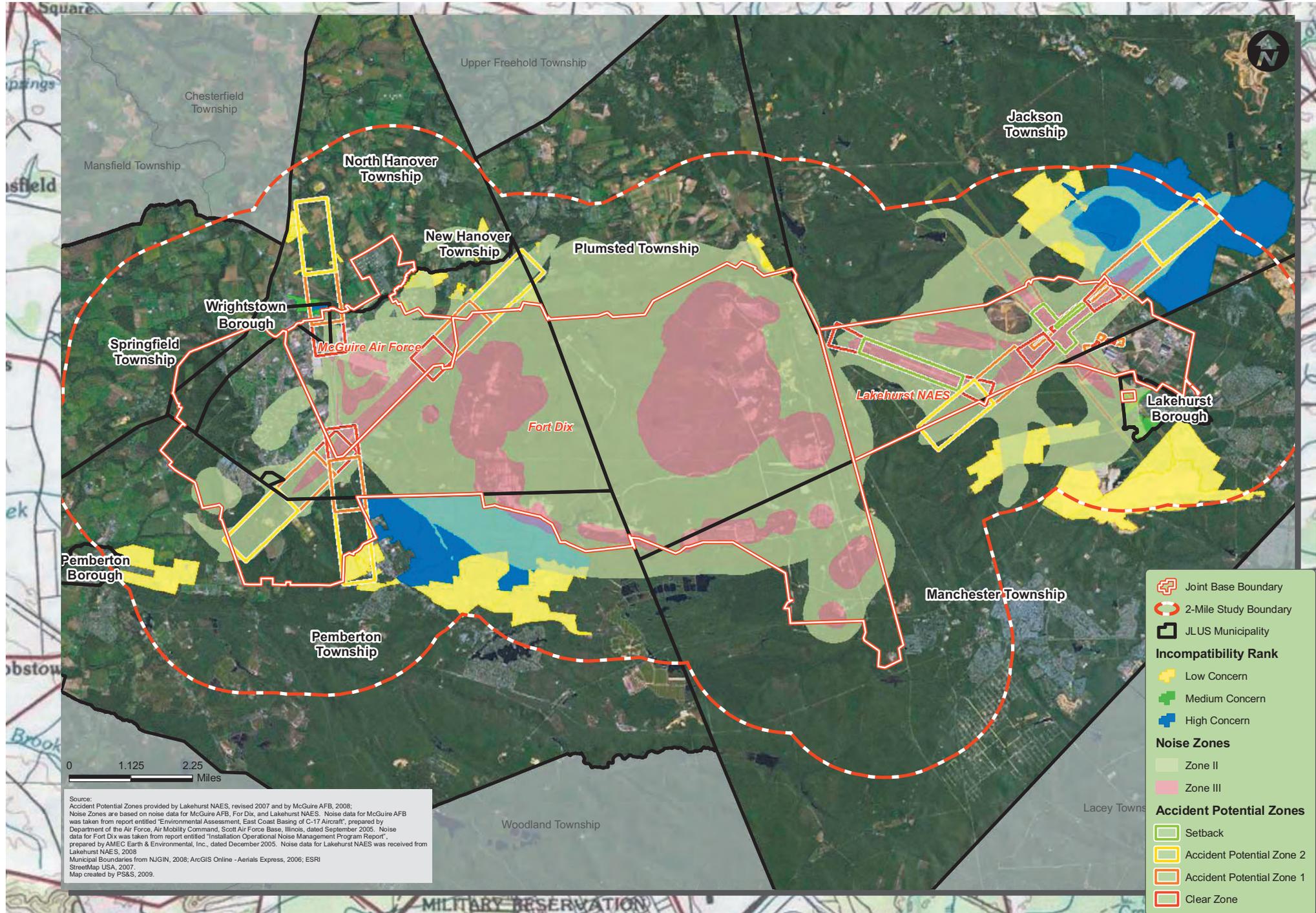
Communication towers (cell towers, radio antenna, etc) present the potential for both physical intrusion into active air space and electromagnetic intrusion of signal that may affect military training, testing and readiness. Wind farms are becoming more common in New Jersey and if built too close to flight paths they may also intrude into active air space. The JLUS municipalities should revise development regulations for communications towers and wind farms to address aircraft safety concerns and to establish procedures for applicants. It is suggested that procedures be adopted that require applicants looking to develop communication and wind farms within the JLUS 2-mile study area obtain written notice of review from the Joint Base regarding potential for conflicts with aircraft operations. This letter should be submitted to the municipality prior to commencing review of such applications.

The Federal Aviation Administration (FAA) Part 77 airspace obstruction analysis specifications

provides additional guidance for the placement of towers and height considerations. While FAA guidelines are not directly applicable to military airspace, they can be used as a guideline for established best management practices.

The use of cluster development techniques, building orientation, and Planned Unit Development in designated Land Use Planning Zones may be helpful for sound reduction and are discussed in further detail in the noise and safety strategies.

Figure 12.1 – Residential Areas of Incompatible Zoning



Source:
 Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008.
 Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled "Environmental Assessment, East Coast Basing of C-17 Aircraft", prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008.
 Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI
 StreetMap USA, 2007.
 Map created by PS&S, 2009.

C. Land Use Approval Process

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
C-1	Land Use Approval Process (Master Plan)		Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements <ul style="list-style-type: none"> Additional suggested revisions would be to address acquisition, environmental protection, open space and agricultural protection, groundwater protection and air quality in relation to population growth near the Joint Base 					X	<u>Lead:</u> JLUS Municipalities <u>Partners:</u> Ocean & Burlington Counties Joint Base		X	X
C-2	Land Use Approval Process (Zoning)		Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	X				<u>Lead:</u> JLUS Municipalities	X		
C-3	Land Use Approval Process (Zoning)		Create an APZ Overlay Zoning District <ul style="list-style-type: none"> Utilize New Jersey Administrative Code, Chapter 62, (N.J.A.C. CH 62) and DoD Compatible Use Guidelines for APZ 	X					<u>Lead:</u> JLUS Municipalities <u>Partners:</u> Joint Base Pinelands	X		
C-4	Land Use Approval Process (Zoning)		Create a Noise Zone/AICUZ Overlay Zoning District Zoning District <ul style="list-style-type: none"> Utilize FICUN Guideline for Considering Noise in Land Use Planning 		X				<u>Lead:</u> JLUS Municipalities <u>Partners:</u> Joint Base Pinelands	X		
C-5	Land Use Approval Process (Zoning)		Use Cluster Development Techniques and Planned Unit Development in LUPZ <ul style="list-style-type: none"> Use Commercial or Open Space as a Noise Buffer to Residential subdivisions 			X			<u>Lead:</u> JLUS Municipalities		X	
C-6	Land Use Approval Process (Zoning)		Use of Noise Attenuation Techniques <ul style="list-style-type: none"> Building Orientation Alternative Siting/Alignment 		X	X		X	<u>Lead:</u> JLUS Municipalities		X	
C-7	Land Use Approval Process (Zoning)		Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X					<u>Lead:</u> JLUS Municipalities Joint Base	X		

D - Noise and Safety

Determining Noise Impacts

The Air Installation Compatibility Use Zone Program (AICUZ) is an ongoing program for all military airfields. It is designed to assist the adjacent community by recommending land use planning that ensures safe aircraft operations and minimizes community noise incompatibilities. AICUZ program experience indicates that future year planning is necessary to consider the effects of expected changes in mission, aircraft, operational levels, etc. One element of the AICUZ program is to develop noise contours around the base that can be used by the community for zoning ordinances.

The Army's Installation Compatible Use Zone (ICUZ) program is similar to the AICUZ program for air operations. ICUZ provides a method for evaluating the effects of noise and other hazards associated with training operations and activities at military installations such as firing ranges. The ICUZ program considers the land areas, with noise-sensitive land uses, that are exposed to generally unacceptable noise levels and aircraft accident potential. The policy and procedures of the ICUZ are essentially the same as the AICUZ.

With the formation of the Joint Base, it is recommended that AICUZ studies be performed for both airfields in concert with an ICUZ for range training operations and that these studies be integrated into a comprehensive set of guidelines for the entire Joint Base. An AICUZ is planned for the Joint Base in 2010 and should include an ICUZ to fully understand all the Joint Base potential impacts to the communities. It was recommended during the policy committee process that new noise modeling also consider atmospheric and actual sound measurements. These additional modeling parameters are not a common component in AICUZ/ICUZ programs but would be helpful in determining the accuracy of the Joint Base noise models.

Existing Noise Zones

Joint Base associated noise zones extend into existing neighborhoods and areas that are zoned for incompatible land uses and are otherwise capable of accommodating future growth. Certain building location measures (e.g., the selection of locations for structures within a development parcel that affords screening from noise sources) and construction methods can be utilized to mitigate the perception of the noise from interior spaces. Utilization of the natural

acoustical shielding associated with the terrain and landscaping may reduce the perceived noise level. Staggering the layout of buildings to avoid locating buildings in a parallel fashion can also reduce the perceived noise level.

The New Jersey State Uniform Construction Code (UCC) Act, signed into law in 1975, authorizes the Commissioner of the Department of Community Affairs (DCA) to adopt and enforce rules pertaining to construction codes and provides for the uniform administration and enforcement of those rules throughout the State. As a result, there is no local prerogative to adopt more or less stringent building code requirements.

While the UCC Act would limit individual municipally adopted construction requirements to address noise, it appears to be in the interest of individuals building a new home in a designated noise zone to mitigate the effects of noise by using specific design techniques and construction materials. Such measures are expected to be much more cost effective than post-construction noise attenuation measures. A limitation of this type of control is that outdoor sound levels are not reduced. There are also measures that property owners may take to further insulate existing homes from noise. Guidelines for developers, contractors and homeowners are available. The Federal Aviation Administration and the Navy have jointly published the "Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations" (Wyle Research Report WR 89-7). This report classifies U.S. residential construction under 26 categories, and discusses "best practice" soundproofing for each category along with cost estimates (in 1989 dollars). An example of noise level construction techniques and acoustic design, "New Construction Acoustical Design Guide prepared for MCAS Cherry Point by Wyle Laboratories (WR 04-28 December 2004)," is included in Appendix 13-7.

Noise mapping that reflects Housing and Urban Development (HUD) and the Veterans Administration (VA) decision-making criteria can be useful for managing agency home financing processes. The HUD and VA establish requirements for granting Federal loans in noise-sensitive areas. At present, both agencies include the refusal of support for new homes constructed in Noise Zone III areas. They also require new homes that are proposed for Noise Zone II areas to include adequate noise attenuation features if the residents request full mortgage support. For homes already in Noise Zone II areas, HUD and the VA will not deny a mortgage based on the noise alone. For homes located in Noise Zone III areas, HUD and the VA will base mortgage support on the homes' actual value. Mapping of noise contours for HUD and agency decision-making regarding the funding of new residential projects will benefit

community planners, builders and the agencies. See Figure 12.2 for mapping of noise zones and existing neighborhoods of low to moderate income.

Safety

Accident Potential Zones (APZ) are the designation of safety zones around airfields that have increased potential for aircraft safety hazards. The APZ are designated land use planning zones, determined by DoD guidelines, that can reduce the potential for public exposure to aircraft safety hazards if incompatible land uses are avoided in these zones. (See Section 6.7 for more detail.) APZ for McGuire AFB extend into Wrightstown Borough, North Hanover Township, New Hanover Township, and Pemberton Township. APZ for NAES Lakehurst extend into Jackson Township, Manchester Township, and Lakehurst Borough.

Acquisition of Properties with Noise and Safety Concerns

Some areas within the JLUS municipalities are subject to more significant impacts as a result of the Base mission and can encroach upon civilian quality of life. It is recommended that acquisition be examined on a case by case basis. The military has used acquisition most often in areas that are within the APZ; particularly the Clear Zone and APZ 1.

A long term acquisition program will help shift future growth away from areas of concern by creating a land buffer between the military base and incompatible uses and help to protect public safety. Acquisition is a tool that helps to eliminate land use incompatibilities through voluntary transactions in the real estate market and local development process. In particular, properties located within the APZ and Noise Zones II and III should be eligible to participate in an acquisition program. Most acquisition programs consist of conservation easements and fee simple acquisitions. A life estate is an example of a fee simple acquisition.

Fee Simple Acquisition

Fee simple acquisition is an outright purchase of a property. The DoD can partner with local governments and conservation agencies, such as the Pinelands Commission or the State Department of Agriculture, to purchase lands. Fee Simple Acquisition is currently used successfully around the Joint Base and is mentioned in Section 11, Existing Land Protection Strategies.

Army Range and Training Land Acquisitions/Army Compatible Use Buffers (ACUB)

This program is a relatively new tool to address encroachment at Army installations. Cooperating partners and willing sellers are essential to successful execution of ACUBs. During the process, the installation negotiates with a designated cooperating partner to formalize the details of a scope of work contingent. The scope of work outlines the Army's and the partner's areas of mutual interests, responsibilities, timeframes, financial contributions, and other dependencies. It can be conceptually discussed early in the process, but formalized only after Headquarters Department of the Army and installation management approval of the ACUB proposal. After the partnership details are authorized in the statement of work, legal arrangements are documented in a formal procurement document. The cooperating partner works with willing landowners to acquire land and provide a natural buffer between military training lands and residential or commercial activities. The partner—not the Army—receives the deeded interest in the property and provides for long-term habitat management. Pursuant to the terms of the cooperative agreement, the installation may retain access rights to conduct compatible military training.

Life Estate

Life Estate is a type of fee simple property acquisition mechanism that allows the preservation of a Life Estate in the Grantor. The Life Estate would allow the county or municipality to purchase the property with a Bargain and Sale deed of conveyance. The Deed would memorialize the terms of the contract of sale between the current land owner and the purchasing agent, which would allow the current owner to remain in the house until he/she chooses to move out or until they pass away. The land could not be transferred or sold to anybody else in the interim. However, the land owner would be allowed to have a live in caretaker. This type of property mechanism is beneficial to the property owner and military installation. The property owner, who may or may not be able to move, would be allowed to live in the property while still reaping the financial benefits of selling the home. Meanwhile, the military installation would be assured that in the future the incompatible land use would be converted to a compatible use, such as conservation. To avoid becoming a landlord, the military installation would be able to contribute to the purchase of the property by partnering with the county, municipality, or a conservation entity.

D. Noise and Safety

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1- 2 Years	3-5 Years	Ongoing
D-1	Noise and Safety (Determining Noise Impacts)		Determine Comprehensive Joint Base Impacts by Performing an updated AICUZ and ICUZ		X	X	X	X	<u>Lead:</u> Joint Base		X	X
D-2	Noise and Safety (Existing Noise Zones)		Make available either by website or by pamphlet voluntary noise attenuation options for home builders and existing homeowners		X	X		X	<u>Lead:</u> Ocean and Burlington Counties Joint Base	X		X
D-3	Noise and Safety (Existing Noise Zones)		Update and Maintain Regional HUD Noise Map		X				<u>Lead:</u> Ocean and Burlington Counties			X
D-4	Noise and Safety (Acquisition)		Establish Joint Base Priority Locations for Possible Acquisition <ul style="list-style-type: none"> Consider Residential Lands within APZ 1 and Residential Lands within Noise Zones II & III 	X	X				<u>Lead:</u> Joint Base Ocean and Burlington Counties <u>Partners:</u> JLUS Municipalities		X	
D-5	Noise and Safety (Acquisition)		Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders	X	X				<u>Lead:</u> Joint Base Ocean and Burlington Counties <u>Partners:</u> JLUS Municipalities	X		

E - Community Development

The JLUS communities will most likely see population growth in accordance with the increased Joint Base mission. Additional military personnel, incoming Joint Base civilian employees, and their households moving into the area will utilize existing municipal facilities and services (public safety, judicial, social services, libraries, recreation, etc.) as well as existing public educational facilities and services (K-12, Post-secondary, Adult). This community growth can be anticipated in accordance with Joint Base anticipated personnel. The following topics seek to mitigate potential challenges to community development.

Transfer of Development Rights

Within the regional Joint Base McGuire-Dix-Lakehurst context, the ten surrounding municipalities are the most directly affected by the Joint Base's mission. There will be instances where the future use of vacant lands will be directly affected by proximity to the Joint Base and the noise generated by it. Transfer of Development Rights (TDR) has been successful in New Jersey on a regional level for Burlington County and the Pinelands in particular. A TDR program can be developed to implement plans to redirect growth from areas of noise and other hazards to areas that are less affected by these conditions. An advantage of such a TDR program would be that it harnesses the free market: the owner of the constrained land sells the development credits established under zoning to a buyer who then can develop additional density on another property based on the number of credits purchased. Also as part of this strategy, local governments could require developers to use low impact site design principles, including the creation of green space/conservation buffers that can support noise and safety impact mitigation. Municipalities seeking to preserve land in the 2-mile JLUS study area through TDR would require sewer service in receiving areas. Additional consideration for cooperative funding for the TDR implementation process may be necessary.

Coordination of Base School Age Children to Local Schools

During the term of the JLUS, there has been a request to have McGuire AFB and Fort Dix children attend the same schools. Such a change will have considerable impacts to the municipality that loses the schoolchildren and the resulting financial support. The issue has

become divisive. Keeping an open dialog on this issue may reduce this divisiveness and possibly identify an approach that advances a long-term resolution. State-aid funding for local schools is influenced by Military's school district decisions for Military dependents and is an issue that warrants further discussion.

Real Estate Disclosure

New residents that move into the JLUS region should be aware of the Joint Base. As an example, Jackson Township has seen major growth in recent years and it was discussed at JLUS policy meetings that many new residents were not aware that the Joint Base was close by. Real estate disclosure documents are often used to inform and advise potential property purchasers that the property they are considering for purchase is within the proximity to a military installation, airport, or accident zone, as defined by a specific jurisdiction. The incorporation of a disclosure notice ensures a buyer is aware of the conditions surrounding the property, such as noise, and can also serve to inform buyers of development guidelines within noise and accident potential zones that may be contained in local zoning codes.

This JLUS recommends inclusion of a disclosure prior to the transfer of ownership of a residence, business, or land, requiring the seller to disclose to any prospective buyer the activities that occur on the Joint Base, the distance to the installation, and any other information pertaining to noise generated by the Joint Base and its impact on the area for sale, and also reference the buyer to JLUS data sources and communication channels. Such disclosure will increase awareness of the existing noise conditions and other base-related environmental and community issues.

Suggested Real Estate Disclosure Implementation Mechanisms:

The adoption of a disclosure ordinance, which would require sellers of real estate living within the 2-mile buffer of the Joint Base to disclose the proximity of their property to the Joint Base, and to note if the property is located in a noise zone or APZ. It is suggested that municipalities adopt separate provisions for the general 2-mile buffer and for noise zones and APZ areas.

The principal problem for such an ordinance is identification of a triggering event and responsible party for actually providing the notice. In the case of new subdivision and site

plan approvals, such approvals could be conditioned upon inclusion of a notice in the deeds or plats perfecting the approval. This would introduce the notice into the chain of title, and every subsequent buyer would therefore be on notice of the property's environment. For transfers of existing properties, it will be very difficult to enforce the notice requirement because the municipality has a very limited role in such transactions and no authority to impose obligations which can be inserted into the chain of title. One way around this may be to include the notice on municipally issued Certificates of Occupancy, or if the particular municipality does not require a new Certificate of Occupancy upon sale, then with the state-required smoke and CO detector certification document.

A second approach (which may be adopted in conjunction with the first approach) would be for municipalities to adopt a "Joint Base Code" (similar to the Country Code adopted by Upper Freehold Township in Monmouth County for the purpose of alerting residents to the agricultural nature of the community and its policies toward the impacts of agriculture on residents). Such a code would put homeowners on notice of the perceived importance of the Joint Base to the community, the need to accommodate the Base for the greater local and patriotic good, and some of the potential impacts of the Base with respect to nearby residents. The code would provide the policy background for the notices required by township ordinances, be made available on the municipality website (linked heavily offsite as well), and circulated regularly to local realtors in pamphlet form.

E. Community Development

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
E-1	Community Development (Real Estate Disclosure)		Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)					X	<u>Lead:</u> JLUS Municipalities <u>Partners:</u> Ocean & Burlington Counties Local Realtors	X		X
E-2	Community Development (impact to local schools and Municipal facilities and services)		Develop JLUS Housing and Community Development Subcommittee to address incoming military issues <ul style="list-style-type: none"> Local Schools impact and aid Determination of need for expansion of Municipal facilities and services 					X	<u>Lead:</u> Burlington County JLUS Municipalities <u>Partners:</u> Ocean County Pinelands Commission		X	X
E-3	Community Development (TDR)		Incorporate JLUS Municipal Transfer of Development Rights Program and other techniques such as contiguous and non-contiguous parcel provisions <ul style="list-style-type: none"> Use APZ, Noise Zones II & III , and LUPZ as sending areas 	X	X	X		X	<u>Lead:</u> Burlington County JLUS Municipalities <u>Partners:</u> Ocean County Pinelands Commission	X		X
E-4	Community Development (TDR)		Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas <ul style="list-style-type: none"> JLUS municipalities to work with military and state government to amend wastewater management plan to and petition for OSG plan endorsement 					X	<u>Lead:</u> JLUS Municipalities Ocean & Burlington Counties <u>Partners:</u> Joint Base Pinelands Commission DCA Office of Smart Growth NJDEP Department of Military and Veterans Affairs		X	
E-5	Community Development (Real Estate Disclosure)		Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities					X	<u>Lead:</u> JLUS Municipalities <u>Partners:</u> Local Realtors	X		X

F - Affordable Housing Development

Within the state of New Jersey, the Council on Affordable Housing (COAH) is the state agency responsible for establishing and monitoring municipal affordable housing obligations. Municipalities enter the COAH process voluntarily but participation offers the municipality a shield from affordable housing related lawsuits. The COAH contribution calculation build out methodology takes into consideration factors regarding the capacity of the land to accommodate new growth (e.g. constraints associated with wetlands or other environmental constraints are removed from developable land inventories). Similarly, the presence of APZ and noise zones limits the capacity of the municipality to develop.

Consideration should also be paid to the Housing and Urban Development (HUD) and Veterans Administration (VA) decision-making criteria for home financing processes. The HUD and VA establish requirements for granting Federal loans in noise-sensitive areas and should be observed when planning low – moderate income housing. At present, both agencies include the refusal of support for new homes constructed in Noise Zone III areas. They also require new homes that are proposed for Noise Zone II areas to include adequate noise attenuation features if the residents request full mortgage support. For homes already in Noise Zone II areas, HUD and the VA will not deny a mortgage based on the noise alone. For homes located in Noise Zone III areas, HUD and the VA will base mortgage support on the homes’ actual value.

The heightened noise environment therefore presents a constraint for the construction of new affordable housing in these zones. The COAH formulation should reflect this limitation to development potential within the JLUS municipalities.

F. Affordable Housing Development

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
F-1	Housing Development (COAH Obligations)		Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones				X		<u>Lead:</u> COAH <u>Partners:</u> JLUS Municipalities	X		X
F-2	Housing Development (affordable housing concerns)		Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience					X	<u>Lead:</u> Burlington County JLUS Municipalities with high rental populations		X	X

G - Economic Development

The Joint Base is a regional economic driver that offers potential economic stimulus to the JLUS municipalities and lies at the center of many potential compatible growth development opportunities. Conversely, the JLUS municipalities may incur economic impacts to the modification of existing and planned land use that may be incompatible to the Joint Base mission. Section 10 identified some future compatible growth opportunities for the JLUS municipalities.

A reoccurring theme in meetings with the JLUS municipalities and the public is the concern regarding the impact of on-base commercial development. In the past, Burlington County JLUS communities have been significantly affected when the Base adds on-site services. The JLUS municipalities are attempting to rebuild their town centers and provide support services to the Joint Base; this in turn, makes the local community very reliant on the base patronage. The consultant team recognizes that this is a component of federal agency decisions (Defense Commissary Agency and the Army and Air Force Exchange Service (AAFES)) but Joint Base outreach and the planning of on-base facilities with the community’s offerings in mind, will help create and maintain an off-base community which is responsive to the needs of the military.

In 2004, a study by Rutgers University, Center for Urban Policy Research, was completed that presented the impact of the in state military operations on New Jersey’s economy and workforce profile. It would be helpful to encourage routine updates to this study to be aware of the overall economic contribution of the Joint Base.

According to feedback from municipal and policy meetings, some of the JLUS municipalities may incur additional infrastructure costs due to the proximity of the Joint Base. The economic sub-committee should work to determine true costs and, if warranted, assistance options for additional services (homeland security, wildfire management, etc) supplied by the municipalities due to Joint Base proximity.

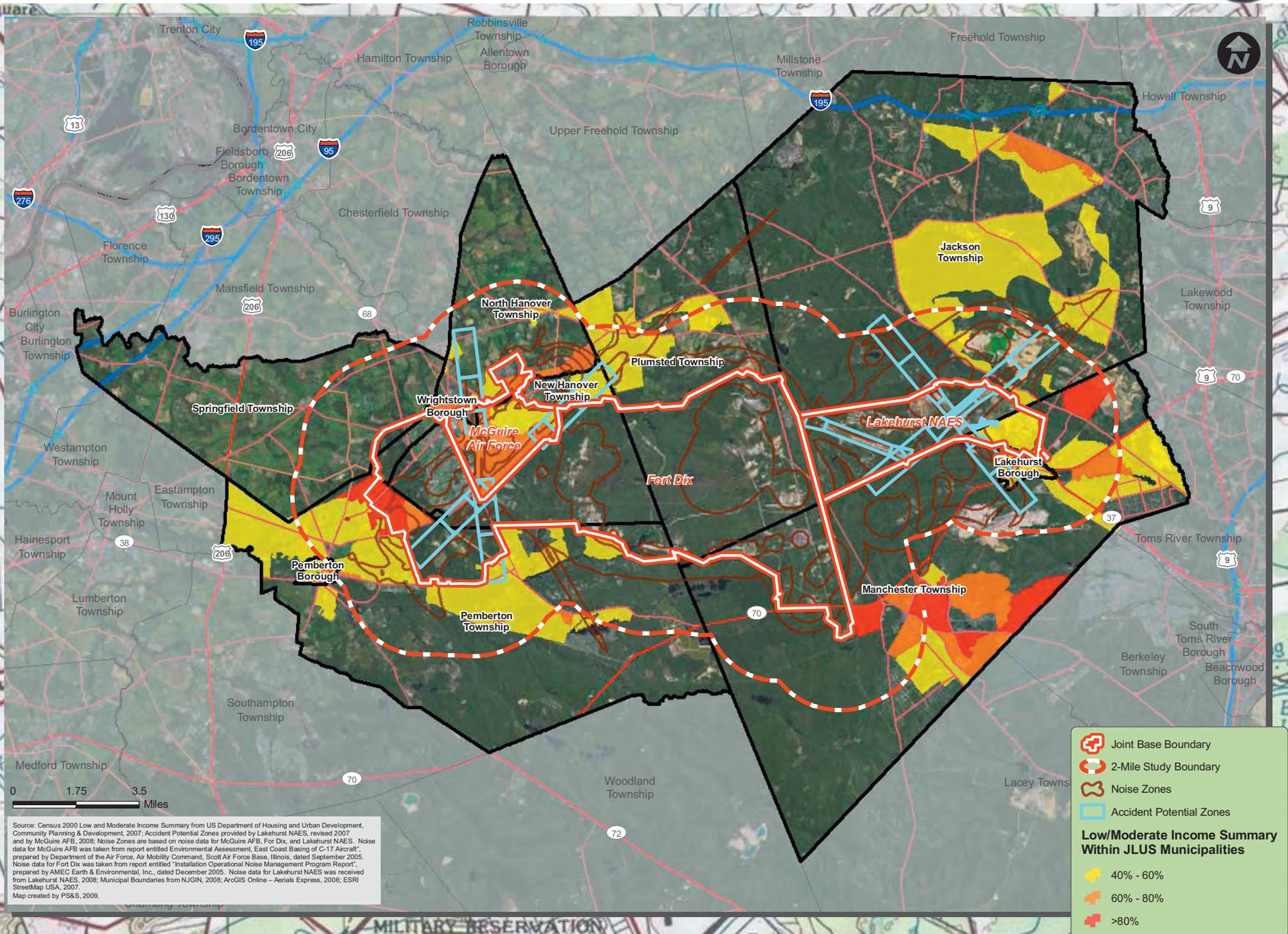
There are multiple areas of low to moderate income housing within the 2-mile JLUS study area, as displayed on Figure 12.2. Low housing costs and relative isolation from employment opportunities tends to concentrate high unemployment and poverty in the study area. Further study and interaction is warranted to address these areas are not adversely affected to Base operations.

G. Economic Development

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1- 2 Years	3-5 Years	Ongoing
G-1	Economic Development		Develop JLUS Economic Development Subcommittee to Address: <ul style="list-style-type: none"> Identified Future Compatible Growth Opportunities within JLUS Municipalities Strategies to offset impact of On-Base Commercial Development and additional infrastructure costs Encourage future follow up study of the economic contribution of military installations within New Jersey Low to Moderate Income Housing within JLUS study area 				X		Lead: Burlington County Ocean County Pemberton Township, Wrightstown Borough Partners: Joint Base DoD OEA AAFES	X		



Figure 12.2 - Low-Moderate Income Summary Within JLUS Municipalities (Census 2000)



Source: Census 2000 Low and Moderate Income Summary from US Department of Housing and Urban Development, Community Planning & Development, 2007; Accident Potential Zones provided by Lakehurst NAES, revised 2007 and by McGuire AFB, 2008; Noise Zones are based on noise data for McGuire AFB, Fort Dix, and Lakehurst NAES. Noise data for McGuire AFB was taken from report entitled "Installation Environmental Assessment, East Coast Basing of C-17 Aircraft", prepared by Department of the Air Force, Air Mobility Command, Scott Air Force Base, Illinois, dated September 2005. Noise data for Fort Dix was taken from report entitled "Installation Operational Noise Management Program Report", prepared by AMEC Earth & Environmental, Inc., dated December 2005. Noise data for Lakehurst NAES was received from Lakehurst NAES, 2008; Municipal Boundaries from NJGIN, 2008; ArcGIS Online - Aerials Express, 2006; ESRI StreetMap USA, 2007. Map created by PS&S, 2009.

H - Infrastructure

A number of the municipalities involved in the JLUS are faced with failing or inadequate wastewater and water supply. Increased infrastructure capacity can be a catalyst for growth, but in the context of the JLUS, these municipalities are endeavoring to support their existing population and to manage and direct growth in to areas that are less affected by noise and other hazards. Both the Joint Base and the municipalities may mutually benefit from infrastructure solutions that support the existing community and its commercial establishments.

Transportation issues were also identified during the course of the study. In particular, there are four main themes:

- Increased traffic and degradation of local roads due to Base traffic
- Route 545/Texas Avenue Closure and impacts to the local community and the alternative local roads traveled
- The Creation of an interior Base access road
- Rail connection for transporting of goods and people including consideration of extension of the Conrail Mount Holly line to Pemberton Borough, or further east to Fort Dix, and the proposed Middlesex Ocean Monmouth (MOM) terminus in Lakehurst Borough.

H. Infrastructure

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
H-1	Infrastructure (lack of wastewater)		Further analyze wastewater solutions for JLUS Municipalities					X	<u>Lead:</u> Ocean and Burlington Counties NJDEP Joint Base <u>Partners:</u> JLUS Municipalities DCA Office of Smart Growth Pinelands Commission	X		
H-2	Infrastructure (military traffic concerns)		Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic within residential neighborhoods					X	<u>Lead:</u> Ocean and Burlington Counties Joint Base		X	X
H-3	Infrastructure (military traffic concerns)		Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges					X	<u>Lead:</u> NJDOT Ocean and Burlington Counties Joint Base <u>Partners:</u> JLUS Municipalities			X
H-4	Infrastructure (lack of transit options)		Explore transit opportunities for military and civilians					X	<u>Lead:</u> NJTransit Ocean and Burlington Counties Joint Base <u>Partners:</u> JLUS Municipalities		X	
H-5	Infrastructure (lack of aesthetic appeal at Base Entrances)		Improve Community Design for Base Entrances				X		<u>Lead:</u> Lakehurst Borough New Hanover Township Manchester Township Pemberton Township Wrightstown Borough Joint Base			X

I - Natural Environment

Preservation of Agriculture

Agriculture is a dominant industry within some of the JLUS municipalities. According to the American Farmland Trust, the United States lost two acres of farmland every minute (from 1992-1997) to new development. Within Ocean and Burlington Counties farmland is being actively preserved to maintain the local rural landscape, maintain access to local foods, protect the environment (with benefits of supporting wildlife habitat and groundwater recharge), preserve prime agricultural lands, and to ensure support of the local industry.

Agriculture and open space preserve the landscapes that are the JLUS communities. In addition, both agriculture and open space are compatible uses with proximity to the Joint Base. Wherever viable, agriculture uses should be preserved within the JLUS municipalities. In particular, any farmlands that are within the APZ, Noise Zones II & III, and within the 2-mile JLUS study area should be considered priority for preservation.

Land preservation around the Joint Base has thus far been a cooperative effort. Ocean and Burlington County have been working with the State Agriculture Development Committee (SADC), the Pinelands Commission, NAES Lakehurst, McGuire AFB and the local municipalities to preserve lands around the Joint Base.

Within New Jersey, the SADC administers the Farmland Preservation Program providing grants to counties, municipalities and nonprofit groups to fund the purchase of development easements on farmland; directly purchasing farms and development easements from landowners; and offering grants to landowners in the program to fund up to 50% of the cost of soils and water conservation projects. SADC preserves farmland by the purchase of development easements, the acceptance of a donation of development easements, the outright purchase of property, or an eight year provisional preservation.

Ocean and Burlington Counties have Comprehensive Farmland Preservation Plans that recommend preservation via mechanisms such as acquisition, clustering, noncontiguous clustering, lot-size averaging and transfer of development rights. The SADC approves these

County plans and is in the process of creating a Comprehensive Preservation State Plan. Under the Agriculture Retention and Development Act, one of the primary responsibilities of each County Agriculture Development Board is the adoption of Agriculture Development Areas (ADAs). Both Ocean and Burlington County have designated ADAs. The ADAs are designated areas where agricultural use is preferred and should be part of the consideration of the farmland preservation process around the Joint Base.

The SADC has begun hosting a yearly conference session to bring together DoD officials (from local military bases and regional offices) and state, county, and local preservation programs to assist in acquiring lands to create a buffer the military bases

Since 2007, NAES Lakehurst and McGuire AFB have received federal funds for land preservation and have been working with Ocean and Burlington Counties to preserve key lands near the Joint Base. The military works to partner with entities that will provide stewardship of lands for preservation.

These types of land preservation programs are often called Conservation Easements. Conservation easements can particularly effective because they advance the complementary goals of shifting future growth away from the installation, while protecting the environment, maintaining agriculture, and conserving open spaces and rural character. As part of this strategy, local governments explore partnerships with the military, State of New Jersey, and non-profit conservation entities to secure conservation easements or to purchase development rights from willing sellers of land in proximity to the Joint Base.

Preservation of Open Space

In New Jersey, the NJDEP Green Acres program purchases land to protect environmentally sensitive open space, water resources and other significant natural and historical open space. Land purchased by Green Acres becomes part of the statewide system of parks and forests, wildlife management areas and natural areas.

Green Acres also provides assistance to local governments and nonprofit organizations to develop parks and outdoor recreation facilities, urban wildlife preserves, and open space. Green Acres State Acquisition funds were recently used to acquire 246 acres in Manchester

Township, Ocean County. This addition to the Manchester Wildlife Management Area was preserved through a joint acquisition effort with the U. S. Navy and to provide for a protective buffer near NAES Lakehurst.

Significant Green Acres funding comes from the Garden State Preservation Trust. The Garden State Preservation Trust has been a successful program, saving open spaces, farmland, historical sites, parks and recreational lands in New Jersey. The trust catalyzed hundreds of New Jersey towns and counties to pass their own open space taxes, creating matching funds to preserve more local lands. As of 2009, long term funding for the trust is necessary to continue the aggressive preservation program.

Shared Natural Environment

The natural resources within the JLUS municipalities are considerable and should be protected. The Pinelands, wetlands, threatened and endangered species, streams, and aquifers of regional importance abound in the study area. Environmental impact studies should be performed as additional information on base missions becomes available to preserve the natural environment.

Many of the JLUS municipalities also rely on wells for their potable water. Testing a private well's water quality on a regular basis is an important part of maintaining a safe and reliable water source. The test results allow a homeowner to properly address any specific problems of a water supply. Testing of well waters helps to ensure that the water source is being properly protected from potential contamination, and that appropriate treatment is selected and operating properly.

In 2007, nearby Warren Grove gunnery range inadvertently started a forest fire during training procedures. Response time was critical and firefighting efforts incorporated military and civilian forces. Coordination and implementation of best management practices, including wildfire management and education, between the Joint Base and JLUS municipalities is necessary in preparation for timely response to unexpected emergencies. Established practices should be routinely evaluated for efficiency.

Joint Base Compatible Uses may also have Nuisance Factors

When considering compatible land uses for the Joint Base, farmland and open space are often the best choices to prevent encroachment concerns. In some cases, there is still the natural nuisance factor that comes into effect. These areas can attract various migratory and non-migratory wildlife species that can be hazardous to military operations. The BASH program (Bird Aircraft Strike Hazard program) is a military program that works to avoid aviation mishaps with wildlife. McGuire AFB uses peregrine falcons to clear the airspace of birds to reduce the risk of bird strikes. NAES Lakehurst incorporates the BASH program and is also involved in a process to change some of the local landscape, an old cranberry bog that attracts birds, into a wooded area that would be more compatible to its location by a NAES Lakehurst runway.

I - Natural Environment

I. Natural Environment

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1- 2 Years	3-5 Years	Ongoing
I-1	Preservation of Agriculture and Open Space		<p>Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation</p> <ul style="list-style-type: none"> Priority should be determined by location to Joint Base operations, development pressures, and integrity of farmland. 	X	X	X	X	X	<p><u>Lead:</u> Ocean & Burlington Counties Joint Base SADC Pinelands Commission</p> <p><u>Partners:</u> New Hanover Township, North Hanover Township, Pemberton Township, Plumsted Township Springfield Township</p>	X		
I-2	Preservation of Agriculture and Open Space		Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns					X	<p><u>Lead:</u> Ocean & Burlington Counties Joint Base SADC Pinelands Commission</p> <p><u>Partners:</u> New Hanover Township, North Hanover Township, Pemberton Township, Plumsted Township Springfield Township</p>	X		
I-3	Natural Environment (preserve available resources)		County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step				X		<p><u>Lead:</u> Ocean and Burlington County Health Departments</p> <p><u>Partners:</u> NJDEP Joint Base Project Managers</p>	X		X
I-4	Natural Environment (preserve available resources)		Continue environmental impact studies in communication with Joint Base as additional information on base missions becomes available and work with Steering Committee to address future issues for natural resources					X	<p><u>Lead:</u> Ocean and Burlington Counties Joint Base</p>		X	X

I. Natural Environment Continued

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
I-5	Natural Environment (shared natural environment)		Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities				X		Lead: Burlington County Ocean County Joint Base Partners: New Hanover Township, North Hanover Township, Pemberton Township, Plumsted Township Springfield Township		X	
I-6	Natural Environment (manage possible nuisance factors)		Distribute BASH Educational Materials to local farmers to promote awareness on reducing the potential for bird and wildlife attractions that may impede safe air operations.				X		Lead: Joint Base Partners: Burlington County Ocean County			
I-7	Trespassing of hunters and trappers encroaches upon Base		Develop trespass avoidance procedures with local governments and adjacent property owners				X		Lead: Burlington County Fort Dix		X	

J - Regional and State Planning Influences

Pinelands

The enactment of Pinelands Protection Act and the subsequent effects of the Comprehensive Management Plan have resulted in a growth-managed area in the proximity of the Joint Base boundaries.

The Pinelands Development Credit (PDC) program, a form of transfer of development rights (TDR), has helped to redirect growth from the Pinelands preservation areas into regional growth areas. The PDC program can be utilized to manage growth and preserve ecologically significant areas within the 2 Mile Study Area, which will further reduce potential future conflicts with base activities.

Conversely, some designated growth areas within the Pinelands Management Plan may be in conflict with Joint Base operations. A recommendation of this JLUS is that the Pinelands collaborate with the Joint Base and the JLUS municipalities to maintain local land compatibility. There are instances where the Pinelands Management Plan may plan for growth and there is conflict with Joint Base, either in designated noise zones or the APZ. The Pinelands should consider Figure 12.1, Residential Areas of Incompatible Zoning, as guidance for areas that are priority recommendations for residential rezoning.

In the Ocean County area a large number of increased flight operations are anticipated from NAES Lakehurst. While an updated AICUZ is a recommendation of this JLUS, it may not be timely to wait for the results when considering further residential development. Joint Base recommendations based on the anticipated impact of increased operations and the frequency and location of incoming residential complaints should be incorporated into consideration for the redefining or reconfiguring some Pinelands management growth areas.

One location-specific recommendation has been identified within Jackson Township. In the Township, a property known as the Clayton Sand Site is within the Pinelands Rural Development Area and has been zoned for low density residential development by the Township in accordance with the Pinelands management area designation. This part of Jackson Township is within the APZ and Noise Zone. Zoning of this area as light industrial rather than residential

would enable positive growth attributes and reduce potential for conflict associated with future residential growth. To the northeast of this area is the LUPZ; while residential lands are permitted in the LUPZ, the full effects of the anticipated increased mission are unknown. The Pinelands and Jackson Township should incorporate the Joint Base in the land use decision making process.

State Plan

State Planning Area designations for the JLUS municipalities will most likely have long term impacts to residential growth and infill development. As the cross acceptance process has not been completed, it is not certain how the Planning Areas and Centers may be changed for the next adopted plan. The County recommendations for Centers help to define areas that are regionally accepted as the proposed central cores of public and private services and community development areas.

The State Plan provides context, vision and a process to establish cooperative statewide planning so that local, regional and state plans are consistent. Through the State Plan process suitable locations for infrastructure, housing, economic growth and conservation are assessed.

The state planning rules establish a voluntary endorsement process. Endorsed plan entitles municipalities and counties to a higher priority for available funding, streamlined permit reviews, and coordinated state agency services. Priority is given to county and regional strategic plans.

The statewide Transfer of Development Rights (TDR) legislation requires that a municipality have had a petition for initial plan endorsement approved by the State Planning Commission in order for a TDR ordinance to take effect. The TDR ordinance and other materials required to be prepared by the Statewide TDR legislation can be submitted to the State Planning Commission along with the petition for initial plan endorsement.

The third round COAH Rules, which took effect in December 2004, required that municipalities obtain Initial Plan Endorsement within 3 years of receiving Third Round Substantive Certification. The rules were modified in 2008 so that Plan Endorsement is no longer required but is encouraged.

J. Regional and State Planning Influences

	Identified Issue	Level of Concern	Strategy	Location					Implementation Team	Schedule		
				APZ	Noise Zones II & III	LUPZ	2 Mile Study Area	JLUS Municipalities		1-2 Years	3-5 Years	Ongoing
J-1	Regional and State Planning Influences (Pinelands)		Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar nonresidential zone	X	X				<u>Lead:</u> Jackson Township Pinelands Commission <u>Partner:</u> Ocean County Joint Base	X		
J-2	Regional and State Planning Influences (Pinelands)		Utilize PDC program	X	X			X	<u>Lead:</u> Jackson Township Manchester Township Pemberton Township Plumsted Township Pinelands Commission	X		X
J-3	Regional and State Planning Influences (Pinelands)		Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible	X	X			X	<u>Lead:</u> Pinelands Commission Joint Base <u>Partner:</u> JLUS Municipalities Ocean and Burlington Counties			X
J-4	Regional and State Planning Influences (State Plan)		Apply for State Plan Endorsement to Establish TDR program					X	<u>Lead:</u> JLUS Municipalities Office of Smart Growth <u>Partners:</u> Ocean County Burlington County	X		

Jackson Township - Summary of Strategies

Jackson Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones.	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
	F-2	Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
Regional and State Planning Influences	J-1	Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar nonresidential zone	X	
	J-2	Utilize PDC Program	X	
	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X
	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Lakehurst Borough				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
	F-2	Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
	H-5	Improve Community Design for Base Entrances	X	
Regional and State Planning Influences	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X
	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Manchester Township - Summary of Strategies

Manchester Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
	H-5	Improve Community Design for Base Entrances	X	
Regional and State Planning Influences	J-2	Utilize PDC program	X	
	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X
	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Plumsted Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation		X
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns		X
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities		X
Regional and State Planning Influences	J-2	Utilize PDC program	X	
	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X

New Hanover Township - Summary of Strategies

New Hanover Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
	H-5	Improve Community Design for Base Entrances	X	
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation		X
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns		X
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities		X
Regional and State Planning Influences	J-4	Apply for State Plan Endorsement to establish TDR Program	X	

North Hanover Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation		X
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns		X
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities		X
Regional and State Planning Influences	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Pemberton Borough - Summary of Strategies

Pemberton Borough				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
Regional and State Planning Influences	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Pemberton Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
	F-2	Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience	X	
Economic Development	G-1	Develop JLUS Economic Development Subcommittee	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
	H-5	Improve Community Design for Base Entrances	X	

Pemberton Township - Summary of Strategies

Pemberton Township (continued)				
Issue	Issue ID	Strategy	Lead	Partner
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation		X
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns		X
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities		X
Regional and State Planning Influences	J-2	Utilize PDC program	X	
	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X
	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Springfield Township				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation		X
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns		X
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities		X
Regional and State Planning Influences	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Wrightstown Borough - Summary of Strategies

Wrightstown Borough				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination		X
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings		X
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements	X	
	C-2	Rezone or incorporate an overlay district for high conflict zoning areas as shown on Figure 12.2	X	
	C-3	Create an APZ Overlay Zoning District	X	
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District	X	
	C-5	Use Cluster Development Techniques and Planned Unit Development in LUPZ	X	
	C-6	Use of Noise Attenuation Techniques	X	
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-4	Establish Joint Base Priority Locations for Possible Acquisition		X
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)	X	
	E-5	Real Estate Joint Base Code supporting the neighboring military base adopted by municipalities	X	
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones		X
	F-2	Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience	X	
Economic Development	G-1	Develop JLUS Economic Development Subcommittee	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges		X
	H-4	Explore transit opportunities for military and civilians		X
	H-5	Improve Community Design for Base Entrances	X	
Regional and State Planning Influences	J-4	Apply for State Plan Endorsement to Establish TDR program	X	

Burlington County				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals	X	
	A-2	Create a Joint Base JLUS Implementation Committee	X	
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination	X	
	A-4	Determine when an updated JLUS is warranted	X	
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee	X	
	B-3	Increase dialogue and collaboration between Joint Base, business, and educational communities	X	
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
	B-5	Update JLUS website		X
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements		X
Noise and Safety	D-2	Make available either by website or by pamphlet voluntary noise attenuation options for home builders and existing homeowners	X	
	D-3	Update and Maintain Regional HUD Noise Map	X	
	D-4	Establish Joint Base Priority Locations for Possible Acquisition	X	
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders	X	
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues	X	
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program	X	
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)		X
Affordable Housing Development	F-2	Develop JLUS Housing and Community Development Subcommittee to address issues like availability of affordable housing and off-base military transience	X	
Economic Development	G-1	Develop JLUS Economic Development Subcommittee	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities	X	
	H-2	Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic within residential neighborhoods	X	
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges	X	
	H-4	Explore transit opportunities for military and civilians	X	
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation	X	
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns	X	
	I-3	County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step	X	
	I-4	Continue environmental impact studies in communication with Joint Base as additional information on base missions becomes available and work with Steering Committee to address future issues for natural resources	X	
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities	X	
	I-6	Distribute BASH Educational Materials to local farmers to promote awareness on reducing the potential for bird and wildlife attractions that may impede safe air operations		X
	I-7	Develop trespass avoidance procedures with local governments and adjacent property owners	X	

Burlington County - Summary of Strategies

Burlington County (continued)				
Issue	Issue ID	Strategy	Lead	Partner
Regional and State Planning Influences	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X

Ocean County				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals	X	
	A-2	Create a Joint Base JLUS Implementation Committee	X	
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination	X	
	A-4	Determine when an updated JLUS is warranted	X	
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee	X	
	B-3	Increase dialogue and collaboration between Joint Base, business, and educational communities	X	
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
	B-5	Update JLUS website		X
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements		X
Noise and Safety	D-2	Make available either by website or by pamphlet voluntary noise attenuation options for home builders and existing homeowners	X	
	D-3	Update and Maintain Regional HUD Noise Map	X	
	D-4	Establish Joint Base Priority Locations for Possible Acquisition	X	
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders	X	
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues		X
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program		X
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas	X	
	E-4	Real Estate Transfer of Ownership Disclosure (by Ordinance or other mechanism)		X
Economic Development	G-1	Develop JLUS Economic Development Subcommittee	X	
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities	X	
	H-2	Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic within residential neighborhoods	X	
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges	X	
	H-4	Explore transit opportunities for military and civilians	X	
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation	X	
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns	X	
	I-3	County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step	X	
	I-4	Continue environmental impact studies in communication with Joint Base as additional information on base missions becomes available and work with Steering Committee to address future issues for natural resources	X	
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities	X	
	I-6	Distribute BASH Educational Materials to local farmers to promote awareness on reducing the potential for bird and wildlife attractions that may impede safe air operations		X

Ocean County - Summary of Strategies

Ocean County (continued)				
Issue	Issue ID	Strategy	Lead	Partner
	J-1	Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar nonresidential zone		X
Regional and State Planning Influences	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible		X
	J-4	Apply for State Plan Endorsement to Establish TDR program		X

Joint Base				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
	A-3	Develop Orientation and Procedures manual for incoming military and civilian officials to coordinate long term efforts and coordination	X	
	A-4	Determine when an updated JLUS is warranted		X
Communication/Coordination	B-1	Designate Joint Base planner(s) for continued representation at Municipal Planning Board Meetings	X	
	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-4	Develop & Maintain a JLUS website link on Municipal, County and Military Website	X	
	B-5	Update JLUS website	X	
Land Use Approval Process	C-1	Revision of municipal Master Plans to include Joint Base missions and APZ and noise zones. At a minimum, the Joint Base should be incorporated into the Land Use Plan and Housing Elements		X
	C-3	Create an APZ Overlay Zoning District		X
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District		X
	C-7	Use Zoning Ordinances to impose height restrictions in key Joint Base runway areas	X	
Noise and Safety	D-1	Determine Comprehensive Joint Base Impacts by Performing an updated AICUZ and ICUZ	X	
	D-2	Make available either by website or by pamphlet voluntary noise attenuation options for home builders and existing homeowners	X	
	D-4	Establish Joint Base Priority Locations for Possible Acquisition	X	
	D-5	Prepare forms of Fee Simple and Life Estate Acquisition in consultation with Stakeholders	X	
Community Development	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas		X
Economic Development	G-1	Develop JLUS Economic Development Subcommittee		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities	X	
	H-2	Examine Alternative Routing Measures to offset County Road Closures and Military thru traffic within residential neighborhoods	X	
	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges	X	
	H-4	Explore transit opportunities for military and civilians	X	
	H-5	Improve Community Design for Base Entrances	X	
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation	X	
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns	X	
	I-3	County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step		X
	I-4	Continue environmental impact studies in communication with Joint Base as additional information on base missions becomes available and work with Steering Committee to address future issues for natural resources	X	
	I-5	Implement best management practices, including wildfire management, dust and bird control, to offset possible effects to Joint Base and JLUS municipalities	X	
	I-6	Distribute BASH Educational Materials to local farmers to promote awareness on reducing the potential for bird and wildlife attractions that may impede safe air operations	X	
	I-7	Develop trespass avoidance procedures with local governments and adjacent property owners	X	

Joint Base - Summary of Strategies

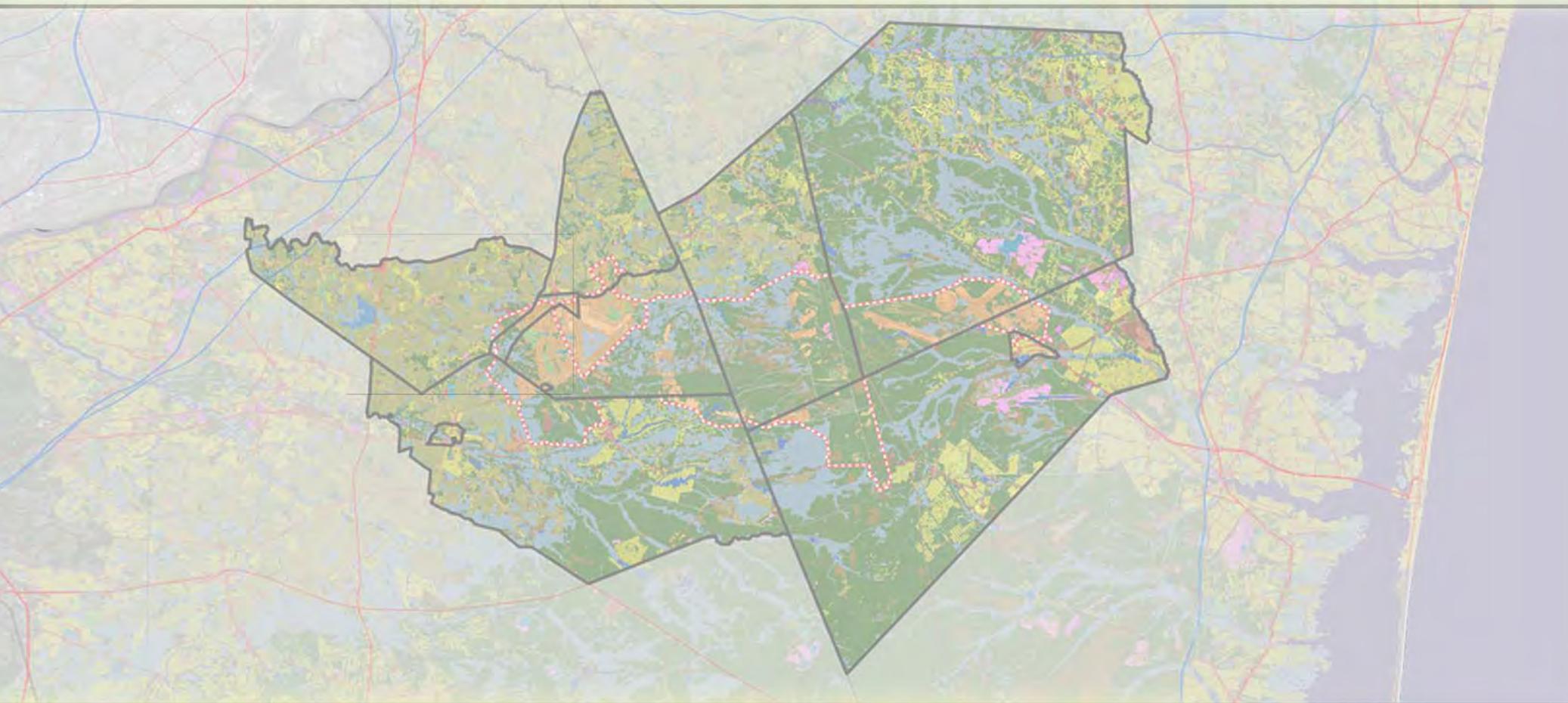
Joint Base (continued)				
Issue	Issue ID	Strategy	Lead	Partner
	J-1	Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar nonresidential zone		X
Regional and State Planning Influences	J-2	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible	X	

Pinelands Commission				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee		X
Land Use Approval Process	C-3	Create an APZ Overlay Zoning District		X
	C-4	Create a Noise Zone/AICUZ Overlay Zoning District		X
Community Development	E-1	Develop JLUS Housing and Community Development Subcommittee to address incoming military issues		X
	E-2	Incorporate JLUS Municipal Transfer of Development Rights Program		X
	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation	X	
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns	X	
Regional and State Planning Influences	J-1	Rezone Clayton Sand Site from RD-9 (residential) to Light Industrial or similar nonresidential zone	X	
	J-2	Utilize PDC program	X	
	J-3	Re-evaluate obligations and zoning requirements for Pinelands Management Areas that may require housing obligations in areas determined to be incompatible	X	
SADC				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee		X
Natural Environment	I-1	Continue to Establish Joint Base Priority Locations for Farmland and Open Space Preservation	X	
	I-2	Implement County and Municipal farmland and open space preservation plans; continue development rights acquisition mechanisms, (including TDR), mitigate property owner equity concerns	X	
NJDEP				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
Community Development	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities	X	
Natural Environment	I-3	County Health Departments should work with Joint Base NJDEP project managers to perform locally known contaminant testing of local wells as a precautionary step		X

State and Federal Agencies - Summary of Strategies

DCA Office of Smart Growth				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee		X
Community Development	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas		X
Infrastructure	H-1	Further analyze wastewater solutions for JLUS Municipalities		X
Natural Environment	J-4	Apply for State Plan Endorsement to Establish TDR program and COAH certification	X	
Department of Military and Veterans Affairs				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
	A-2	Create a Joint Base JLUS Implementation Committee		X
Communication/Coordination	B-2	Create a Joint Base JLUS Implementation Committee		X
	B-3	Increase dialogue and collaboration between Joint Base, business, and educational communities	X	
Community Development	E-3	Municipalities seeking to preserve land in buffer area through TDR require sewer service in receiving areas		X
DoD OEA/AAFES				
Issue	Issue ID	Strategy	Lead	Partner
JLUS Review & Ongoing Support	A-1	Execution of a charter that addresses the needs of all participants and defines future participation and goals		X
Economic Development	G-1	Develop JLUS Economic Development Subcommittee		X
NJDOT/NJTransit				
Issue	Issue ID	Strategy	Lead	Partner
Infrastructure	H-3	Develop Military traffic routing plan and evaluate weight tolerances due to weight loads of military vehicles on local roads and bridges	X	
	H-4	Explore transit opportunities for military and civilians	X	
COAH				
Issue	Issue ID	Strategy	Lead	Partner
Affordable Housing Development	F-1	Reduce JLUS municipalities low-moderate income COAH obligations by removing lands that are within APZ and noise zones	X	

Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington



Section 13.1 - List of Acronyms

AASF	Army Aviation Support Facility
ADNL	A-weighted Day-Night Noise Level
AFB	Air Force Base
AICP	American Institute of Certified Planners
AICUZ	Air Installation Compatible Use Zone
AIMD	Aircraft Intermediate Maintenance Department
ALZ	Assault Landing Zone
ANG	Air National Guard
ANSI	American National Standards Institute
AMC	Air Mobility Command
AMW	Air Mobility Wing
API	Aircraft Platform Interface
APZ	Accident Potential Zone
AR	Army Regulation
ARB	Air Reserve Base
ARFC	Air Force Reserve Command
ARW	Air Refueling Wing
ASD	Aviation Supply Division
AW	Airlift Wing
BAH	Basic Allowance for Housing
BASH	Bird Aircraft Strike Hazard
BOS	Base Operating Support
BRAC	Base Realignment and Closure
CALASSES	Carrier Aircraft Launch and Support Systems Equipment Simulator
CDNL	C-weighted Day-Night Noise Level
CDPT	Compatible Development Planning Team
CDR	Commander
CEC	Civil Engineer Corps
CFR	Code of Federal Regulations
CLTF	Consolidated Logistics and Training Facility

CMP	Pinelands Comprehensive Management Plan
CNIC	Commander, Navy Installations Command
COAH	Council on Affordable Housing
Col.	Colonel
CRW	Contingency Response Wing
CZ	Clear Zone
DA	Department of the Army
dB	Decibels
dBA	A-weighted Decibel
dBc	C-weighted Decibel
dBp	Decibel, Unweighted (Peak)
DNL	Day-Night Average Noise Level
DNMRL	Onset Rate-adjusted Monthly Day-Night Level
DoD	Department of Defense
DOT	Department of Transportation
DPW	Department of Public Works
DVRPC	Delaware Valley Regional Planning Commission
EA	Environmental Assessment
Ed.D	Doctor of Education
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMALS	Electromagnetic Aircraft Launching System
EMTF	Expeditionary Mobility Task Force
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHA	Federal Highway Administration
FICAN	Federal Interagency Committee on Aircraft Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FONSI	Finding of no significant impact

Section 13.1 - List of Acronyms

FORSCOM	US Forces Command
GIS	Geographic Information Systems
GPD	Gallons per Day
GW	Groundwater
HE	High Explosive Round
HMH-772	Marine Heavy Helicopter Squadron 772
HMLA-775	Marine Light Attack Helicopter Squadron 775
HQDA	Headquarters, Department of the Army
HUD	Department of Housing and Urban Development
ICUZ	Installation Compatible Use Zone
IOC	Interim Operational Capability
IONMP	Army's Installation Operational Noise Management Plan
JLUS	Joint Land Use Study
JRB	Joint Reserve Base
JSF	Joint Strike Fighter
LEQ	Equivalent level
LITR	Low-noise Training Round
LTC	Lieutenant Colonel
Lt. Col	Lieutenant Colonel
LUPZ	Land Use Planning Zone
MAG-49	Marine Air Group 49
MLRS	Multi-Launch Rocket System
mm	Millimeter
MOA	Military Operating Area
mph	Miles per Hour
MWSS	Marine Wing Support Squadron
MUA	Municipal Utilities Authority
NAEC	Naval Air Engineering Center
NAES	Naval Air Engineering Station
NAS	Naval Air Station
NASJRB	Naval Air Station Joint Reserve Base
NATF	Naval Air Test Facility
NAVAIR	Naval Air Systems Command

NAWC	Naval Air Warfare Center
NAWCADLKE	Naval Air Warfare Center Aircraft Division Lakehurst
NCA	Noise Control Act of 1972
NCO	Non-commissioned Officer
NCP	Noise Compatibility Program
NEM	Noise Exposure Map
NEPA	National Environmental Policy Act
NJAC	New Jersey Administrative Code
NJARNG	New Jersey Army National Guard
NJDEP	New Jersey Department of Environmental Protection
NJNG	New Jersey National Guard
NJPDES	New Jersey Pollution Discharge Elimination System
NJTPA	North Jersey Transportation Planning Authority
NLR	Noise Level Reduction
NOSC	Naval Operations Support Center
NZ	Noise Zone
ODEP	Office of the Director of Environmental Programs
OEA	Office of Economic Adjustment
ONAC	Office of Noise Abatement and Control
OSHA	Occupational Safety and Health Act
PAO	Public Affairs Office
PATCO	Port Authority Transit Corporation
PDC	Pinelands Development Credit
PE	Professional Engineer
PP	Professional Planner
PPA	Pinelands Preservation Area
ppsm	Persons per Square Mile
PS&S	Paulus, Sokolowski, and Sartor, LLC
RAICUZ	Range Air Installation Compatible Use Zone
RALS	Runway Arrested Landing Site
RCO	Range Control Officer
Ret	Retired
RMC	Registered Municipal Clerk

RWPA	Water Resource Planning Areas
SADC	State Agriculture Development Committee
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SARNAM	Small Arms Range Noise Assessment Model
SEL	Sound Exposure Level
SEPTA	Southeastern Pennsylvania Transportation Authority
ppsm	Persons per Square Miles
SLUCM	Standard Land use Classification Manual
SW	Surface Water
TDR	Transfer of Development Rights
TWA	Treatment Works Approval
USACHPPM	US Army Center for Health Promotion and Preventive Medicine
USAF	United States Air Force
USAR	US Army Reserve
U.S.C.	United States Code
USN	United States Navy
USNR	United States Navy Reserve
UTES	Unit Training Equipment Site
VA	Veterans Administration
VR-52	Fleet Logistics Support Squadron 52
VR-64	Fleet Logistics Support Squadron 64
WMA	Watershed Management Areas
WMP	Wastewater Management Plan
WQMP	Water Quality Management Plan
XO	Executive Officer
ZOI	Zone of Influence

Section 13.2 - References

Section 13.2 - References

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Section 13.3 - Policy Committee Meeting Minutes

Meeting Minutes

**Joint Land Use Study (JLUS)
Policy Committee Meeting
Burlington County Institute of Technology, Medford, NJ
October 22, 2007**

In attendance were the following:

As Policy Committee Members:

Stephen F. Childers, Mayor, Lakehurst Borough – Ocean County
Tim Borsetti, Councilman (Designee), Lakehurst Borough – Ocean County
Dan Burke, Township Engineer (Designee), Jackson Township – Ocean County
Robert Hardy (Designee), Plumsted Township – Ocean County
Dennis Roohr, Mayor, New Hanover Township – Burlington County
Louis DeLorenzo, Mayor, North Hanover Township – Burlington County
David Patriarca, Mayor, Pemberton Township – Burlington County
William H. Pettit, Sr., Mayor, Springfield Township – Burlington County
Thomas E. Harper, Mayor, Wrightstown Borough – Burlington County
Susan Grogan, Chief Planner, New Jersey Pinelands Commission

As Ex-Officio Policy Committee Members:

Richard T. Dean, Community Planner - McGuire Air Force Base
R. Eric Raaum, PE, Senior Planning Engineer - Lakehurst Naval Air Engineering Station
Dennis Blazak, Chief Environmental Engineer - Lakehurst Naval Air Engineering Station
Stacy Grillo, New Jersey Office of Smart Growth
Timothy Brill, Planning Manager, New Jersey State Agriculture Development Committee
James J. McSorley, Director-Public Policy, Christopher H. Smith, United States Congressman
John Leigh, Project Manager, United States DOD/Office of Economic Adjustment

As an Interested Party:

Emil Kaunitz, President - Friends of Navy Lakehurst

As JLUS Project Coordination:

David J. McKeon, Planning Director – Ocean County
Anthony M. Agliata, Assistant Planning Director – Ocean County
John R. Brown, Assistant Planner - Ocean County
Mark Remsa, Director – Economic Development & Regional Planning – Burlington County
David Hojsak, Principal Planner - Economic Development & Regional Planning – Burlington County

The Salute to the Flag signaled the beginning of the meeting.

On behalf of the Burlington and Ocean County Freeholders, David McKeon, Ocean County Planning Director, announced the Welcomed and Called the Meeting to Order. Each attendee introduced themselves and the entity they represented (See Above.).

Mark Remsa, Burlington County's Director of Economic Development and Regional Planning, presented an Overview of Study's Goals and Objectives. The Role of the Policy Committee was addressed by David McKeon. And John Leigh, Project Manager, from the US Department of Defense/Office of Economic Adjustment gave an overview of JLUS's from the National Perspective.

The specific components of Fort Dix/McGuire AFB/NAES Lakehurst study was presented by David McKeon and included:

- Role of the Consultant
- Draft Request for Proposal
- Designation of Working Committee Participants

Mark Remsa addressed the Next Steps for the JLUS. This was followed by a Question and Answer period.

The next Policy Committee Meeting will be scheduled sometime late in January 2008.

The meeting was adjourned.

**Meeting Minutes
Joint Land Use Study (JLUS)
Policy Committee Meeting
NAES Lakehurst, NJ
January 29, 2008**

Attendance was as follows:

Policy Committee Members:

Dan Burke, Township Engineer (Designee), Jackson Township – Ocean County
Michael Fressola, Mayor, Manchester Township – Ocean County
Robert Hardy (Designee), Planning Bd., Plumsted Township – Ocean County
Dennis Roohr, Mayor, New Hanover Township – Burlington County
James Durr (Designee), Committeeman, North Hanover Township – Burlington County
Thomas E. Harper, Mayor, Wrightstown Borough – Burlington County
Peter Sobotka (Designee), Deputy Mayor of Springfield Township – Burlington County
Susan Grogan, Chief Planner, New Jersey Pinelands Commission
John P. Kelly, Freeholder – Ocean County
Joseph Donnelly, Deputy Freeholder Director - Burlington County

Ex-Officio Policy Committee Members:

Richard T. Dean, Community Planner - McGuire Air Force Base
R. Eric Raaum, PE, Senior Planning Engineer - Lakehurst Naval Air Engineering Station
Dennis Blazak, Chief Environmental Engineer - Lakehurst Naval Air Engineering Station
Stacy Grillo, Planner - New Jersey Office of Smart Growth
Timothy Brill, Planning Manager, New Jersey State Agriculture Development Committee
Ellen Stein, Director, New Jersey Dept of Military & Veterans Affairs
Pidge Carroll, District Director - Christopher H. Smith, United States Congressman
John Leigh, Project Manager, United States DOD/Office of Economic Adjustment

Other Interested Parties:

Capt. J.C. Harding, Executive Officer, U.S. Navy, NAES Lakehurst
Geoffrey Urbanic, Administrator, New Hanover Township – Burlington County
Glen McComas, Councilman, Lakehurst Borough – Ocean County
Sid Hooper, Councilman, Lakehurst Borough – Ocean County
Heidi Hinz, GIS Program Analyst - Lakehurst Naval Air Engineering Station,
Emily Previti, Reporter, Atlantic City Press

JLUS Staff Coordinators:

David J. McKeon, Planning Director – Ocean County
Anthony M. Agliata, Assistant Planning Director – Ocean County
David Hojsak, Principal Planner - Economic Development & Regional Planning – Burlington County
John R. Brown, Assistant Planner - Ocean County
Erika Stahl, Planner Trainee – Ocean County

At 7:00 p.m., the meeting opened with a Salute to the American Flag.

Captain J.C. Harding made the opening comments. He thanked and gave appreciation for using Lakehurst base as the host site for the meeting, and thanked Chef Ian and his Ocean County Technical Vocational School students for preparing the meal. He also thanked the JLUS Policy Committee for working cooperatively and for making sure all the parties' interests were taken into account. He was also impressed by the 240 acres that were accrued recently through the Farmland Preservation program around Lakehurst Base to create a buffer between the base and civilian uses.

Freeholder John P. Kelly (Ocean County) and Deputy Freeholder Director Joseph Donnelly (Burlington County) did a formal introduction and opened up the meeting. Deputy Freeholder Director Donnelly asked all present to formerly introduce themselves.

Dinner was served, followed by a short intermission.

Meeting Minutes
Joint Land Use Study (JLUS)
Policy Committee Meeting
NAES Lakehurst, NJ
January 29, 2008

David McKeon reconvened the meeting after the intermission. He covered a discussion about the consultant selection process and the consultant recommendation. He stated that approximately 50 companies requested information regarding the RFP and 8 qualified responses came in. Mark Remsa, David McKeon, Anthony Agliata, Thomas E. Harper, and Robert Hardy (Consultant Selection Review Committee) reviewed the proposals and choose their top three favorites independent of each other. They then sat down and discussed their choices and chose the top three consultants they felt collectively would do a thorough and excellent job with the Joint Land Use Study. Interviews were then held last week and the top consultant was chosen. The proposal amount they are seeking has not been looked at yet, but that is the next step. Financial negotiation will be taking place shortly, and then the consultant team recommendation will be given to the Ocean County Board of Chosen Freeholders for final approval. PS&S was chosen as the recommended consultant based on the fact that they are offering to gather and complete all information that is not yet made. A benefit, other consultants did not cover.

The meeting was opened up to questions regarding new information:

David Hojsak thanked Ocean County for including Burlington County in the consultant selection process.

Dan Burke asked whether the proposal followed the recommendations made during the last Policy meeting: finding a local firm with NJ Planning Knowledge, military background, and past experience with other Joint Land Use Studies.

David McKeon commented that those recommendations were used to select the consultant and were part of the Request for Proposals (RFP).

Peter Sobotka asked for a time line for the study. David McKeon responded by stating that a rough estimate schedule is to get the consultants put on the Ocean County Freeholder agenda for their February 20th meeting. Then have a start date in March for the Consultant. He also suggested that the next JLUS Policy Committee meeting should be scheduled for March 31st. At this meeting the consultant will be introduced and pertinent information regarding contacts and other useful information will be given to the consultant. March should be the time for the consultant to be introduced to contacts and start their public outreach process. The Department of Defense (DOD) requires 3 rounds of public outreach meetings but that can be negotiated with the consultant. The Consultant will also develop an interactive website for the public.

Peter Sobotka asked if the consultant was familiar with the State Process. David McKeon responded that was part of the RFP criteria that the consultant needed to meet.

Peter Sobotka asked if the consultant was familiar with the New Jersey Council on Affordable Housing (COAH) process. David McKeon responded that they had as much knowledge as everybody else did, and whatever they don't know they'll have to learn.

David McKeon then asked for the base officials to give information about any new updates they have regarding their bases and the JLUS if they choose.

Richard Dean spoke for the McGuire Air Force Base. He stated that about \$3 million was granted to the Air Force from DOD and of the 3 million granted; \$1 million was slated for the Air Force planning department for the acquisition of property rights for properties lying in the buffer zone. The New Jersey Pinelands have also identified some properties in the buffer zone as properties that should be acquired as well, which will add more money for acquiring properties.

Meeting was adjourned at 8:15pm.

Meeting Minutes prepared by:
Erika Stahl, Planner Trainee – Ocean County

Fort Dix/McGuire AFB/Lakehurst NAES
Joint Land Use Study
3rd Policy Committee Meeting
Burlington County Vocational Institute
March 31, 2008

Minutes

Mark Remsa, Burlington Economic Development and Regional Planning Director, and David McKeon, Ocean County Planning Director, opened up the meeting at 6:45pm. Mark Remsa asked the Joint Land Use Study Policy Committee to introduce themselves.

The Dinner Intermission was taken at 6:50pm.

The video, "Base Next Door", was played from 7:15pm to 7:30pm.

David McKeon informing the Policy Committee that the consultant chosen was approved by the Ocean County Board of Chosen Freeholders and they came in under budget. He then introduced Elizabeth McLoughlin, principle in charge for the consultant Paulus, Sokolowski and Sartor, LLC (PS&S).

Elizabeth McLoughlin gave a broad overview of the key players of the three consultants, PS&S, Sabre Systems, and HR&A. She explained that PS&S would be working with the civilian aspect of the study, Sabre Systems with the military analysis, and HR&A the economic analysis. PS&S is the lead consultant so they will be in charge of making sure the study comes together.

The goals of the study is to identify any encroachment issues, encourage cooperative land use planning, identifying compatible and incompatible land uses, and forge relationships between the civilian and military entities. This relationship should continue after the study and be actively involved in making decisions in the best interests of the population represented by the study entities.

Elizabeth McLoughlin stated that the bulk of the study is the data collection. The key is to gather GIS data and maps, so that it can be forged into comprehensive database of existing conditions and serve as the foundation for the study. This will include environmental data. Other data that should be included is infrastructure. Key questions to ask relating to infrastructure are, "Where is it located and where is it planned for?" Once all the data is gathered, the real planning can begin.

The next step after the information is gathered is to analyze the economic impact of the current situation. The data gathered and economic analysis will then be used to make recommendations for the future land use planning and set a stage for ongoing communication for all the entities involved long after the study has been completed.

Public involvement is a large part of the study. The interactive website will be a huge component in incorporating the public into the study. The public will be informed of meetings via brochures, public notice, and the website. Public meetings will be held in both Ocean and Burlington Counties.

The website will also be used as a tool to gather information from the Policy and Technical Committees and be used to keep all members informed about meeting dates and contact information.

Elizabeth McLoughlin discussed PS&S's timeline for the study. April is the first month in the data-collection process. The goal is to have all the data collected by June so that the current situation can be mapped. This will be helpful in depicting the current situation, as well as compatible and incompatible land uses to the public. Early July has been projected for the first public meeting, so that the public can have input and be informed about the study.

Once all the study entities' positions and conflicts have been identified the recommendations for future land use planning will be made. These recommendations will be developed and approved by the Policy Committee.

Sabre Systems will be investigating what the military's (as a whole) and each military base's position is, as well as gathering data from the military. Data that will be collected from the bases include Air Installations Compatible Use Zone (AICUZ) studies, AICUZ noise contours, explosive arcs, electromagnetic radiation contours, community complaint logs, operational mitigation measures, and Installation Natural Resource Management Plans. Particular noise contours and explosive arcs that will impact off-base locations will be assessed the most. New base activities and how they will impact the surrounding municipalities will also be assessed.

Municipality, county, and state data is important in the understanding of current and future land uses. Data requests for the community are as following: County and Municipal Master Plans, existing and proposed infrastructure data, approved developments, developments in progress, designated redevelopment areas, up-to-date zoning ordinances and building codes, and contacts for the municipal interview process.

This study is important to the local and state economy. There was 5 billion dollars in state-based military spending in 2002, as stated by a Rutgers, The State University study. These 5 billion dollars are broken down into 1.6 billion dollars in payroll spending and 3.4 billion dollars in military contracts. Civilians comprise a third of military on-base jobs. These jobs are well paying, and in fact yielded 30% above the statewide average. Off-base military spending contributed to more than 21,000 jobs and 1.3 billion dollars of payrolls of firms operating in the state. The multiplier affect from military spending contributed to over 90,000 jobs with 3.6 billion dollars in payroll.

This study should be looked at as an opportunity to forge relationships between the civilian side and the military. It should be thought of as a new opportunity to work together, raise public awareness, identify areas of concern, and open communication between all parties involved. The goal is to improve the quality of life and not compromise the quality of life. The study will also help prepare communities for future compatible growth, and maintain economic viability.

Elizabeth McLoughlin introduced Brandi Bartolomeo, PS&S Joint Land Use Project Manager, to further discuss the data that is needed and the process to get information to the consultant.

Brandi Bartolomeo introduced the File Transferable Portal, FTP for municipalities and the counties to submit files. She explained how to transfer files into it. Brandi stated that she would take any files in GIS format or any other format. Hard copies that have been scanned will also work. The goal is to create data layers to create a seamless map. Brandi asked the municipalities to drop off their master plans and designate individuals for the upcoming municipality interviews.

The FTP site is being used to make a "Green" Joint Land Use Study, especially since there will be a lot of data being shared. Brandi informed the Policy Committee that the following data should be dropped off: Municipal and County Master Plans, existing and proposed infrastructure data (such as roadways, water supply information, waste water, and utilities, zoning, designated open space, and Publicly Funded Capital and Infrastructure Improvements), approved developments, developments in progress, designated redevelopment areas, municipal zoning ordinances, building codes, and a list of officials to interview.

The Joint Land Use Study website will be created shortly for Policy Committee members viewing only. This will include a list of all the members and their contact information, meeting minutes, future meeting dates, and agendas. In the future Brandi Bartolomeo will upload an interactive map onto the website to visually demonstrate the progress of the study. This will work well as the public becomes more involved. The map will allow concerned citizens to view their home and how it relates to the study. Brandi then opened up the meeting for questions regarding the data collection process and the FTP site.

Mark Santilli, Fort Dix Army Master Planner, shared the fact that he would love to share information with the public but security of the data is a main issue. A lot of the data that the Fort Dix Army Base Planning Department does is interesting, but if shared would put soldiers at risk. There are ammunition locations, remote soldier areas outside the fence, and vehicle storage areas that need to be kept safe.

Elizabeth McLoughlin responded by stating the bases are absolutely not supposed to upload their information onto the FTP site. We are asking the municipalities to upload their data. Sabre Systems will collect the military information.

Bret Gordon, Project Manager from Sabre Systems, applauded Mark Santilli for asking the question and opening up dialect. Mark Santilli stated that the man who tried to compromise Fort Dix was recently sentenced. Bret Gordon continued by stating that Sabre Systems wants to know what is considered sacra or sank, or what you would not like to share. The bottom line is that this is a product of what is put in. The study will only be as good as the information that you will give us. We will work with anything and everything that you will give us. A way to figure out what kind of information to share is to find out what sister installations have shared in past Joint Land Use Studies. Some have been more open than others, most likely dependant on their mission. We understand that the Army Base, Air Force Base, and Navy Base will all have different information to share. Brandi and Elizabeth will act as liaison for the civilian side, while Sabre Systems will be the liaison for the military side. The goal is to meld the two sides together.

Brandi Bartolomeo stated that whatever effects off base, or outside the base boundaries, will be taken care of by PS&S.

Bret Gordon continued by stating that we want you to make noise. We want you to have the ability to complete your mission. We want the civilians to be made aware of that noise potential and of the sound study so that if they are building in the area that the builders or house owners can add sound attenuation products. The real estate agents will play a big role because they have to communicate what you want them to know for people buying houses in that area. We don't want this Joint Land Use Study to be like the Naval Air Station Oceana, Virginia Joint Land Use Study since they are the poster child of how not to do this kind of study. The base and surrounding communities did not work corporately together and dragged their feet. After many years of not making any progress they have learned their lesson, and know have to backtrack to get the process restarted. We do not want to put the military or the local communities in this circumstance. We should feed off of each other in a continuous basis so that the product given to you next March will be a dynamic document. It will be a snap shot in time, but a document that will bridge the civilian side and the military side. It should be used as a reference in ten years from now, even though everybody would have grown exponentially.

One of the mayors asked if the study would make recommendations for their Master Plans.

Elizabeth McLoughlin answered by stating "generally we are going to incorporate your master plans with the Counties' Master Plans to identify where this natural buffer needs to be around the base. We are going to identify locations where master plans show development is going to occur but the military base states that an incompatible use will or is occurring adjacent to that chosen location. That information will be shared so everybody can make informed decisions.

Bret Gordon stated that the study would make recommendations. The study is a snap shot of the current circumstance, however it is developing a process of communication so that if the municipalities' needs changes or the military missions expand or shrink everybody will know it and be able to react to it. We want instant communication for all parties. We will make a recommendation for 2009 but more importantly you will have a process to move forward with, so that in 2019 you will have the same open communication.

Elizabeth McLoughlin stated, "It's your master plan, and essentially we are informing you with information. You can use this information to create a more informed master plan."

Bret Gordon asked John Leigh to discuss a JLUS that is still going on now.

John Leigh, Department of Defense Office of Economic Growth Project Manager, discussed the Fort Bragg/Pope Base study in North Carolina that is still continuing today. He stated that the initial study was done 10 years ago, and an update was done in 2003. The JLUS committee recently requested to do a further study due to changes in operations, which identified new problems. In years past the study was paid for by the Department of Defense and the municipalities were left to their own devices to implement the recommendations. Now the Department of Defense Office of Economic Adjustment can and will help with the assistance in implementing the recommendations made by the Joint Land Use Study, as well as assist with further studies if need be.

David McKeon stated that planning is very uncertain especially with the state plan and the change in the wastewater rules, etc. This is a dynamic time in New Jersey. One thing that this study does is that it brings the state agencies together with the local municipalities, counties, consultant team, and the military bases so that we can work together in a coordinated fashion. It's a huge undertaking. The problem with the state plan is that it tries to solve problems on a large scale, however Newark is very different from Salem County. This study gives us a very focused area with a lot of similarities. We are going to work together knowing that there are going to be changes in the future and promises made in the past that did not come to fruition. We are aware that there are changes coming such as the wastewater rules. Where there are recommendations that come out of the study, we will work to make sure that they are justified.

David McKeon announced the first Technical Committee date for April 17, 2008. It's a group comprised of the Policy Committee's members or their staffing level professionals, such as engineers, planners, or consultants. The meeting will be in Plumsted at 10a.m., since it is a central location. The interviewing process has been brought up by the consultant and is what made this consultant stand out from the others. They feel that is important to meet one-on-one with the municipalities to find out what is going on in your town, what has worked and what hasn't worked. You may want to invite your council members, engineers, planners, etc.

Captain J.C. Harding, Lakehurst Naval Air Engineering Station Commanding Officer, asked the following question. How will the study continue in the future? What county will be in charge?

David McKeon stated that one-way or another the committee will be kept up. The database will be maintained without a consultant.

Bret Gordon stated, "a process that will nurture the study will be recommended." The website will be maintained for one year after the study ends.

John Leigh stated that some studies created a committee that meets on an annual basis to make recommendations and update information. Each study is different and in the beginning the committee might meet more often and then taper off to larger chunks of time in between meetings. The point of the committee is to look at the recommendations and the need for further study or changes. The most important point is to continue the dialogue.

Bret Gordon stated that this JLUS is unique because it encompasses three military branches, two counties, and ten municipalities. This is an opportunity for communities to talk to each other as well as the military bases. Everybody will have an opportunity to learn from each other and might find new ways to make their communities function better from shared information. The true beneficiaries will be the municipalities and the catalyst will be the military bases.

Mark Remsa stated that the commanders move on every 2 to 3 years. He wants, as well as some Mayors, a manual for new commanders that details what has been agreed upon in the Joint Land Use study so that it will live on in the military. There is an ongoing process that they need to learn about and be a part of.

Bret Gordon stated that it is true that commanders move on every few years, but they do have a civilian staff that remain constant. They are the ones that provide the expertise year in and out and are important to have communication with. The continuity will be continuing with the civilian staff. The commanders should keep on top of the study but it is the civilian staff that will be here year in and out. It is important to continue that relationship with them.

It was also brought up by Mark Santilli that the Army and Navy have the National Guard that owns their own real property on Fort Dix. They do not answer to the Fort Dix commander but their own commander.

Bret Gordon has stated that they will be brought on board as well.

David McKeon again reminded the policy committee to designate members to the Technical Committee.

David McKeon adjourned meeting at 8:25

Policy Committee Attendance:

Anthony M. Agliata, Assistant Planning Director, Ocean County Planning Department
Tim Brill, Planning/Program Manager, NJ State Agriculture Development Committee
Chester Broccoli, Chairman of the Land Use Board, Plumsted Township
John R. Brown, Assistant Planner, Ocean County Planning Department
Daniel J. Burke, Township Engineer, Jackson Township
Michael Georgalas, GIS Specialist II, Ocean County Planning Department
Susan Grogan, Chief Planner, NJ Pinelands Commission
Thomas E. Harper, Mayor, Wrightstown Borough
David J. Hojsak, Principal Planner, Burlington County Economic Development & Regional Planning
Sidney Hooper, Council Member, Lakehurst Borough
Glenn McComas, Council Member, Lakehurst Borough
David J. McKeon, Planning Director, Ocean County Planning Department
David A. Patriarca, Mayor, Pemberton Township
William H. Pettit, Sr., Mayor, Springfield Township
Mark Remsa, Director, Burlington County Economic Development & Regional Planning
Dennis Roorh, Mayor, New Hanover Township
Peter Sobotka, Deputy Mayor, Springfield Township
Erika F. Stahl, Planner Trainee, Ocean County Planning Department
William T. Stewart, Supervising Administrative Analyst, Burlington County
Diane P. Stinney, Council President, Pemberton Township

Ex-Officio Committee Attendance:

Greg Bury, Environmental Engineer, Lakehurst Naval Air Engineering Station
Pidge Carroll, District Director, United States Congressman Christopher H. Smith, 4th district
Richard T. Dean, Community Planner, McGuire Air Force Base
Capt. J.C. Harding, Executive Officer, Lakehurst Naval Air Engineering Station
John Leigh, Project Manager, Department of Defense/Office of Economic Adjustment
R. Eric Raam, Senior Planning Engineer, Lakehurst Naval Air Engineering Station
Mark Santilli, Master Planner, Fort Dix Army Base

Consultant Attendance:

Brandi Bartolomeo, Project Manager, Paulus, Sokolowski and Sartor, LLC
Bret Gordon, Program Monitor, Sabre Systems, Inc.
Elizabeth McLoughlin, Principle in Charge, Paulus, Sokolowski and Sartor, LLC
Charles E. Mink, Program Monitor, Sabre Systems, Inc.
John Wondolowski, Director of Strategic Initiatives, Sabre Systems, Inc.

Other Interested Parties:

Emily Previti, Reporter, Atlantic City Press

**Joint Base McGuire, Dix, Lakehurst
Joint Land Use Study
4th Policy Committee Meeting
Lakehurst Naval Engineering Air Station
May 29, 2008**

Call to Order was made by David McKeon and David Hojsak at 7:15pm.

The consultant team presented a PowerPoint presentation that summarized the JLUS status. In May of 2008 the consultant team met with:

- Pemberton Borough
- North Hanover Township
- Wrightstown Borough
- Jackson Township
- Pemberton Township
- Plumsted Township
- New Hanover Township
- NJ Pinelands Commission
- Lakehurst NAES

These meetings were productive to gain an understanding of each Town's individual concerns and existing relationship the Base and to the local community. Each Town's meeting discussion topics were mentioned.

Major themes included:

- Redevelopment Areas
- Schools
- Pinelands
- Sewer Service Area
- Areas under Construction/In Development
- Retail Competition with Base
- Traffic Circulation

Charlie Mink discussed the progress of meetings with base representatives from Lakehurst NAES, Fort Dix, and McGuire AFB as well as what data had been collected/received from the Bases for integration into the JLUS.

Many niche issues had come up through the initial meetings with the municipalities and a wastewater needs discussion was introduced by David McKeon and the topic was discussed by Rick Brown from the NJDEP.

- David McKeon gave an overview of the situation in Plumsted, North Hanover, and New Hanover.
- Rick Brown discussed the need for synergy between the bases and the local municipalities. "Let's get everything out in the open."

- Mark Santilli stated that there is a congressional Inquiry into the wastewater treatment. There is the capability to expand it, but it needs congressional approval and funding, as well as permits
- Rick Brown stated that NJDEP will give the permits to expand it to include enough capacity for the municipalities and for future growth of the base. Since we have all parties at the table through the Joint Land Use Study the process of getting the permits would be expedited.
- Mark Santilli stated that Fort Dix Commanders and Officers need to be approached in such a fashion as to not offend them. There is a way to still possibly get wastewater treatment to Plumsted – it's not fully taken off the table. The Commanders and Officers want to know that Plumsted doesn't just want to take from them and give nothing back in return.
- David Hojsak stated that the military base shouldn't feel that they always have to say yes. He can accept a no. As far as he is aware the sharing of wastewater facilities with Burlington county municipalities has been taken off the table.
- Captain Harding, stated that nothing should be taken off the table yet. Let's keep all options on the table even if they don't seem feasible now. They could become feasible in the future. He also stated that the military's relationships to the community have changed post 9-11, and a new strategy for collaboration must be found. He also stated that monetary resources may become available and that the military leaders at each base were open to discussion of these issues.
- Erika Stahl stated that Mark Santilli that Ocean County does want to keep that option open if it will assist Plumsted Twp.
- David Hojsak brought up the issue about other possible niche issues:
 1. Addressing retail competition between the municipalities and the military bases – he feels this can be addressed by the study
 2. Transportation, circulation issues (closure of Texas Avenue took passing traffic from Wrightstown and surrounding municipalities and gave to other municipalities) – this is an issue he does not feel will be solved by the JLUS
- Dave McKeon stated that studies to focus on these niche issues were out of scope of the project's basic land use mandate, and added that additional niche issues included:
 1. Transfer of development rights (TDR)
 2. Economic diversification
 3. School children of military and funding to local schools

State Plan Endorsement Inter-Agency Meetings were introduced by Rick Brown (NJDEP) and further discussed in detail by Lorissa Whitaker from the Office of Smart Growth.

- Rick Brown stated that bases will get a Plan Implementation Agreement, which is a 10-year contract for endorsed time. This is the best way to go for military bases that want to make sure the agreements will continue to live on.
- Lorrissa Whitaker stated that the Plan Implementation mechanism gets the office of smart Growth blessing, along with other state agencies blessing (many of them who are represented in the JLUS study). She also discussed her office's enthusiasm for the project and its relationship to their State Plan process in the mutual goal of identifying where growth should occur. Ms. Whitaker stated that each plan endorsement process was linked to a municipality's master plan and then to state priorities. There is opportunity here also for grant funding to prioritize action in designated centers through plan endorsement agreements for Plumsted or North Hanover, for example.
- Plumsted is the furthest along in the Plan Endorsement process followed by New Hanover.

Public Meeting Discussion

Brandi Bartolomeo opened up the public meeting discussion. Public meeting has been planned for July of 2008 but, many members of the Policy Committee felt that the public meetings were too soon and that a large population would be unable to attend given the large number of people that usually vacation in July.

- Mark Santilli and Rick Brown both suggested that the meetings should be moved to September. This will allow for more public outreach and to get editorial boards circulating.
- Mayor Patriarca suggested that we contact the Asbury Park Press for editorial boards. He also informed the policy committee that Pemberton High School runs their own infomercial programs; there is a great possibility of using that venue for free. The programs get broadcast on the Comcast network. Ocean County Community Colleges and Burlington Community Colleges might also be possible sources for infomercial programming assistance.
- Captain Harding stated that the study should use web-enacted tools, use the press and media, and Comcast as a forum as suggested by Mayor Patriarca.
- Peter Sobotka stated that the county libraries should be used as a forum to spread information.

It was decided at the end of the Policy Committee meeting that the public outreach meetings would be postponed to this September (2008) after schoolchildren are back to school. The next Policy Committee meeting would be held at the end of July and would focus on study progress and the upcoming public meetings.

The meeting adjourned at 9:00pm.

Meeting Minutes
Burlington County
Emergency Services Training Facility
July 29, 2008
6:30 –9pm

Burlington County Freeholder Joseph Donnelly called the meeting to order at 7:15pm.

Brandi Bartolomeo, Paulus, Sokolowski & Sartor, gave a summary of the status of the Joint Land Use Study (JLUS). In the months of May and June all ten participating municipalities, Pinelands Commission, three military bases, and the National Guard met with the consultant teams and county representatives individually. The Joint Land Use website has been made public and a section of it will still function as a member only site. The data-gathering phase is nearing completion and the data interpretation phase has begun. GIS compilation data information will be handed out to each individual municipality during this meeting for verification and correction purposes. The Joint Land Use Study will move forward with the public outreach and economic component of the study.

Brandi Bartolomeo presented key concerns and facts that have been uncovered during the individual meetings with the municipalities held in the month of June. Manchester Township's key concerns revolved around residential development around Lakehurst base, since they have received pressure to develop in the Golden Triangle site, Heritage Minerals site, and Retreat at Manchester. Manchester Township has a large senior citizen population, about 80 percent. Manchester also has an avigation easement at the Pulte Homes located across from Lakehurst base. The township's history in working with the military has had its ups and downs.

Springfield Township's major industry is agriculture and the township is pro farmland preservation. They have 4500 contiguous acres of farmland. Springfield Township does not have sufficient water or sewer capacity for future growth, or much of a commercial area.

Lakehurst Borough is actively working with Lakehurst base to define and determine the best use for the redevelopment area. There is little growth projected for the borough. Lakehurst Borough mentioned working with the base regarding re-opening the back gate to Lakehurst base. The borough supports the reopening of the Monmouth Ocean Middlesex (MOM) rail line, which runs through the borough.

Brandi introduced Bret Gordon from Sabre Systems who stated, that we have had various degrees of success in getting information from the military bases. Lakehurst has been the most cooperative base, but we are missing key information from McGuire and Fort Dix. Sabre Systems has solicited them for this information. He implored the committee members to please ask the military bases to provide the information we are looking for. The information being asked is very basic, and with it we will be able to put out a better product.

Sabre Systems had the opportunity to sit down with all of the commanding officers and other military interested personnel (planners, engineers, land use development, public services, etc.). The purpose was to reinforce the importance of the Joint Land Use Study and identify whom it will benefit. Sabre Systems tried to emphasize that the military is a large beneficiary because they get to retain their missions. The bottom line is that the municipalities will benefit as well, and it's a win-win situation for both sides. This is an opportunity to reinforce what is happening on this large joint military base. The Joint Land Use Study is the

catalyst for future jobs and local economies both in Ocean and Burlington counties. The more information we can get not only from the military side, but also the municipalities the better the product and the more it will benefit both sides.

There is positive momentum from Fort Dix. Noise contour data is being evaluated. McGuire Air force base, Commander Ayer, was convinced that the Joint Land Use Study is a good thing for McGuire. There will be a personnel increase on McGuire from the transfer of closed missions on Willow Grove base. This increase in personnel will generate more revenue for the local area. There are more construction opportunities on McGuire Air Force Base, which could mean more local jobs. An AICUZ study (noise study) is underway and will be completed shortly. The AICUZ data will not take into consideration the new aircraft coming in, that will be done by year 2010. The 2010 AICUZ will cover the entire Joint Base McGuire, Dix, Lakehurst. This highlights that the JLUS document we are creating will be a working dynamic document, not just a static picture of the present.

The National Guard is a tenant on McGuire, Fort Dix and Lakehurst Base. Their members do not typically interact as a unit and necessarily live near the base. However, they still bring money into the community and commute in and out of the community to get to work. They have a ton of projects going on right now: The National Guard is building on Route 539, which stands between Lakehurst Base and Fort Dix, a 70 million dollars consolidated Logistics and Training Facility. Also by 2011 a hanger facility will be built on Lakehurst base to house all of the NJ National Guard Helicopters. All of this construction and new missions equate to more jobs in the long run. They are also responsible for the 108's on McGuire Air Force base, which are responsible for refueling.

Brandi Bartolomeo asked all the municipalities to collect their handouts from the back of the room at the end of the meeting, which consists of 3 copies of the GIS maps and a table with lots and blocks corresponding to the maps. Manchester and Jackson were not provided handouts due to the fact that the consultant just received their information or in the process of receiving their information and did not have time to process it. She asked those in attendance to verify the information and inform her of any incorrect data that is found so that it can be corrected.

Rick Brown from the Department of Environmental Protection brought up the issue of farms being classified as vacant lands because they are considered a use.

Brandi stated, "That we are not discounting the use, but looking at zoning. All unpreserved farms were classified as vacant because they could easily be converted to a different use and as the study moves along this will change. It will remain as a semi-permanent status."

Rick Brown commented that redevelopment areas should be categorized as vacant as well under this formula.

Brandi acknowledged Rick Browns comments. She then asked the municipalities to bring their maps to their planners and engineers to check them for accuracy and get back to her.

Mark Remsa asked Brandi when and how she would like the municipalities to respond back to her in regards to changes that need to be made on the GIS maps.

Brandi stated email, phone calls, fax, or any format.

Mark Remsa asked Brandi if she wants them to mark it up and scan it to back to her.

Brandi stated, scan, faxed, or mailed hard copy is fine. Even a phone call with a lot and block will do. She asked for a quick response from the municipalities.

The Mayor of Springfield, William H. Pettit, brought up the issue of COAH and the importance to his community. It's something we have to plan for. We have a lot of agriculture, so we don't need that much but we still have to plan for it.

Brandi mentioned that we are aware of COAH obligations.

Elizabeth McLoughlin introduced the economic component of the study. HR& A are economic advisors. They specialize in doing market analysis and military based economic analysis. They are coming on board now, since most of the military and municipal information has been gathered. They will be focusing on studying the base line, current and future trends, of Ocean and Burlington County. They will use the land use data to identify what would be the key component driver of a land use in particular areas and target those sites. They will also have an overall economic model for the impact of the new missions on the military bases. HR&A will be attending the next policy meeting to make a presentation.

Brandi informed the policy meeting that the login page was moved due to the website becoming public. To get to the committee website directly add a forward slash after login. The current committee website will stay as it is. The Committee website does have two new surveys for committee input; one for non-military committee members and one for military-members. The public website will include an interactive mapper, as well as a public questionnaire.

Brandi had suggested that any source used for making the recommendations could be added to the website, such as master plans, zoning maps, etc. This could be helpful for local communities who do not have websites or have not scanned their documents.

David Hojsak brought up the point that we wouldn't want to leave out of date information on the website.

Brandi stated that only sources used to create the Joint Land Use Study recommendations would be posted. PS&S has already scanned the municipalities' documents.

David Hojsak stated that all municipalities should be contacted to gather their permission to upload their data onto the website.

Pat Austin stated that the mapper shouldn't be presented to the public until it is fully complete, because some members of the public would discredit the study just based on that.

Brandi stated that the mapper would be added to the policy committee webpage and not onto the public part of the website until it was completed.

Rick Brown suggested that Brandi and PS&S model the Highlands website which used the resources of Google map and added their own layers. Sour Lands Mountain region has used a mapping system where they attach notes to specific areas of the map.

John Reiser stated that it is important to make a composite map which shows which areas are planned, which show single-family residential, multi-family, etc. The information needs to be simple for the public to understand.

The Public Open House meetings will be held on September 15, 2008 at the Regional Day School in Jackson for Ocean County and September 18, 2008 at the Burlington Vocational Technical Community College for Burlington County.

Section 13.3 - Policy Committee Meeting Minutes

The public survey will be ranked one through five. Questions will be: Are you aware of the Joint Land Use Study, Do you consider the military to be an asset, Do you think the military is good for the regional and local economies, etc. The public survey will be online because all online survey information gets compiled and quantified.

David McKeon asked Brandi if there was anyway to ask the public to inform us where they lived so that we could map the responders.

Brandi stated that it could be done. IP addresses could also assist in tracking responses. We can make zip codes and town names as a mandatory field.

David Hojsak stated that zip codes in Burlington County stretch into many other towns since it is rural.

Charlie Mink stated that "a zip code plus four would identify the correct town", however Brandi Bartolomeo and the rest of the committee agreed that most people do not know their 9-digit zip code.

Brandi asked the committee if they thought that names should be required on the public comment

Bret Gordon stated that there is no point to make it a mandatory field or to ask for it.

David McKeon stated that a person should be allowed to enter their name and contact information if they would like future information.

Rick Brown asked, "What do we want to get out of the survey? I think the questions are too loaded and might confuse the public. Ask the questions in a yes-no format instead of a rated format. Allow space for the public to input why they agree or disagree with the question."

Brandi stated that she agrees with Rick regarding changing the format.

Bret Gordon stated that the survey would inform the public as well as get input from them. The public website and public outreach should also be another avenue to educate the public.

Brandi also passed out a draft public handout for committee input. Rick Brown stated that it was hard to find the information on the flyer for the public meeting dates. Erika Stahl, Ocean County Planning Department stated that the dates and locations should be more visible by making them larger and centered with a small description about the meetings. David McKeon stated that the space where the municipalities are listed should be removed and replaced with the dates and location of the meetings. There was input from another policy committee member that the municipalities names could be used as a border instead of put in a paragraph form.

Michael Gorman, the Pemberton School Superintendent suggested that the flyers be distributed through the school system and dropped off at community centers and municipal buildings. He also suggested that the date of the public meetings be changed since it is around the time when students return for the new school year.

Brandi stated that it was brought up in a past policy meeting, where it was decided that mid-September would be the best time for the meetings.

Erika Stahl presented a Joint Land Use Study infomercial to the Policy Committee for input. Bret Gordon stated the infomercial needed to be rephrased to be all-inclusive.

Brandi Bartolomeo presented news article topics related to the Joint Land Use Study. Bret Gordon stated that the Cyber Command would be a win-win situation for the local military bases and the local municipalities since it would bring high paying positions to the region.

Mayor Harper of Wrightstown described his second term honorary position with Joint Base McGuire, Dix, Lakehurst base. The McGuire Honorary Commander Program was created as a liaison to local business and civic members and to inform the local communities of what is happening on the base. Mayor Harper informed the committee how the military gave him a tour of the bases and allowed him to attend some ceremonies and meetings on the base.

Erika Stahl, Ocean County Planning Department, asked all participating municipalities to pick up their Joint Land Use Study poster and flyers for their communities.

The meeting was open to public comments

It was suggested that economic information should be presented to the public, so that they can see that the military bases in a better light.

Mayor Patriarca of Pemberton Township, stated that the negative aspects of the expansion of the military missions should also be presented to the public. The negative aspects are areas in need of economic redevelopment, the economic standing with our school systems, road closures and lack of funding for emergency services. He also stated that surrounding municipalities need to prepare for a plane crash and other types of emergencies relating to the base, yet get no funding for it.

Brandi stated that his perspective has been noted.

Mayor Patriarca, Pemberton Township, reiterated that the encroachment study doesn't make sense for his area because the township's buffer with the base is the town's only developable land and the base is going to do what they want with it. The real issues for his community are schools, road closures effect on economy and emergency services.

Bret Gordon stated that the military does see that there are impacts to the community. The military sees compatible development, not just development in general. They do not want to prevent development but wants to encourage compatible development.

Rick Brown stated that the military bases should show by payroll where the base personnel reside.

Bret Gordon stated that Rutgers University did such a study a few years back.

Charlie Mink stated that the personnel residence information will be mapped by zip code and is underway now.

Rick Brown stated that absentee landlords are also a problem affecting the communities, as well as other housing problems. These absentee landlords usually do not take care of their property as well as those living in the community. Megabase impact on housing should be looked at in a further study.

David McKeon stated that the transportation issues, housing issues, redevelopment issues and school issues will be well-documented so that they can be further looked at. This study focuses on land issues pertaining to encroachment.

Michael Gorman, Pemberton Township Superintendent of Schools, had asked if the 500 children were in addition to the already projected increase. He stated that Pemberton Township is ready for these additional

students, however the New Hanover school district would require more teachers, classrooms, and infrastructure if the school children are transferred to their school system.

Brandi stated that she believed the 500 children were in addition to the previous projections.

Erika Stahl brought up an article from the Fort Dix Times that stated that 50 percent of the military is married, more than the World War II peak. This means that there is an increase of young families and could be a potential problem down the line if the bases are not ready to take care of this influx of families.

Michael Gorman stated that is something they are keeping an eye on. There is a disproportionate amount of young children compared to typical families, since most of the parents tend to be in their twenties.

Bret Gordon stated that this is already part of the in-processing phase. The military member is asked about how many dependents he/she has and their ages. This information is relayed to the school system.

Michael Gorman stated that 250 students live on base and 1000 live off base already. He wanted to know how many families are projected to move from Willow Grove to the Joint Base.

Mayor Patriarca was concerned that the lack of uniformed military presence is not a good sign and asked why there aren't commanders from the bases participating and do they take the study seriously.

Bret Gordon stated the military funded 90 percent of this study.

David McKeon stated that John Leigh couldn't be here, but he has been here every other meeting. He is aware that there are other underlying issues besides the encroachment issue. However, those issues cannot be studied under this Joint Land Use Study but will be eligible under additional funding in the future and they should be studied.

Bret Gordon stated, the military changes leadership every two years, but the civilians provide the continuity year in and year out. Bret stated that a request could be made to the military bases if it would bring comfort to the policy committee members. Bret said, "Just because you don't see those in uniform does not mean that they are not engaged. We have been and are getting military civilian personnel attendance at our policy meetings."

Mayor Patriarca stated that based on past experiences we are asked by the military to give but we never hear what they are willing to give back. It would be nice to hear them state what they would be willing to work on.

Mark Remsa stated these types of concerns would be relayed back to the department of defense.

John Reiser, NJDEP, commented that a section should be added to the questionnaire where respondents could mark if they are enlisted, and if so, if they are permanent or temporary residents in the area/base. Also, the respondents should be asked where they plan to be in the next couple of years, so we can find out if they are part of the continuity of the base.

Meeting Adjourned 8:30pm.

**Fort Dix/McGuire AFB/Lakehurst NAES
Attendees – Joint Land Use Study
5th Policy Committee Meeting
July 29, 2008**

Anthony M. Agliata, Assistant Planning Director, Ocean County Planning Dept.
Pat Austin, Business School Administrator, Pemberton Township
Sara Banks, Systems Analyst, Lakehurst Naval Air Engineering Station
Brandi Bartolomeo, JLUS Project Manager, Paulus, Sokolowski & Sartor, LLC
Dennis Blazak, Chief Environmental Engineer, Lakehurst Naval Air Engineering Station
Timothy Brill, Planning Manager, NJ State Agriculture Development Committee
Chester Broccoli, Chairman, Plumsted Township Planning Board
Rick Brown, Planner, NJ DEP
Daniel Burke, Township Engineer, Jackson Township
Scott Cadigan, GIS Specialist I, Ocean County Planning Dept.
Pidge Carroll, District Director, (Christopher H. Smith, U.S. Congressman) 4th District
Bill Chandler, Designee, Manchester Township
Richard T. Dean, Community Planner, McGuire Air Force Base
Joseph Donnelly, Deputy Freeholder Director, Burlington County
Bret Gordon, Program Manager, Sabre Systems, Inc.
Michael R. Gorman, Ed. Dtr., Superintendent of Schools, Pemberton Township
Stacy Grillo, Planner, NJDCA, Office of Smart Growth
Robert Hardy, Plumsted Twp. Planning Bd., Plumsted Township (Designee)
Thomas E. Harper, Mayor, Wrightstown Borough
David J. Hojsak, Principal Planner, Economic Dev. & Regional Planning Burlington County
John P. Kelly, Freeholder, Ocean County
David J. McKeon, Planning Director, Ocean County Planning Department
Elizabeth McLoughlin, Principal in Charge, Paulus, Sokolowski & Sartor, LLC
Charles E. Mink, P.E., Program Manager, Sabre Systems, Inc.
Lou Mraw, Manager, NJ Dept. of Community Affairs
David A. Patriarca, Mayor, Pemberton Township
Stacy Perrine, Assistant Planner, Ocean County Planning Department
William H. Pettit, Sr., Mayor, Springfield Township
Jill Priar, Chief Real Property, NJ Dept. of Military & Veteran's Affairs
R. Eric Raaum, PE Senior Planning Engineer, Public Works Dept., Lakehurst Naval Air Engineering Station
John Reiser, Planner & GIS Specialist, NJDCA, Office of Smart Growth
Mark Remsa, Director, Burlington Economic Dev. & Regional Planning
Jeff Sagnip, Congressional Aide, US Congressman Jim Saxton's Office
F. Lyman Simpkins, Mayor, Pemberton Township
Peter Sobotka, Deputy Mayor, Springfield Township
Erika Stahl, Planner Trainee, Ocean County Planning Department
William T. Stewart, Supervising Admin. Analyst, Burlington County
Bill Tilton, Deputy Mayor, North Hanover Township (designee)
Kenneth Vanderzeil, Councilman, Manchester Township
Peter L. Ylvisaker, Executive Director, Main Street New Egypt, Plumsted Township



Paulus, Sokolowski and Sartor, LLC
 67B Mountain Boulevard Extension
 P.O. Box 4039
 Warren, NJ 07059
 Tel: 732-560-9700 Fax: 732-560-9768

Meeting Report

Project Name: Joint Base Land Use Study	Date of Report:	December 11, 2008
Project No.: 03143-0005	By:	Elizabeth McLoughlin
Meeting Location: Policy Committee	Meeting Date:	October 29, 2008
Participants: See list of attendees		
Distribution: Public		

1. Call to order by Dave McKeon
2. **Summary of Joint Land Use Study Status**
3. **Summary of September 2008 Open Houses**

The data gathering stage is almost complete; with the receipt of noise data we will begin land use analysis.

Brandi Bartolomeo presented a summary of open public house meetings. Two open houses were held; September 15th for Ocean County, in Jackson Township and September 18th for Burlington County in Pemberton Township. Advertisements were placed in five newspapers and online community calendars, fliers were sent to the municipalities and Pinelands Commission for public distribution. Each municipality was afforded a display of GIS mapping including zoning, environmental constraints and preserved lands within a 2-mile buffer of the military base. The Department of Defense “Base Next Door” video was presented with inserts from Ocean County Freeholder Kelly and Burlington County Freeholder Donnelly. McGuire, Dix and Lakehurst were all represented at the open houses. Both online and paper copy public surveys were available to the public, as well as an interactive online map station. Handouts were also available. The military base personnel attendance allowed for direct access to members of the public with comments or questions. Ocean County’s Open House had fewer than 20 attendees. Burlington County’s Open House attendees approximated 100 persons. Pemberton and Jackson Townships had the highest attendance of the municipalities involved.

4. **Results from the Public Surveys and Overview of Interactive Web-Based Mapper**

There was approximately 50 public surveys completed online and in person. The survey data indicated that 30-40% of the responses fell in a minimally impacted category for how the bases affect their households. In response to whether the bases affected their community, the majority of responses fell in the minimally affected category, with the exception of road closures due to base activity or security, with 26% of responses checking that their community was greatly impacted.

PS&S will proceed in reliance on this report. Any discrepancies should be brought to our attention in writing within (7) days.

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Meeting Report
 December 12, 2008
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The vast majority, 79 percent of responders, stated that the military was a valuable asset to their community. The following is a breakdown of responses that were “very concerned” about the following issues with regard to the military presence in their community:

Public welfare	18.4%	(7 respondents)
Local Economy	36.8%	(14 respondents)
Environmental Concerns	27.0%	(10 respondents)
Heightened Security Concerns	20.5%	(8 respondents)
Temporary Military Residents	14.3%	(6 respondents)

28.9 percent of respondents are military or veterans, and 15% are civilians employed by the military. Respondents were allowed space to write in their concerns and this section was summarized for the Policy Committee.

5. **Overview of the JLUS Economic Analysis**

Dave McKeon discussed the recent Ocean County seminar regarding “Doing Business with the Military”. It was very well attended, and is consistent with the type of economic analysis for the JLUS.

Candace Damon of HR&A presented the preliminary economic findings:

The role of the economic analyses is to:

- a) identify best development sites within study area
- b) develop complementary uses to base mission while enriching community

Summary findings are:

- Ocean and Burlington Counties are similar to New Jersey as a whole however, more affluent in some areas
- Both counties have grown rapidly relative to the State:
 - Seniors have driven recent growth in Burlington
 - Ocean County has a comparatively large senior citizen population
 - Counties’ employment is similar to New Jersey’s except more dependent on education and health services and less professional services that State of New Jersey as a whole

This creates an opportunity for improved linkage between base and sources of local economic strength.

- Focus on educational expansion and a curriculum on base mission. A working group of education leaders and military base staff is recommended.
- Manufacturing is strong in Burlington with 19,500 jobs, high paying, but projected to decline. Therefore, link sizeable computer and electronic production subsector to Lakehurst’s bases: R&D mission and stem manufacturing decline. Convene working group of local manufacturing and base officials to expand local contracting opportunities for just-in-time manufacturing electronics and technology needs.

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- Evaluate incentives and recruiting and site opportunities
- Take advantage of demographic trends to bolster employment: Health Care/social assistance sector.
 - Grow health care/social assistance professions to support veterans and promote area as retirement destination
 - Focus health care growth on higher paying subsectors including Philadelphia hospitals and nurturing of Deborah Heart & Lung Center
 - Explore linkage with retiree population
- Retail, food and accommodation is increasingly vital but low-paying
 - Target sector growth keyed to demographic changes
 - Promote smart location and product mix
- Talk to brokers and planners to identify submarkets and locations with demand for accommodation, food and retail growth.
- Assess demand for local agricultural products, especially as health option for seniors.

The next phase of the economic analysis is to explore benefits of optimal site development using the analysis from the noise and land use components of the JLUS.

6. AICUZ Mapping

PS&S and Sabre Systems have received some but not all noise data from the military. The consultant team is still waiting on McGuire AICUZ data and helicopter flight path data. A noise chart was used to relate noise examples to the decibel levels displayed on the maps presented.

To date we have:

- Lakehurst - Accident potential zones
Noise level zones
- McGuire - Accident potential zones
Noise level zones from 2005 and awaiting the new AICUZ data
- Fort Dix - Large arms noise contours
Small arms noise contours

The team will work to procure the preliminary AICUZ data from McGuire to utilize in the analysis. A discussion with the policy committee ensued. It was mentioned by Mayor Patriarca that residents had noticed new flight patterns over Browns Mills. Colonel Polhemus responded that the flight patterns were going to be for a limited time and would cease in the next few weeks.

7. Next Meeting

The meeting concluded with a schedule for the next policy committee meeting to be held on December 18, 2008.

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**Joint Land Use Study
6th Policy Committee Meeting
October 29, 2008
Attendee List**

- Anthony M. Agliata, Assistant Planning Director, Ocean County Planning Department
Sara Banks, Lakehurst NAES
Brandi Bartolomeo, Associate GIS Coordinator, PS&S
Dennis Blazak, Chief Environmental Engineer, NAES Lakehurst
Tim Brill, Program Manager, New Jersey State Agriculture Development Committee
Dan Burke, Township Engineer, Jackson Township
Scott Cadigan, GIS Specialist 1, Ocean County Planning Department
Candace Damon, AICP, P.P, HR&A
Ed Fox, Economic Development & Regional Planning, Burlington County
Bret Gordon, Program Manager, Sabre Systems, Inc.
Susan Grogan, Planner, New Jersey Pinelands Commission
Capt. J.C. Harding, Executive Officer, US Navy, Lakehurst NAES
Robert Hardy, Member of Planning Board, Plumsted Township
Thomas E. Harper, Mayor of Wrightstown Borough
Matthew Harrison, Economic Analysis for JLUS, HR&A
Sidney Hooper, Council Member, Borough of Lakehurst
John P. Kelly, Freeholder, Ocean County
John Leigh, Project Manager, US Department of Defense/Office of Economic Adjustment
David J. McKeon, Planning Director, Ocean County
Elizabeth McLoughlin, Principal-In-Charge, PS&S
Charles E. Mink, P.E., Program Manager, Sabre Systems, Inc.
Lou Mraw, Manager, NJ Department of Community Affairs Division of Codes
David Patriarca, Mayor of Pemberton Township
Stacy Perrine, Assistant Planner, Ocean County Planning Department
Col. Mike Polhemus, Director of Staff, 305th AMW McGuire AFB
R. Eric Raam, PE, Senior Planning Engineer, Lakehurst NAES
Mark Remsa, Director, Economic Development & Regional Planning, Burlington County
Dennis Roohr, Mayor of New Hanover Township
Peter Sobotka, Deputy Mayor, Springfield Township
Erika Stahl, Planner Trainee, Ocean County Planning Department
William T. Stewart, Supervising Administrative Analyst, Burlington County
Diane P. Stinney, Council President & JLUS Council Liaison, Pemberton Township
Craig Wallis, Council President, Manchester Township
Lorissa Whitaker, Principal Planner, NJ DCA, Office of Smart Growth

**Joint Base McGuire, Dix, Lakehurst
Joint Land Use Study
7th Policy Committee Meeting
Plumsted Township Municipal Building
December 18, 2008**

Dave McKeon, Ocean Count Planning Director, called the meeting to order at 3:20pm.

New Policy members introduced themselves and Brandi Bartolomeo, PS&S JLUS project manager, discussed the planned meeting agenda.

Brandi Bartolomeo introduced PS&S Noise Expert, Mike Barboza. Mike Barboza presented the JLUS noise analysis and gave an overview presentation of Joint Base APZ's and AICUZ data. Mike discussed the basis for the noise analysis.

Air Safety Zones or APZ zones, stretch from 2.5 to 2.8 miles from the end of each operating runway. There are three main air safety zones: Clear Zone, Accident Potential Zone I (APZ I) and Accident Potential Zone II (APZ II). Within each designated safety zone, there are land use compatibility guidelines. The guidelines were discussed while viewing map slides showing APZs for McGuire AFB and NAES Lakehurst along with current aerial imagery and zoning designations.

Mike Barboza, presented an overview of noise basics before delving into the AICUZ data and analysis. Sound and noise are often used synonymously. Noise descriptors, common activities and their accompanying sound levels, and ongoing military programs were discussed.

Noise Zones for the JLUS are Noise Zone I, Noise Zone II, and Noise Zone III, and the Land Use Planning Zone.

- **Noise Zone I** residential and other noise sensitive land uses are considered "compatible"
- **Noise Zone II** noise exposure within this area is significant and it is recommended to limit land use to non-sensitive activities, such as industrial, manufacturing, transportation, agriculture and resource production normally incompatible with residential and other noise-sensitive land uses
- **Noise Zone III** noise is severe enough to cause conflicts with almost all activities, incompatible with residential and other noise-sensitive land uses
- **Land Use Planning Zone** noise environment at the installation varies daily and seasonally
 - o The Land Use Planning Zone (LUPZ) contour more broadly encompasses off-base lands
 - o The LUPZ is a planning tool for better prediction of variability in noise conditions/impacts buffer between NZ I and NZ II

Baseline and Projected noise conditions were presented to the Policy Committee. Mike Barboza stated that noise contours are not obsolete, can change in a day, month, etc.

Charles Mink, from Sabre Systems asked whether the 10 decibels required for nighttime noise was added to the average. Michael Barboza answered yes, it's an average of day and night decibel levels.

A noise complaints map was shown to the committee. Complaints made to NAES Lakehurst were mapped. There were a good number of recent complaints that were outside of the noise contour mapped regions.

Rick Brown, NJDEP, asked if cloud cover affects it, because from his experience he noticed an increase during these days. (Answer: yes)

Rick Brown, NJDEP, asked:

- Can modeling pick up contours, elevations and weather information?

Mike Barboza, PS&S noise analyst responded:

- The Consultant team didn't gather the information, info. The data was provided by the bases, but usually modeling covers contour and elevations changes. Not always weather.
-

Rick Dean, McGuire AFB Planner, stated:

- McGuire data doesn't take weather into account but does take into account contours and elevations.

Robert Turnbo – Airspace Manager for McGuire AFB, stated:

- It is possible for the noise to have traveled outside of the modeled areas. Once there are two or more planes flying by in the same flight path you will get accrual of noise which could travel to the West Lake region in Jackson. Military practices inside the circle TABS, which means planes will fly down as low as 500 ft.

Brandi Bartolomeo PS&S JLUS Project Manager stated:

- Fog and cloud cover accelerates noise.
- McGuire is currently creating new AICUZ data.

Mayor Patriarca, Pemberton Township, asked:

- How is this Data from 2005 going to help when activity increase is occurring now and will max out in 2011?

Dennis Blazak, NAES Lakehurst, responded:

- Data includes all operations (new and not on base now) and will be tweaked in the future. The current data takes into consideration max. Capacity at base, even though it is not at max currently. Some helicopters are overseas.

Rick Dean, McGuire AFB stated:

- KC-110's were included in draft of new AICUZ study

Rick Brown, NJDEP, asked:

- Does this current data take into consideration different conditions? If not something to work on for the next AICUZ study (# of planes on flight path, weather, etc.)

Joe Schwartz, Fort Dix, stated:

- Fort Dix is projected to have less large arms and more small arms.

Dennis Blazak, NAES Lakehurst, asked:

- Will the preliminary recommendations be uploaded to the website?

Brandi Bartolomeo PS&S JLUS Project Manager responded:

- Yes, the recommendations will be posted on the policy committee website.

Daniel Kennedy, Burlington County Farmland Preservation Coordinator, asked:

- Who is the Legal Authority of properties located in the APZ? What are the consequences of not following the recommendations?

Daniel Glasson, DoD, OEA responded:

- The Federal Government has no regulations. Constitution claims Home Rule so municipalities will be in charge of making the recommendations.

Daniel Kennedy Burlington County Farmland Preservation Coordinator responded:

- Hierarchy matters, the county over the municipalities, state over counties and federal over states.

Daniel Glasson, DoD, OEA responded:

- There are very few times the Federal government will be legally impacted by the location of APZ's or AICUZ markings from a JLUS recommendation. This relation is due to demarcation impact.

-

Rick Brown, NJDEP, stated:

- TDR or Contiguous Clustering could be used to solve problem

Daniel Kennedy, Burlington County Farmland Preservation Coordinator, asked:

- This information has been out for years, why should the municipalities make changes now?

Elizabeth McLoughlin, PS&S Principal in Charge responded:

- This JLUS is the first trigger of a Land Use Implementation process.

Daniel Glasson DoD, OEA responded:

- These zones imply the percentage of accidents or noise disturbance that could occur. Therefore it would be the best interest for people to be aware of them and to make changes that they see fit.

Mark Remsa, Director of Burlington Economic Development & Regional Planning, stated:

- These are guidelines; zoning establishes values of land, this process is supposed to help establish what is happening on bases. Local zoning is what gives a value

to land, which gets complex with the addition of DEP wetlands and other state agencies regulations.

David McKeon, Director of Ocean County Planning Department, stated:

- Such as State Regulations, COAH, Sewer Regulations etc. The benefits of this study have been the close coordination with the state agencies, regional levels (the pinelands), and military. This is a special area and needs its own rules. The state agencies need to try to work with us (possibly bend) to understand that some current regulations will not work with this region. They may need to come up with new solutions/regulations. This will be an ongoing effort and we all need to work together.

Dan Glasson, DoD, OEA responded:

- DOD is willing to put up funding for areas where preservation is key. Will work with well-established County programs
- In 2008 the Pinelands, Counties, DEP, and DOD identified properties for acquisition and purchased them.
- Navy, Air Force, and Army still need partners for future acquisition.

Mark Remsa, Director of Burlington Economic Development & Regional Planning, stated:

- \$1.2 million was spent for land acquisition/easements.
- Hopefully another \$2 million to purchase land/easements will be coming in 2009.

David Hojsak, Senior Planner for Burlington Economic Development & Regional Planning, stated:

- Land acquisition mechanisms will be a recommendation.

Joseph Swartz, Fort Dix, stated:

- Joint Base needs sources of money to buy from existing property owners.

Rick Brown, NJDEP, asked:

- Will sound mitigation be recommended?

Brandi Bartolomeo, PS&S JLUS Project Manager stated:

- Yes sound mitigation will be included in the recommendations.

-

David McKeon, Director of Ocean County Planning Department, stated:

- Schools, Commercial Development, and TDR studies will be recommended with DoD funding sources as follow up studies.
- The Policy and Technical meeting groups will continue to work together even after the study wraps up to ensure that the recommendations are implemented.

Meeting Adjourned.

**Joint Land Use Study
7th Policy/Technical Committee Meeting
Plumsted Township Court Room
December 18, 2008, 3-5pm
Attendee List**

Anthony M. Agliata, Assistant Planning Director, Ocean County Planning Department
 Michael Barboza, Noise Analyst, Paulus, Sokolowski, and Sartor, LLC
 Brandi Bartolomeo, JLUS Project Manager, Paulus, Sokolowski, and Sartor, LLC
 Dennis Blazak, Chief Environmental Engineer, Lakehurst Naval Air Engineering Station
 Timothy Brill, Planning Manager, NJ State Agriculture Development Committee
 Chester Broccoli, President of Planning Board, Plumsted Township
 Rick Brown, Planner, NJDEP Office of Planning and Sustainable Communities
 Daniel Burke, Township Engineer, Jackson Township
 Gregory Bury, Geobase Manager, Lakehurst Naval Air Engineering Station
 Scott Cadigan, GIS Specialist 1, Ocean County Planning Department
 Pidge Carroll, District Director, Office of U.S. Congressman Christopher H. Smith
 Richard Dean, Community Planner, McGuire Air Force Base
 Daniel Glasson, Program Manager, US Department of Defense Office of Economic Adjustment
 Bret Gordon, Program Manager, Sabre Systems Inc.
 Stacy Grillo, Planner, NJDCA Office of Smart Growth
 Robert Hardy, Plumsted Township Planning Board Member, Plumsted Township
 Mark Hoffman, Noise Analyst, Paulus, Sokolowski, and Sartor
 David Hojsak, Principal Planner, Burlington County Economic Development and Regional Planning
 Sidney Hooper, Councilman, Lakehurst Borough
 Daniel Kennedy, Farmland Preservation Coordinator, Burlington County Department of Resource Planning
 Lt. Col Wayne McCaughey, NJ National Guard
 David McKeon, Planning Director, Ocean County Planning Department
 Elizabeth McLoughlin, Principal in Charge, Paulus, Sokolowski and Sartor, LLC
 Charles Mink, Program Monitor, Sabre Systems, Inc.
 Lou Mraw, Manager, NJDCA Division of Codes and Standards
 Margit Myers, Presidential Management Fellow, US Department of Defense Office of Economic Adjustment
 Daniel Patrick O'Connell, President, Evergreen Capital Advisors
 John Olson, Planning Engineer, Lakehurst Naval Air Engineering Station
 David Patriarca, Mayor, Pemberton Township
 R. Eric Raaum, Senior Planning Engineer, Public Works Department, Lakehurst Naval Air Engineer Station
 Michael Reina, Mayor, Jackson Township
 Mark Remsa, Director, Burlington County Economic Development and Regional Planning
 Edward Sain, Director of Installations, NJ Department of Military and Veterans Affairs
 Joseph Schwartz, Environmental Specialist, DPW, Fort Dix Army Post
 Roger Smith, Natural Resources Management Scientist, Environmental Natural Resources Office, Fort Dix Army
 Peter Sobotka, Deputy Mayor, Springfield Township
 Brian Sperling, Council President & Wrightstown MUA Operations Manager, Wrightstown Borough
 Erika Stahl, Planner Trainee, Ocean County Planning Department
 Diane Stinney, Council President & JLUS liaison for Township Council, Pemberton Township
 Robert Turnbo, Air Field Operations, McGuire Air Force Base
 Erik Waldrip, Community Planner, McGuire Air Force Base
 Peter L. Ylvisaker, Executive Director, Main Street New Egypt, Plumsted Township

**Joint Base McGuire, Dix, Lakehurst
Joint Land Use Study
8th Policy Committee Meeting
Plumsted Township Municipal Building
March 10, 2009**

- Dave McKeon, Ocean Count Planning Director, convened meeting at 3:10 PM and introduced Colonel Gina Grosso, USAF, the new Commander of the 87th Air Base Wing and Joint Base McGuire Dix Lakehurst.
- Policy Committee Members introduced themselves for the new Commander
- Brandi Bartolomeo, PS&S JLUS Project Manager, presented a PowerPoint presentation that provided an overview of the JLUS Final Report, discussed sections 1 - 4 and introduced Bret Gordon to summarize the JLUS military analysis
- Bret Gordon, Sabre Systems, summarized the military analysis section, section 5, of the JLUS report.
- Brandi Bartolomeo presented sections 7- 9 of the report and introduced Candace Damon of HR&A Advisors, to present the economic component of the JLUS (section 10)
- Candace Damon, HR&A Advisors, presented the conclusion of the economic component of the JLUS
- Brandi Bartolomeo presented the identified issues brought up during the JLUS process and then discussed the recommended implementation strategies
- A Q&A session was held with participants. The following topics were mentioned and discussed.

Rick Brown, NJDEP

- Discussed the desire to see Joint Base noise studies to consider effects of real world noise, cloud cover, weather, etc

Dave Hosak, Burlington County

- Cell towers are issue but there is limited municipal authority to limit
- Base notification for cell tower applications is important

Mayor Patriarca, Pemberton Twp

- Municipalities should be compensated for loss of potential revenue when limiting development in Transfer of Development Rights (TDR) programs
- Can DoD OEA help funding or offer incentive programs for TDR in JLUS municipalities?
- There is a small agriculture grant program

Ed Fox, Burlington County

- Important look at Dept of Agriculture, FHWA and other grant programs that may help fund some of the implementation of recommendations

Tim Brill, NJ State Agricultural Development Committee

- Add agricultural development areas to maps
- Ocean County and Burlington County were just updated
- Address trespass issues and permissive trespass

Dave Frank, Legal Counsel for New Hanover Twp and Wrightstown Borough

- The Joint Base should make it a priority to work through commercial competition and curtail on base competition

Mark Remsa, Burlington County

- Include next immediate steps in report
- It is an important step for both the JLUS municipalities and the Joint Base to implement the suggested charter and to develop the proposed procedures in the near term.

- Brandi Bartolomeo thanked the policy committee for their attendance and participation throughout the study.
- Dave McKeon announced that he JLUS Public Hearing would be held on March 30, 2009 at the New Egypt Primary School, Evergreen Road, Plumsted Twp, NJ and that a final Policy Committee meeting would be held at the end of April and hard copies of the final report would be distributed.
- The meeting was adjourned at 5:10 PM.

**Fort Dix/McGuire AFB/Lakehurst NAES
Attendees – Joint Land Use Study
8th Policy/ Technical Committee Meeting
Tuesday March 10, 2009**

Anthony M. Agliata, Assistant Planning Director, Ocean County Planning Dept.
 Brandi Bartolomeo, JLUS Project Manager, Paulus, Sokolowski & Sartor, LLC
 Gary Basham, Master Planner, Engineering Plans and Services Division, Fort Dix
 Dennis Blazak, Chief Environmental Engineer, Lakehurst Naval Air Engineering Station
 Timothy Brill, Planning Manager, NJ State Agriculture Development Committee
 Rick Brown, Planner, NJ Department of Environmental Protection
 Daniel Burke, Township Engineer, Jackson Township
 Greg Bury, Environmental Engineer, Lakehurst Naval Air Engineering Station
 Scott Cadigan, GIS Specialist I, Ocean County Planning Department
 Candace Damon, Economic Analyst, HR&A
 Richard T. Dean, Community Planner, McGuire Air Force Base
 James Durr, Mayor, North Hanover Township
 Ed Fox, Regional Planning Coordinator, Burlington County Economic and Regional Planning Dept.
 David Frank, Councilman, Springfield Township
 Daniel Glasson, Project Manager, US Department of Defense Office of Economic Adjustment
 Bret Gordon, Program Manager, Sabre Systems, Inc.
 Charlie Graziano, Field Representative, Office of US Congressman John H. Adler
 Susan Grogan, Chief Planner, New Jersey Pinelands Commission
 Colonel Gina Grosso, 87 Air Base Wing, Joint Base McGuire, Dix, Lakehurst Commander
 Captian J.C. Harding, Executive Officer, Lakehurst Naval Air Engineering Station
 Robert Hardy, Plumsted Twp. Planning Board member, Plumsted Township
 Thomas E. Harper, Mayor, Wrightstown Borough
 Matthew Harrison, Economic Analyst, HR&A
 Mark Hoffman, Noise Analyst, Paulus, Sokolowski & Sartor, LLC
 David J. Hojsak, Principal Planner, Burlington County Economic Development & Regional Planning Dept.
 Sidney Hooper, Councilman, Lakehurst Borough
 David J. McKeon, Planning Director, Ocean County Planning Department
 Brian McPeak, Principal, Paulus, Sokolowski & Sartor, LLC
 Charles E. Mink, Program Monitor, Sabre Systems, Inc.
 Lou Mraw, Manager, NJ Dept. of Community Affairs Division of Codes and Standards
 Margit Meyers, Presidential Management Fellow, US Department of Defense Office of Economic Adjustment
 John Olson, Planning Engineer, Lakehurst Naval Air Engineering Station
 David A. Patriarca, Mayor, Pemberton Township
 Col. Mike Polhemus, Director of Staff, 87 ABW, Joint Base McGuire, Dix, Lakehurst
 R. Eric Raam, Senior Planning Engineer, Public Works Dept., Lakehurst Naval Air Engineering Station
 Mark Remsa, Director, Burlington County Economic Dev. & Regional Planning
 Jeff Sagnip, Congressional Aide, Office of US Congressman Christopher H. Smith, 4th District
 Lt. Col (Ret) Edward R. Sain, Director of Installations, Department of Military and Veteran's Affairs
 Joseph Schwartz, Environmental Specialist, DPW, Fort Dix
 Brian Sperling, Council President, Wrightstown Borough
 Roger Smith, Environmental Resources Office Branch Chief, Fort Dix
 Peter Sobotka, Deputy Mayor, Springfield Township
 Erika Stahl, Assistant Planner, Ocean County Planning Department
 Diane P. Stinney, Council President, JLUS Liaison for Township Council, Pemberton Township
 Erik Waldrip, Community Planner, 87 CES, Joint Base McGuire, Dix, Lakehurst
 Lorissa Whitaker, Principal Planner, NJ Dept. of Community Affairs Office of Smart Growth
 Peter L. Ylvisaker, Executive Director, Main Street New Egypt, Plumsted Township

Section 13.4 - Noise Basics

Sound Sound is generated when a vibrating object (sound source) creates a physical disturbance that sets the parcels of air or other surrounding medium nearest to it in motion, causing pressure variations that form a series of alternating compression and expansion pressure waves that move or propagate outward away from the source usually in a spherical pattern. Factors that affect how sound is perceived by the human ear include the amplitude or loudness, the frequency, and the duration of the sound, as well as the location of the receiver relative to the source of sound. The sound levels we encounter in daily life vary over wide ranges of these factors.

Decibel (dB) The standard metric for noise is the decibel (dB). The lowest sound pressure level the ear can detect (a soft whisper) is more than a million times less than that of a jet engine. To make this large range of values more meaningful, an adaptation of a logarithmic mathematical scale is used (i.e., the dB scale). On the dB scale, the range of human hearing is represented at the lowest audible level by 20 dB and at the maximum level, or threshold of pain, at approximately 140 dB.

The decibel is used as a unit of sound amplitude or loudness and is derived from a comparison sound pressure, in air, with a reference pressure. Broadband sound covers the whole of the audible frequency range and is made up of many tones. Figure 13.4-1 equates decibel levels with the sound of everyday activities.

Noise The terms “sound” and “noise” are often used synonymously. Noise is unwanted sound usually composed of a spectrum of many single frequency components, each having its own amplitude. The disturbing effects of noise depend both on the intensity and the frequency of the tones. For example, higher frequencies are often more disturbing than low frequencies. Pure tones can be more disturbing than broadband sound. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying.

Frequency The normal human ear can detect sounds that range in frequency from about 20 cycles per second (Hz) to 15,000 Hz. However, all sounds throughout this range are not heard

equally well. Low-frequency sounds are heard as “rumbles,” and high-frequency sounds are heard as “screeches.”

Noise with distinct tones can be more noticeable and often more disturbing than other types of noise, for example, noise from fans, compressors, or power saws. There are different frequency-weighting systems related to the type of noise source.

A-Weighting (dBA) Noise measurements are often taken using the “A-weighted” frequency response function. The A-weighted frequency or dBA scale simulates the response of the human ear to sound levels (particularly low-level sound) and has been given prominence as a means for estimating annoyance caused by noise, for estimating the magnitude of noise-induced hearing damage, in hearing conservation criteria, for speech interference measurements, and in procedures for estimating community reaction to (general broad band) noise (Clayton, et al. 1978; Cheremisinoff, et al. 1977). Sound measurements are often made using the “A” frequency weighting when assessing environmental noise.

A-weighting measures noise that closely resembles the frequency response of human hearing, including response to high-frequency noise. A-weighting, expressed as dBA, is a good descriptor of higher frequency noise caused by small arms firing, aircraft use, and vehicle operations. Further, small arms are also characterized in terms of peak un-weighted dB level.

C-Weighting (dBC) C-weighting measures the low-frequency component of noise, which can cause buildings and windows to shake and rattle. C-weighted sound level measurement (dBC) correlates well with physical vibration response of buildings and other structures to airborne sound. Impulsive noise resulting from armor, artillery, and demolition activities are assessed in terms of dBC; C-weighting shows the low frequency noise and vibration associated with the firing of larger weapons systems. When measuring sound with a large low-frequency component, values measured using the C-scale are usually higher than values measured using the A-scale.

Noise Descriptors There are a number of noise descriptors used to characterize various aspects of noise that take into account the variability of noise levels over time which most environments experience. Commonly used descriptors applicable to different situations are discussed below.

Common Sounds and Noise Levels (A-weighted)

Noise Source (at a given distance)	Typical Reaction
Civil Defense Siren (100 ft)	Pain
140	
130	Maximum Vocal Effort
Jackhammer (50 ft)	
Pile Driver (50 ft)	
110	Very Annoying/ Discomfort
Ambulance Siren (100 ft)	
Motorcycle (25 ft) Power Lawnmower	
80	
Garbage Disposal (3 ft) Alarm Clock	Intrusive
70	
Vacuum Cleaner (3 ft)	Normal Speech
60	
Normal Conversation (5 ft) Dishwasher	
50	Quiet
Light Traffic (100ft)	
40	Just Audible
Bird Calls (Distant)	
30	
Soft Whisper (5 ft)	
20	
10	
Human Breathing	
0	

Equivalent Sound Level (Leq) The equivalent sound level (Leq) is the value of a steady-state sound which has the same sound energy as that contained in the time-varying sound. The Leq is a single sound level value for a desired duration, which includes all of the time-varying sound energy occurring during the measurement period. The U.S. EPA has selected Leq as the best environmental noise descriptor for several reasons, but primarily because it correlates reasonably well with the effects of noise on people, even for wide variations of environmental sound levels and different time exposure patterns. Also, equipment is available to measure and compute the Leq.

Statistical Descriptors Statistical sound level descriptors such as L1, L10, L50, and L90 are used to represent noise levels that are exceeded 1, 10, 50, and 90 percent of the time, respectively. L50, the Sound Pressure Level (SPL) exceeded 50 percent of the time, provides an indication of the median sound level. L90 represents the residual level, or the background noise level without intrusive noises. The Lmax represents the maximum sound level recorded, and the Lmin represents the lowest sound level recorded over a specific time interval (i.e., 1-hour, 24-hour monitoring periods).

Peak Sound Level Peak sound level is the maximum instantaneous sound level of an event measured with a sound level meter or analyzer set for un-weighted (or linear weighting). No time integrating is used when peak levels are measured.

Ambient (Residual) Noise Level Ambient noise is the combined noise from all noise generating sources (factory noise, traffic noise, birdsong, running water, etc.). The ambient noise is composed of the noise contributions from specific noise sources.

Residual or background sound level can be useful in characterizing a community with respect to noise. The residual sound level is the minimum sound level in the absence of identifiable or intermittent local sources. It is not the absolute minimum sound level during a long observation period, but rather the lowest reading that is reached repeatedly during a given period. The L90 (referred to as the ambient level) is a statistical descriptor, which represents the level that is exceeded 90 percent of the time. Comparisons of data have shown that the L90, measured with a continuous statistical sound meter, and the residual sound level, measured by trained personnel with a sound-level meter, are closely correlated with one another (Bolt, Beranek, and Neman, Inc. 1978).

Day/Night Equivalent Sound Level (DNL) The day/night equivalent sound level (DNL) or (Ldn) is the equivalent energy-averaged sound level for a 24-hour period (U.S. EPA 1974). The Ldn is estimated from the equivalent daytime Ld (7:00 a.m. to 10:00 p.m.) and nighttime Ln (10:00 p.m. and 7:00 a.m.) levels with an additional 10 dBA weighting imposed on the equivalent sound levels occurring during nighttime (10:00 p.m. and 7:00 a.m.). The 10-decibel increase at night is because people are more sensitive to noise during normal sleeping hours, when ambient noise levels are lower.

The U.S. EPA suggests this descriptor be used to relate noise in residential areas to annoyance caused by interference with speech, sleep and other activity. Based on interpretation of available scientific information, U.S. EPA identified an outdoor Ldn of 55 dBA as a level protective of public health and welfare with an adequate margin of safety, without concern for economic and technical feasibility (U.S. EPA 1978).

The DNL provides a single measure of overall noise impact and represents total sound exposure. Although DNL does provide a single measure of overall noise impact, it does not provide specific information on the number of noise events or specific individual sound levels that occur. For example, a DNL of 65 dB could result from a small number of very loud events or from a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent total sound exposure. Scientific studies and social surveys have found DNL to be the best measure for assessing levels of annoyance associated with all types of environmental noise. Therefore, the scientific community and governmental agencies, such as US EPA, the Federal Interagency Committee on Urban Noise (FICUN), and the Federal Interagency Committee on Noise (FICON), endorse its use. DNL is the preferred noise metric of the US EPA, HUD, FAA, and DOD.

DNL can be assessed using the A-weighted scale or C-weighted scale. The A-weighted Day-Night Average Sound Level (ADNL) noise descriptor is used to describe the noise environment around airfields; DNL has been determined to be a reliable measure of community sensitivity to aircraft noise and has become the standard metric used in the U.S. to quantify aircraft noise. The C-weighted Day-Night Average Sound Level (CDNL) is used for intense noise containing low frequency sound energy (near or below the threshold of human hearing) like that from large gun blasts and sonic booms that tend to elicit annoyance through building rattles.

Sensitive Receptors Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. Areas or receptors that are considered potentially sensitive to noise include residences, schools, hospitals, and recreational facilities (U.S. Environmental Protection Agency, 1974). Potentially sensitive receptors located near the noise source usually include residential areas near the site. The location of closest residence to the noise source is identified and is commonly a candidate for noise monitoring. Affected receptors are specific (e.g., schools, churches, or hospitals) or broad (e.g., nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists and existing background levels.

Noise Guidelines and Standards Federal and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. Chapter 7 of Department of the Army Regulation (AR) 200-1 implements all Federal laws concerning environmental noise from Department of the Army activities. According to AR 200-1, the objectives of noise abatement are to:

- Assess the environmental impacts from noise produced by military activities and to mitigate harmful or objectionable effects to the maximum extent possible
- Comply with applicable Federal, state, interstate, and local standards pertaining to noise consistent with military requirements
- Achieve noise abatement through the application of engineering noise control measures, modern land use planning, and procurement of low-noise emission products
- Incorporate noise control provisions as necessary.

USEPA The U.S. EPA suggests the DNL be used to relate noise in residential areas to annoyance caused by interference with speech, sleep and other activity. Based on interpretation of available scientific information, U.S. EPA identified an outdoor DNL of 55 dBA as a level protective of public health and welfare with an adequate margin of safety, without concern for economic and technical feasibility (U.S. EPA 1978).

The US EPA has examined levels of environmental noise necessary to protect public health and welfare, and on speech communication and indoor interference (U.S. EPA 1978) and indicates that “the highest noise level that permits relaxed conversation with 100% sentence intelligibility throughout a room is an indoor DNL of 45 dBA.” An indoor sound-level of 55 dBA corresponds to 99% sentence intelligibility and an indoor sound-level of about 65 dBA corresponds to 95% sentence intelligibility. These sound-levels are guidance levels developed by US EPA without concern for economic and technological feasibility and are intentionally conservative. An indoor DNL of 45 dBA or lower is the preferred level of the US EPA for assessing indoor noise exposure.

HUD Circular 1390.2 The U.S. Department of Housing and Urban Development (HUD) is a federal agency established in 1965 by the Department of Housing and Urban Development Act. HUD’s mission is to increase homeownership, support community development and increase access to affordable housing free from discrimination.

HUD was tasked by the Housing and Urban Development Act of 1965 (Public Law 89-117) “to determine feasible methods of reducing the economic loss and hardships suffered by homeowners as a result of the depreciation in the value of their properties following the construction of airports in the vicinity of their homes. The Noise Control Act of 1972, in addition to its specific tasking to EPA, tasked all Federal agencies to administer their programs in ways which to reduce noise pollution. Finally, the Department is tasked by Federal Management Circular 75-2: Compatible Land Uses at Federal Airfields to make sure that its actions do not promote incompatible land uses around Federal airfields (U.S. Department of Housing and Urban Development, 2002).

HUD has the responsibility to be aware of potential noise problems and potential noise impacts on HUD housing environments. HUD Regulations set forth the following exterior noise standards for new housing construction: 65 Ldn or less is acceptable, exceeding 65 Ldn but not exceeding 75 Ldn is normally unacceptable, and exceeding 75 Ldn is unacceptable. Approvals of mortgage loans from HUD or the Department of Veterans Affairs are subject

to HUD requirements (circular) that sets forth a discretionary policy to withhold funds for housing projects when noise exposure levels are in excess of prescribed levels. HUD funding for residential housing may be permitted in areas with outdoor ADNL of 65, provided sound insulation is accomplished. Insulation, however, may make development in these areas financially less attractive. Because the HUD policy is discretionary, variances may also be permitted, depending on regional interpretation and local conditions.

HUD also has a policy which does not provide funding for projects in clear zones and accident potential zones unless the project is compatible with the AICUZ (24 CFR Section 51.300).

GSA Federal Management Circular 75-2 GSA requires agencies sponsoring federally funded projects to ensure that these projects are compatible with land use plans of the airport operator. This circular allows the aircraft installation to extend its land use recommendations to federally funded projects in the vicinity.

FICUN In the late 1970’s, several federal agencies, including the DOD, came together to establish the Federal Interagency Council on Urban Noise (FICUN) with the purpose of creating a consistent set of guidelines for determining the total noise impact on communities. Many of the current DOD land use compatibility guidelines were adopted as the method to determine noise impacts on these communities and FICUN published these guidelines in a 1980 report (FICUN 1980).

In response to citizen concerns in the late 1980’s and the need for interagency coordination, the federal agencies came together for two purposes. The first was to reassess the EPA’s method of determining noise and the second reason was to establish the impact criteria from noise sources. To signify this broader mandate, the agencies changed their name to the Federal Interagency Committee on Noise (FICON) and in their report they reconfirmed the basic noise measurement standards as applicable for noise analysis (FICON 1992). At the same time, FICON also established a curve for assessing the impact of noise on sleep disturbance and established thresholds for judging significant impacts.

In 1993, FICON came together again, this time to concentrate on aviation noise. The Federal Interagency Committee on Aviation Noise (FICAN) was formed to provide forums for debate over the need for future aviation noise research and to encourage new development efforts in this area.

Section 13.4 - Noise Basics

The Federal Interagency Committee on Urban Noise (FICUN) developed land use compatibility guidelines for noise exposure areas (FICUN 1980). FICUN developed guidelines for considering noise in land use planning in terms of a DNL sound level (FICUN, 1980).

DNL is the accepted unit for quantifying annoyance to humans from general environmental noise, including aircraft noise. Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis. Studies specifically conducted to determine noise impacts on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below 65 dBA (USDOT 1984). Studies of community annoyance in response to numerous types of environmental noise show that ADNL correlates well with impact assessments and that there is a consistent relationship between ADNL and the level of annoyance.

Based upon these FICUN guidelines, the FAA developed recommended land uses in aircraft noise exposure areas. These guidelines provide for assessing land uses related to noise zones based on USAF, FAA and HUD criteria. According to the USAF, the FAA, and the HUD criteria, residential units and other noise-sensitive land uses are “clearly unacceptable” in areas where the noise exposure exceeds 75 dBA; “normally unacceptable” in regions exposed to noise between 65 dBA and 75 dBA; and “normally acceptable” in areas exposed to noise of 65 dBA or under. For outdoor activities, the USEPA recommends a DNL sound level of 55 dBA as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974).

The Air Force uses DNL as the method to estimate the amount of exposure to aircraft noise and predict impacts as recommended by FICUN. Land use compatibility and incompatibility are determined by comparing the predicted DNL level at a site with the recommended land uses.

AICUZ and IONMP Ongoing DOD programs provide for studies to assess potential noise levels generated and air safety concerns associated with various training operations and to identify off-base land areas around military installations (i.e., airfields, ranges), with zoning and/or land use that may be incompatible with the noise levels and aircraft accident potential. This information provides a basis to develop recommendations for the land lying within these areas that are compatible with the needs of the community and the base missions.

The Air Installation Compatibility Use Zone Program (AICUZ) is an ongoing program for all Air Force airfields. It is designed to assist the adjacent community by recommending land use planning that ensures safe aircraft operations and minimizes noise impacts to the community. AICUZ program experience indicates that future year planning is necessary to consider the effects of expected changes in mission, aircraft, operational levels, etc. One element of the AICUZ program is to develop noise contours around the base that can be used by the community for zoning ordinances.

The Army Installation Compatible Use Zone (ICUZ) program is similar to the AICUZ program for air operations. ICUZ provides a method for evaluating the effect of noise and the hazards associated with training operations that stem from activities at military installations such as ranges. The ICUZ program considers the land areas, with noise-sensitive land uses, that are exposed to generally unacceptable noise levels and aircraft accident potential.

The policy and procedures of the ICUZ are essentially the same as the AICUZ. The ICUZ has recently been incorporated into the IONMP to emphasize actions other than zoning (i.e., ordinances, regulation of new construction, etc.) as solutions to planning in the noise environment.

With the IONMP, the primary strategies for protecting the mission of military installations from the problems of noise incompatibility are long-range land use planning and being a responsible neighbor to surrounding communities.

Central to these programs is noise modeling that creates noise contours against which the land use compatibility designations are overlaid. As part of the Installation Operational Noise Management Plan (IONMP) the ICUZ study, the key tool to identifying and avoiding potential noise problems at an installation, is essentially a planning document.

The purpose of the IONMP is to:

- Control environmental noise to protect the health and welfare of people, on and off-base, who are impacted by military installation authorized noise producers
- Reduce community annoyance from environmental noise to the extent feasible
- Actively engage local communities in land use planning in areas subject to high levels of operational noise with a high potential for noise complaints

An Installation Operational Noise Management Program (IONMP) Report is the main component of noise abatement planning and is an essential tool for finding common ground with neighboring communities. It is an installation-specific study of the existing and future noise environment, developed to aid military and civilian officials and planners in creating land-use plans and policies that promote compatibility between the needs of the civilian sector and the installation's mission requirements.

The IONMP not only examines current activities on the installation, but also considers the impacts of future weapons and missions. The IONMP process attempts to take immediate steps to prevent land compatibility conflicts from occurring or at least to minimize their impacts. The purpose of the program is to identify land areas that are exposed to generally unacceptable noise levels and aircraft accident potential. This information is then used to recommend uses for the land lying within these areas that are compatible with the needs of the civilian community and the Army.

AICUZ and IONMP information was provided to the Team for current and forecasted operations from previous studies and documents by others and included noise contours from detailed computerized simulation modeling for AICUZ /IONMP.

AICUZ /IONMP noise studies define noise level contours that reflect noise associated with air operations and other activities at the base. Boundaries of the AICUZ Study Area (ASA) are based on the existing community planning or jurisdictional boundaries of local municipalities located nearby.

AICUZ Projected Operations AICUZ contours are developed to reflect the normalized operating conditions of any new rotary and fixed-wing aircraft to accommodate the safe co-

location of the military installation and the surrounding community development.

Therefore, in addition to the baseline year analysis, the AICUZ includes an analysis of future mission requirements (projected operations). The resultant noise contours are referred to as the "projected" noise contours. Projections of aircraft and aircraft operations are based upon currently available unclassified estimates of future mission requirements.

Projections of air operations activity levels (normally for a time frame 5 to 10 years forward) are needed to assess changes in air installation activity levels and/or operational procedures. The noise effects of a given or forecast of air operations can be assessed by a measure of the amount of land area associated with various DNL noise contours (for example of 65 dB). Relative increases or decreases of areas within various DNL contour levels for the various land uses and populations within these areas can also be assessed and related to different air or other operations.

Noise Modeling Computer models are used to simulate resulting noise levels from various operational activities (aircraft operations, small arms use, large arms use, etc.). Noise contours are developed by a computerized simulation model of munitions and/or aircraft activity at an installation that reflect noise from site-specific operational data; e.g., type of training, type of weapons used, flight tracks, type and mix of aircraft, aircraft profiles (airspeed, altitude, power settings), frequency and times of operations at a given base and meteorology. This operational information is used to calculate values (noise levels) at points on a regularly spaced grid surrounding a base. A plotting program generates contour lines connecting points of equal values in a manner similar to elevation contours shown on topographic maps. Noise levels from various operations are represented by noise contours.

The contours around the installation reflect either the peak sound level, or an average day-night sound level (DNL) that converts noise varying from peak bursts to relative quiet into a steady measure of acoustic energy over a 24 hour period. The DNL can be assessed using the A-weighted scale or C-weighted scale. The A-weighted Day-Night Average Sound Level (ADNL) noise descriptor is used to describe the noise environment around airfields or for small arms munitions use. The C-weighted Day-Night Average Sound Level (CDNL) is used for intense noise containing low frequency sound energy like that from large arms munitions use.

Section 13.4 - Noise Basics

Noise levels (Peak or DNL) are depicted as contours connecting points of equal value, usually in 5-decibel increments. Calculated noise contours do not represent exact scientific noise measurements; noise levels inside a contour may be similar to those outside a contour line. The area between two specific sets of contours is known as a noise zone. Contours that define noise zones should be viewed as a planning tool, not as a series of discrete lines that sharply divide noise-affected land from non-noise affected areas.

U.S. Department of Defense (DOD) approved noise models were used to define the noise zones for Fort Dix munitions use. Small Arms Range Noise Assessment Model (SARNAM) was used to generate noise contours from small arms activity (munitions less than 20 millimeters), and Blast Noise (BNOISE2) was used to generate noise contours from the artillery and demolition firing (munitions greater than 20 millimeters). Noise levels associated with civilian and military vehicle operations were determined using Federal Highway Administration Traffic Noise Model (FHWA TNM).

The noise analysis methods used for airfield operations at McGuire AFB and NAES Lakehurst are based on the noise contours produced by the NOISEMAP noise model (AMC EA, 2005). NOISEMAP is a suite of computer programs developed by the Air Force to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations.

The contours produced by NOISEMAP, SARNAM and BNOISE2 were developed as part of previous studies related to operations and analyses of potential environmental impact assessments compiled for the three military installations. These contours have been compiled, reviewed, extracted and summarized in the noise analysis sections from available previously prepared documents, and other

Section 13.5 - Guideline for Considering Noise in Land Use Planning and Control

(FICUN 1980)

	NZ I		NZ II		NZ III		
	0-55	55-65	65-70	70-75	75-80	80-85	85+
RESIDENTIAL							
Household Units	Yes	Yes*	25'	30'	No	No	No
Group Quarters	Yes	Yes*	25'	30'	No	No	No
Residential Hotels	Yes	Yes*	25'	30'	No	No	No
Manufactured Housing	Yes	Yes*	No	No	No	No	No
Other Residential	Yes	Yes*	25'	30'	No	No	No
MANUFACTURING							
Food Products	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Textile Mill Products	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Apparel	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Wood Products	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Furniture	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Paper	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Printing	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Manufacturing	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
TRANSPORT, COMMS & UTIL							
Railroad	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Motor Vehicle	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Aircraft	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Marine Craft	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Highway & Street	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Parking	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Communications	Yes	Yes	Yes	25 ⁵	30 ⁵	No	No
Utilities	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁴
Other T, C & U	Yes	Yes	Yes	25 ⁵	30 ⁵	No	No
TRADE							
Wholesale Trade	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Retail - Building	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No

	NZ I		NZ II		NZ III		
	0-55	55-65	65-70	70-75	75-80	80-85	85+
Retail - General	Yes	Yes	Yes	25	30	No	No
Retail - Food	Yes	Yes	Yes	25	30	No	No
Retail - Auto	Yes	Yes	Yes	25	30	No	No
Retail - Apparel	Yes	Yes	Yes	25	30	No	No
Retail - Furniture	Yes	Yes	Yes	25	30	No	No
Retail - Eating	Yes	Yes	Yes	25	30	No	No
Other Retail Trade	Yes	Yes	Yes	25	30	No	No
SERVICES							
Finance, Insurance	Yes	Yes	Yes	25	30	No	No
Personal Services	Yes	Yes	Yes	25	30	No	No
Cemeteries ¹¹	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	Yes ⁵
Repair Services	Yes	Yes	Yes	Yes ²	Yes ³	Yes ⁴	No
Profess Services	Yes	Yes	Yes	25	30	No	No
Hospitals, Nursing	Yes	Yes*	25*	30*	No	No	No
Other Medical Facilities	Yes	Yes	Yes	25	30	No	No
Contract Construction	Yes	Yes	Yes	25	30	No	No
Government Services	Yes	Yes*	Yes*	25*	30*	No	No
Educational Services	Yes	Yes*	25*	30*	No	No	No
Misc Services	Yes	Yes	Yes	25	30	No	No
CULTURAL, ENTERTAINMENT & REC							
Churches	Yes	Yes*	25*	30*	No	No	No
Nature Exhibits	Yes	Yes*	Yes*	No	No	No	No
Public Assembly	Yes	Yes	Yes	No	No	No	No
Auditoriums	Yes	Yes	25	30	No	No	No
Amphitheatres	Yes	Yes*	No	No	No	No	No
Outdoor Sports	Yes	Yes	Yes ⁷	Yes ⁷	No	No	No
Amusements	Yes	Yes	Yes	Yes	No	No	No
Recreational	Yes	Yes*	Yes*	25*	30*	No	No
Resorts	Yes	Yes*	Yes*	Yes*	No	No	No
Parks	Yes	Yes*	Yes*	Yes*	No	No	No
Other	Yes	Yes*	Yes*	Yes*	No	No	No

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	NZ I		NZ II		NZ III		
	0-55	55-65	65-70	70-75	75-80	80-85	85+
RESOURCE PRODUCT							
Agriculture	Yes	Yes	Yes ^a	Yes ⁹	Yes ¹⁰	Yes ¹⁰	Yes ¹⁰
Livestock	Yes	Yes	Yes ^a	Yes ⁹	No	No	No
Forestry	Yes	Yes	Yes ^a	Yes ⁹	Yes ¹⁰	Yes ¹⁰	Yes ¹⁰
Fishing	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mining	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Resource	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Legend:

Yes	Land use and related structures compatible without restrictions
No	Land use and related structures are not compatible and should be prohibited
ADNL	A-weighted day-night sound level
NZ	Noise Zone
Yesx	(Yes with restrictions) Land use and related structures generally compatible
25, 30, 35	Land use and related structures generally compatible; measures to achieve noise level reduction (NLR) of 25, 30 or 35 must be incorporated into design and construction of structure
25*, 30*, 35*	Land use generally compatible with NLR; however, measures to achieve an overall NLR do not necessarily solve noise difficulties; additional evaluation is warranted
NLR	Noise level reduction (outdoor to indoor) is to be achieved through incorporation of noise attenuation into the design and construction of the structure.

Notes:

- 1(a) Local conditions may require residential use, however it is discouraged in 65-70 ADNL and strongly discouraged in 70-75 ADNL. The absence of viable alternative development options should be determined and an evaluation, indicating that a demonstrated community need for residential use would not be met if development were prohibited in these Zones, should be conducted prior to approvals.
- 1(b) Where the community determines that residential uses must be allowed, measures to achieve an outdoor to indoor NLR of at least 25 dB (65-70 ADNL) and 30 dB (70-75 ADNL) should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded Sound Transmission Class (STC) ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

- 1(c) NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.
- 2 Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
- 3 Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
- 4 Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
- 5 If noise-sensitive, use indicated NLR; if not, use is compatible.
- 6 No buildings.
- 7 Land use compatible provided special sound reinforcement systems are installed.
- 8 Residential buildings require a NLR of 25.
- 9 Residential buildings require a NLR of 30.
- 10 Residential buildings not permitted.
- 11 In areas with ADNL greater than 80, land use not recommended, but if community decides use is necessary, hearing protection devices should be worn by personnel.

Section 13.6 - DoD Compatible Land Use Guidelines

For Clear Zones And Accident Potential Zones (APZ)
(U.S. Army 1981)

Land Use	Clear Zone	APZ I	APZ II
RESIDENTIAL			
Single Family Unit	No	No	Yes ²
2-4 Family Units	No	No	No
Multifamily Dwellings (Apartments)	No	No	No
Group Quarters	No	No	No
Residential Hotels	No	No	No
Mobile Home Parks or Courts	No	No	No
Other Residential	No	No	No
INDUSTRIAL & MANUFACTURING³			
Food and Kindred Products	No	No	Yes
Apparel	No	No	No
Lumber and Wood Products	No	Yes	Yes
Furniture and Fixtures	No	Yes	Yes
Printing, Publishing	No	Yes	Yes
Miscellaneous Manufacturing	No	Yes	Yes
TRANSPORTATION, COMMUNICATIONS & UTILITIES⁴			
Railroad, Rapid Rail Transit (on-grade)	No	Yes ⁴	Yes
Highway and Street Rights-of-Way	Yes ⁵	Yes	Yes
Auto Parking	No	Yes	Yes
Communications	Yes ⁵	Yes	Yes
Utilities	Yes ⁵	Yes ⁴	Yes
Other Transportation, Communications and Utilities	Yes ⁵	Yes	Yes
COMMERCIAL & RETAIL TRADE			
Wholesale Trade	No	Yes	Yes
Building Materials (Retail)	No	Yes	Yes
General Merchandise (Retail)	No	No	Yes

Land Use	Clear Zone	APZ I	APZ II
Food (Retail)	No	No	Yes
Automotive, Marine, and Aviation	No	Yes	Yes
Apparel and Accessories (Retail)	No	No	Yes
Furniture, Home Furnishings (Retail)	No	No	Yes
Eating and Drinking Facilities	No	No	No
Other Retail Trade	No	No	Yes
PERSONAL & BUSINESS SERVICES⁶			
Finance, Insurance, and Real Estate	No	No	Yes
Personal Services	No	No	Yes
Business Services	No	No	Yes
Repair Services	No	Yes	Yes
Professional Services	No	No	Yes
Contract Construction Services	No	Yes	Yes
Indoor Recreation Services	No	No	Yes
Other Services	No	No	Yes
PUBLIC AND QUASI-PUBLIC SERVICES			
Government Services	No	No	Yes ⁶
Educational Services	No	No	No
Cultural Activities	No	No	No
Medical and Other Health Services	No	No	No
Cemeteries	No	Yes ⁷	Yes ⁷
Non-profit Organizations including Churches	No	No	No
Other Public and Quasi-Public Services	No	No	Yes
OUTDOOR RECREATION			
Playgrounds and Neighborhood Parks	No	No	Yes
Community and Regional Parks	No	Yes ⁸	Yes ⁸
Nature Exhibits	No	Yes	Yes
Spectator Sports Including Arenas	No	No	No
Golf Courses ⁹ , Riding Stables ¹⁰	No	Yes	Yes
Water Based Recreational Areas	No	Yes	Yes
Resort and Group Camps	No	No	No

Section 13.6 - DoD Compatible Land Use

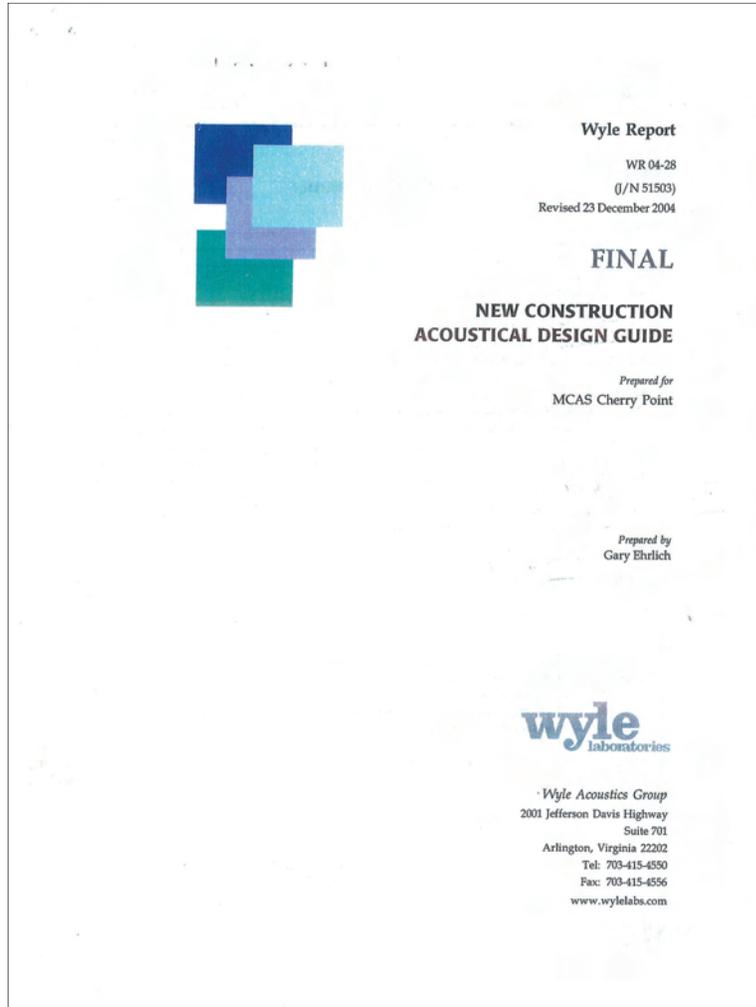
Land Use	Clear Zone	APZ I	APZ II
Entertainment Assembly Areas	No	No	No
Other Outdoor Recreation	No	Yes ⁸	Yes
RESOURCE PRODUCTION & EXTRACTION& OPEN LAND			
Agriculture ¹¹	Yes	Yes	Yes
Livestock Farming, Animal Breeding ¹²	No	Yes	Yes
Forestry Activities	No	Yes	Yes
Fishing Activities and Related Services ¹³	No ¹⁴	Yes ¹³	Yes
Mining Activities	No	Yes	Yes
Permanent Open Space	Yes	Yes	Yes
Water Areas ¹³	Yes	Yes	Yes

Notes:

- 1A "Yes" or "No" designation for compatible land use is to be used only for gross comparison. Within each, uses exist where further definition may be needed as to whether it is clear or usually acceptable/unacceptable owing to variations in densities of people and structures. For heliports and stagefields, the takeoff safety zone is equivalent to the clear zone and the approach-departure zone is equivalent to APZ I for these land use guidelines.
- 2 Suggested maximum density 1-2 dwelling units per acre, possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.
- 3 Factors to be considered: Labor intensity, structural coverage, explosive characteristics, and air pollution.
- 4 No passenger terminals and no major above ground transmission lines in APZ I.
- 5 Not permitted in graded area.
- 6 Low intensity office uses only. Meeting places, auditoriums, etc., not recommended.
- 7 Excludes chapels.
- 8 Facilities must be low intensity.
- 9 Clubhouse not recommended.
- 10 Concentrated rings with large classes not recommended.
- 11 Includes livestock grazing but excludes feedlots and intensive animal husbandry.
- 12 Includes feedlots and intensive animal husbandry.
- 13 Includes hunting and fishing.
- 14 Controlled hunting and fishing may be permitted for the purpose of wildlife control.

Section 13.7 - New Construction Acoustical Design Guide

Prepared for MCAS Cherry Point by Wyle Laboratories (WR 04-28 December 2004)



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1.0 Introduction

1.1 Background

Residences located near military airfields experience many economic and transportation benefits of the facility, but are unfortunately exposed to significant amounts of aircraft noise. However, using proper construction techniques and materials minimizes the impact of aircraft noise and reduces interference with regular indoor activities. This New Construction Acoustical Design Guide can assist in incorporating specific noise level reduction features into the designs of new homes in the Marine Corps Air Station (MCAS) Cherry Point area. These features will help to ensure that new homes in the area provide an adequate noise level reduction to protect occupants from undesirable noise impacts.

For homes located in areas with high noise levels, standard building methods, even those that are designed for thermal efficiency, are normally inadequate to protect inhabitants from external noise. For this reason, building design and construction methods may have to be modified for noise-sensitive rooms such as bedrooms, kitchens, living rooms, and family rooms. These spaces are referred to as the habitable rooms in a house. Standard design and construction methods can typically be used for non-habitable rooms, such as garages, mudrooms, and breezeways unless they open directly to habitable rooms without interior doors in between the rooms.

This Design Guide provides recommendations for the design of dwellings in the vicinity of the airfield that may be constructed in the future. It is meant to be used in conjunction with noise overlay zones developed by the surrounding communities through the joint land use study process. This Guide was developed for new homes; different materials and techniques would be appropriate when renovating houses to achieve the noise level reduction goals. Construction guidelines are presented for the noise level reductions (NLRs) of 20, 25, 30, and 35 decibels. Noise levels typically vary somewhat throughout a room. Throughout this guide the NLR is considered for locations approximately six feet from exterior walls.

The recommendations contained in this Guide were developed considering the unique characteristics of the aircraft that currently use MCAS Cherry Point. As a result, the recommendations would not be the same as those developed for communities near civilian airfields.

1.2 How to Use this Guide

This guide has been developed to be used by a variety of different professionals, as well as by interested homeowners. This guide is recommended for the following people:

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- ▶ Planning Officials
- ▶ Plan Reviewers
- ▶ Building Inspectors
- ▶ Builders
- ▶ Homebuyers/Homeowners

Sections 2.0 Through 3.0

The main design guide sections include a brief overview of sound transmission paths into a home, a discussion of basic design principles, and subsections for each building element including windows, doors, walls, ceilings and roofs, floors and crawlspaces, and mechanical systems. The building element subsections include text, tables, and design detail drawings to illustrate various options for noise control. Cost estimates are included for the proposed upgrades.

Section 4.0

Specific design requirements are presented in a selection chart. Designs that achieve noise level reductions (NLR) of 20, 25, 30 and 35 dB are listed. The table in Section 4.0 tells the sound ratings of building materials that are needed to achieve the NLR design goals. Additional details are provided in Appendix A.

Section 5.0

This section discusses some of the assumptions used in developing the proposed design methods, as well as factors that would affect the accuracy of NLR predictions.

Appendices

The first appendix provides a description of design and construction methods necessary to achieve NLRs of 20, 25, 30, and 35 dB. It supplements and details the design requirements presented in Section 4.0. Once the reader is familiar with this Guide, Section 4.0 and Appendix A can be used as stand-alone references in implementing the designs. Appendices B and C will be useful to local officials. Appendices D and E will be useful to builders, as they provide information on many acoustical product manufacturers and certified test laboratories. Appendix F is a glossary that will be useful to all parties. Appendix G provides additional information regarding high wind zones and would be of most interest to builders.

General Notes

This Guide seeks to provide clear, unambiguous direction that is practical and can be implemented with minimum additional cost. However, construction quality is especially

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important for maintaining the acoustical integrity of a design. For example, even a good window, if not installed properly, will allow a significant amount of noise into the building. High-quality construction standards are absolutely essential for these techniques to work effectively.

The design packages in Section 4.0 and Appendix A address typical home sizes and styles. The noise analysis used here makes assumptions about the number and type of exterior doors, the floor area, and the amount of furnishings in the room. Unusual homes may require more specialized analysis to ensure compliance. For example, very small rooms with a normal area of windows have a larger window-to-floor area ratio and may allow more noise intrusion than typical rooms. Homes with large wrap-around porches may provide shielding from noise that the Guide will not anticipate. For these reasons, homes with unique features or with dimensions that differ significantly from the average may require the services of an acoustical consultant in order to ensure adequate noise reduction.

Individuals differ in their response to noise. In an aircraft noise-affected neighborhood, a number of residents are very annoyed by aircraft overflights, while quite a few others are not. If properly implemented, the recommendations in this Guide will reduce noise inside the home to levels that most people will find acceptable. The aircraft will still be discernible; sound insulation is not sound elimination. People will know that a plane is passing overhead but, with the techniques outlined in this Guide, the noise should not be so loud that it interferes with normal daily indoor activities. Those individuals, however, who are most sensitive to noise, may continue to be annoyed. Nevertheless, the number of people who perceive unacceptable indoor noise levels can be significantly reduced by the use of proper construction techniques.

House Types

In the MCAS Cherry Point area new homes could include:

- ▶ Single-family homes
- ▶ Modular single-family homes
- ▶ Manufactured ("HUD Code") single-family homes
- ▶ Townhouses
- ▶ Apartments (rental or condominium)

The recommendations in this guide apply to all of these types of homes, except to HUD Code homes. There are Federal requirements for the construction and safety of manufactured homes. The National Manufactured Housing Construction and Safety Standards Act of 1974 (Title VI of Pub. L. 93-383, 88 Stat. 700, 42 U.S.C. 5401, et seq.) required the U.S. Department of Housing and Urban Development (HUD) to establish construction and safety standards for manufactured homes. The resulting Manufactured Home Construction and Safety Standards, generally

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referred to as the "HUD Code" (24 CFR 3280), regulate the design and construction of all manufactured homes in the U.S. A manufactured home (formerly known as a trailer or mobile home) by definition must have "continued transportability." In contrast, a modular home is assembled from panels and is installed on a site-built permanent foundation. Therefore, modular homes do not have continued transportability and are not covered by the HUD Code (see 24 CFR 3280.7). A manufacturer may elect to construct a structure that is both a manufactured and a modular home (see CFR 3282.12).

Only the HUD Code can be used to limit the construction of manufactured homes, with certain exceptions related to wind loads and foundation design. States and localities cannot preempt Federal requirements with respect to the construction and safety of a manufactured home. A locality can require that all other types of housing be built to attain certain noise level reduction goals, but they cannot for manufactured homes. A locality can only prohibit the use of manufactured homes in certain locations such as in a specified noise zone.

Manufactured homes and some modular homes use thinner gypsum board and particular types of mechanical systems. In addition, where it is necessary to use additional layers of gypsum board on walls or ceilings, there is a question of whether the structure can carry the extra weight. This may make it impossible or cost prohibitive to meet the noise reduction goals for manufactured homes and some modular homes.

Therefore, this Guide does not cover sound insulating manufactured homes. Modular homes should be treated no differently than traditional single-family homes.

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2.0 Noise Control Basics

2.1 Units Used in Acoustics

A number of different metrics (measures) have been developed to express various aspects of acoustics. It is important to understand several of them in order to make the best use of this Guide.

Aircraft noise is generally expressed in terms of its A-weighted sound level, in units called "decibels." Strictly speaking, the decibel unit should be abbreviated only by "dB"; however, for clarity "dBA" and "dB(A)" are often used to highlight the fact that the sound level measurement has been A-weighted (this weighting system is described below).

The noise exposure in areas around airfields is expressed in terms of the Day-Night Average Sound Level, which is abbreviated by "DNL" in text and " L_{dn} " in equations. DNL is a measure of the average A-weighted sound level of all aircraft flights occurring in a 24-hour period with nighttime operations being counted more heavily as described below. The unit of DNL is also the decibel.

The sound insulation properties of building construction materials are described by Sound Transmission Loss (TL) or Sound Transmission Class (STC). These measures of sound insulation are also described below.

A-Weighted Sound Level

The two most obvious characteristics of sound are level and frequency. Level is essentially a measure of loudness that refers to how much energy or power a sound has when we hear it. Frequency is essentially a measure of pitch. A deep-voiced baritone singer has a lower frequency (or pitch) than a soprano voice, though they may be equally loud. Hertz (abbreviated Hz) is the unit used to indicate frequency and is equal to the number of sound waves (cycles) per second. For reference, middle C on a piano has a frequency of exactly 256 Hz. The normal human ear can detect sound frequencies ranging from about 20 Hz to about 15,000 Hz. People do not hear all sounds over this wide range of frequencies equally well, however. The human ear is most sensitive to sounds in the 1,000 to 6,000 Hz range.

In order to reflect the differences in hearing sensitivity to different frequencies, sounds are usually described in terms of A-weighted sound levels. When a sound is A-weighted, sound levels measured in the 1,000 to 6,000 Hz frequency range are increased by a specified amount to account for the fact that the ear perceives them as louder compared to other frequencies.

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Similarly, sound levels measured at frequencies outside this range are reduced because the ear is less sensitive in those regions.

Day-Night Average Sound Level (DNL) and Noise Contours

Aircraft noise exposure in a community is usually described in terms of noise contour maps. These indicate bands or zones around airfields where the average noise level can be expected to fall within the ranges specified by the contour lines. Most noise contour maps show contour levels of DNL 65 dB and above in 5 dB increments.

The acoustic metric used at MCAS Cherry Point is the Day-Night Average Sound Level (DNL or L_{dn}). As noted above, this is a cumulative measure of the noise exposure during a 24-hour calendar day. A 10 dB penalty is added to noise events occurring between 10:00 p.m. and 7:00 a.m. to reflect their greater intrusiveness and potential for disturbing sleep. The DNL is the result of averaging the A-weighted sound pressure level over 24 hours for aircraft activities taking place on an average busy day. The average busy day is determined by analyzing flight activity over a full year and averaging the number of operations that occur during generally busy periods. This gives an indication of the year-round average noise exposure for the community.

Sound Transmission Loss (TL)¹

This is the physical measure that describes the sound insulation value of a building element such as a window or wall. Values of TL are determined in acoustical laboratories under controlled testing methods prescribed by the American Society for Testing and Materials (ASTM). The TL is expressed in decibels (dB), and the greater the sound insulation, the higher the TL value and the less sound will be transmitted through the building material. TL values are determined for different frequency ranges and give an indication of how a building product or assembly responds differently to sounds at different frequencies.

Sound Transmission Class (STC)²

Since working with a series of TL measurements for different frequencies can be cumbersome, a single-number descriptor based on the TL values has been developed. This rating method is called the Sound Transmission Class (STC). As with the TL, the greater the STC rating for a construction method or component, the higher the sound insulation. Originally, STC ratings were developed as a single-number descriptor for the TL of interior office or apartment walls for typical office noise and speech spectra. Now, they are used for exterior building components as

¹ Tests to determine TL are described in American Society for Testing and Materials (ASTM) Standard E90.

² STC is described in ASTM Standard E413.

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well. Most acoustical materials and components are commonly specified in terms of their STC ratings.

2.2 Aircraft Noise*Interference with Activities*

The problem of aircraft noise has been recognized and studied in this country since the 1950s. Opinion surveys indicate that interference with telephone usage, listening to television and radio, and conversations invoke the most complaints. However, after a home has been sound insulated, residents notice improvements in their ability to carry out these normal activities as well as to fall asleep and concentrate.

Fears of permanent hearing damage from flyovers have been shown to be unfounded. A large number of studies on the physical health effects of aircraft noise exposure have led to the general conclusion that residences near airfields are not exposed to high enough sound levels to warrant concern. The principal effect of aircraft noise on airfield neighbors is annoyance caused by interference with daily activities.

Aircraft Noise Characteristics

Noise intrusion from aircraft activities is perceived as more disturbing than other kinds of noise because of two primary characteristics. Unlike many other community noise sources, such as highway noise, which tend to be fairly constant, aircraft noise consists of sporadic individual noise events with a distinct rise and fall pattern. People do not, in general, respond to these events as just another component of the "background noise" of their day-to-day lives. Some people get used to the noise, but many others feel that each individual flyover event is recognizable and disturbing.

The noise level experienced at a particular dwelling will depend on its location relative to the aircraft flight paths and the mode of ongoing aircraft operations (arrivals or departures). For homes very near the airfield, the quality that makes aircraft noise more intrusive is its higher level, or loudness, than other types of community noise.

Aircraft Sound Spectrum

The noise produced by modern aircraft contains acoustical energy over a wide frequency range. The audible noise includes many sounds from a low-frequency "rumble" to a high-frequency "whine." The exact character depends on the aircraft type and the operation performed (takeoff, landing, or ground run-up). Low-frequency noise (below 250 Hz) penetrates walls, roofs, doors, and windows much more efficiently than does high-frequency noise. Higher frequencies (above

1,000 Hz), however, are carried through cracks and vents better. Also, people hear higher frequency sound better, the human ear being more sensitive above 1,000 Hz than below.

Since aircraft noise differs somewhat from other types of community noise, it is important to identify the characteristics of the noise that sound insulation is protecting against. Most materials and construction methods are more effective at insulating in one part of the frequency spectrum than in others. Knowing the noise characteristics helps in choosing the best materials for sound insulation. This Guide has been designed specifically to protect against noise from the types of aircraft that use MCAS Cherry Point rather than noise from civilian aircraft, highway traffic, or other types of noise sources.

Most of the sound energy from military aircraft operations is found at middle frequencies. This is different from civilian aircraft that have more equal sound at low and middle frequencies. Section 2.4 discusses the process by which sound is transmitted into a dwelling interior.

2.3 Sound Insulation to Reduce Noise

Total "soundproofing" of the dwelling, such that aircraft operations are not heard, is usually not practical or cost-effective. The goal for residential sound insulation is to *reduce* the dwelling interior noise level due to aircraft operations to an acceptable level, that is, a level where it no longer interferes with daily activities.

Interior Noise Objectives

The U.S. Department of the Navy has established land use compatibility guidance for exposure to aircraft noise. The land-use compatibility table states that residential use is discouraged in the 65-69 dB DNL zone, and strongly discouraged in the 70-74 dB DNL zone. The table recommends that a home exposed to a DNL of 65 to 69 dB should provide at least 25 dB of NLR, a home exposed to a DNL of 70 to 74 dB should provide at least 30 dB of NLR, and a home exposed to a DNL of 75 to 79 dB should provide at least 35 dB of NLR. The use of other NLR goals may be appropriate in many cases, especially if a noise metric other than DNL is used in the community. The table assumes that typical homes can provide an NLR of 20 dB; separate recommendations are provided in this guide for homes exposed to a DNL of 60 to 64 dB in order to ensure that an NLR of 20 dB is provided.

Room Variations

The noise level of different rooms in a house depends on the amount of sound absorption within the room, as well as on the noise entering from outside. Upholstered furniture, drapes, and carpeting absorb sound while hard surfaces do not. The exterior sound level is transmitted through the outside walls (depending on their construction) and is further modified by the

absorption inside the room (from the various furnishings) to determine what the interior noise level will be. *The calculations contained in this report are based on the assumption that all rooms would be furnished; noise levels in unfurnished rooms would be higher.*

Expected Dwelling Noise Level Reduction

An acoustically well-insulated home with windows and doors kept closed can provide 30 to 35 dB of NLR whereas more typical, unmodified designs might provide 20 to 25 dB of NLR. Experience has proven that the objectives discussed here are reasonable when construction materials and methods follow the guidelines presented in Sections 3.0 and 4.0. Providing more than 40 dB of noise level reduction is not usually practical for a typical residence. Of course, sound insulation will not have any effect on outdoor activities. The advantage of sound insulation is that it provides a refuge from external aircraft noise levels.

In general, it is more efficient and cost effective to take acoustic performance into account at the start when designing and building a home. Remodeling a pre-existing home is far more costly and time consuming than anticipating and building using good sound insulation techniques. This Guide was developed for new homes; different materials and techniques would be appropriate when renovating houses to achieve the NLR goals.

2.4 Basic Sound Insulation Concepts

Sound Transmission

In order to effectively examine noise control measures for dwellings it is helpful to understand how sound travels from the exterior to the interior of the house. This happens in one of two basic ways: through the solid structural elements and directly through the air. Figure 2-1 illustrates the sound transmission through a wall constructed with brick exterior, wood studs, an interior finish, and sound absorbent material in the stud cavities.

The sound transmission starts with noise at the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This finish surface then radiates sound into the dwelling interior. As the figure shows, some vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

Openings in the dwelling, which provide air infiltration paths through windows, vents, and leaks, allow sound to travel directly into the interior. This is a very common, and often overlooked, source of noise intrusion. Basically, any way that air enters a home, sound will also enter.

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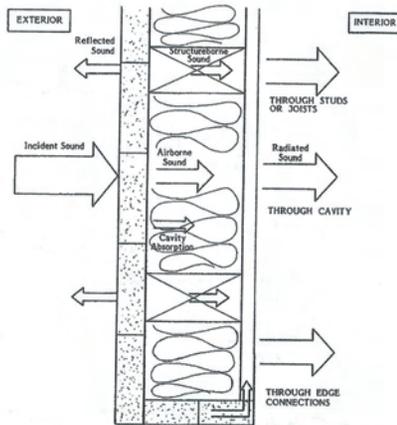


Figure 2-1. Pictorial Representation of Sound Transmission Through Built Construction

Flanking is a similar concept and usually refers to sound passing around a wall. Examples of common flanking paths include: air ducts, open ceiling or attic plenums, and crawlspaces.

Figure 2-2 displays the three different major paths for noise transmission into a dwelling: air infiltration through gaps and cracks, secondary elements such as windows and doors, and primary building elements such as walls and the roof.

Low-frequency sound is most efficiently transmitted through solid structural elements such as walls, roofs, doors, and windows. High frequencies travel best through the air gaps.

Within these broad categories, different building materials have different responses based on the frequency of the incident sound and varying abilities to insulate against sound.

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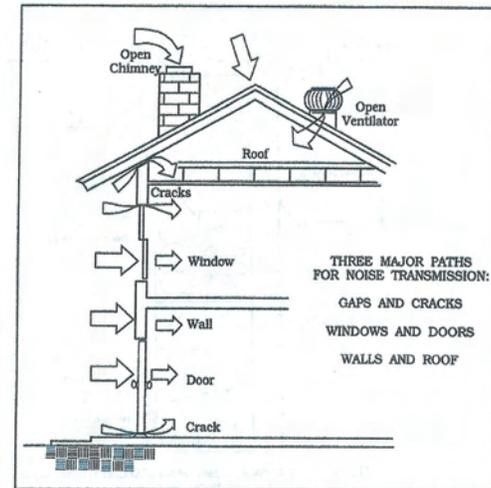


Figure 2-2. Sound Transmission Paths Into Dwelling Interiors

Reducing Transmitted Sound

The amount of sound energy transmitted through a wall, roof, or floor can be limited in several ways. First, all air infiltration gaps, openings, and possible flanking paths must be eliminated wherever possible. This is the single most important, but occasionally overlooked, step in noise level reduction. This includes keeping windows and doors closed and putting baffles on open-air vents. Some materials reflect more of the incident sound, converting less of it into vibrational energy. The mass of the exterior and interior panels influences how much sound will pass through them. The more mass a structural element has the more energy it takes to set it into vibration, so using heavier building elements generally blocks more noise. Then, absorption in the air cavity, resilient mounting of interior finish panels, and mounting the exterior and interior panels on different studs can further reduce the sound transmitted to the room. The primary approaches for improving sound isolation are:

1. Elimination of openings and flanking paths.
2. Using higher STC windows and doors.
3. Adding mass to walls or ceilings.
4. Isolation of panel elements through increasing their separation, mounting the interior and exterior panels on different studs, or resiliently mounting the interior panels.
5. Adding absorptive materials between the studs or joists.

Acoustical Design

The most important, or controlling, sound paths must be identified in order to know how to modify a dwelling design to meet a specified noise criterion. The ideal sound insulation design would focus on those elements that transmit the most acoustical energy into a room. This eliminates any weak links in the building's sound insulation envelope.

Windows generally allow more noise intrusion than walls; as more of the wall area is taken up with windows, the overall noise protection decreases. This effect is significant even for massive wall materials, such as brick. Intuition suggests that a brick wall would protect better against sound than siding and this is true when these materials alone are compared. But, putting a weak window or an especially large window into a brick wall will cause the overall construction to perform very poorly since noise enters through the weakest path. On the other hand, installing a high-STC window in a wood-framed sided wall will give much better noise level reduction than building a weak window into a brick wall.

The STC rating, defined in Section 2.1, is a measure of the material's ability to insulate against sound; the higher the STC rating, the better the insulator. Proper use of STC ratings will be discussed in more detail in Section 3.1. Table 2-1 gives a brief list of typical STC ratings for common building elements. The variability for walls and roofs is due to the type of studs or joists, or the thickness of concrete. The ratings in Table 2-1 cannot be used directly to estimate noise level reduction because they do not account for the presence of other elements or the areas of each element.

In most cases, after making sure that openings remain sealed, the windows are the controlling sound paths. Using acoustical windows typically does more to improve the sound insulation performance than any other design modification. Exterior doors also typically require high STC ratings. Depending on the noise level reduction goal, other elements may become important as well. Ceilings and exterior walls may require special construction, particularly in the higher DNL zones. Treatments for these paths and others are discussed in Sections 3.2 through 3.8 of this Guide.

Table 2-1. Typical STC Ratings for Common New Construction Elements

LARGE ELEMENTS	
EXTERIOR WALLS	
Vinyl Siding on Wood Frame	36-37
Insulated Concrete Forms	42-55
ROOFS	
Vented Attic with Flat Ceiling	49-53
Vaulted Ceiling	41-45
FLOORS	
Elevated House on Pylons	App. 43
Vented Crawlspace	App. 48
SMALL ELEMENTS	
WINDOWS	
Double Pane Glass	24-29
DOORS	
Swinging Steel or Fiberglass	23-25
Swinging Steel or fiberglass with Storm	29-33
Sliding Glass	25-29

¹ A higher STC value generally indicates greater sound insulation.

Problem Areas

Sound intrusion problems are commonly caused by:

1. Building construction components and configurations not providing sufficient sound insulation.
2. Building elements, such as windows, doors, walls, roofs, and floors chosen and combined in an unbalanced way so that some parts are much weaker sound insulators than others.
3. Unintended openings or sound-flanking paths caused by improper installation of construction elements.

Thermal Insulation

While homes that are well insulated thermally often perform well acoustically, thermal insulation is not always a good indicator of sound insulation. Many thermal windows provide little sound insulation when compared to walls or acoustical windows and are frequently the weak link in the building envelope. However, thermal treatments usually eliminate air infiltration and may serve to improve the acoustical performance of a dwelling for that reason. The presence of insulation in walls or ceilings is far more important than the type of the insulation.

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Shielding

The last concept to consider is shielding. This refers to the fact that the side of the dwelling that faces away from the flight path and does not have an open line-of-sight to it will be protected somewhat from the noise. The shielding may be as much as 10 dB in some cases, though values on the order of 5 dB are more common. Sides of the house facing directly toward the flight path are unshielded. Sides that face the flight track at an angle may benefit from some minor shielding effects. Sometimes, however, sound is reflected off nearby buildings in such a way as to counteract the shielding benefits. Shielding must be examined on a case-by-case basis and the possibility of aircraft straying from the usual flight path must be taken into account before assuming a consistent shielding effect. Considering shielding is not useful when predicting indoor noise levels at homes near MCAS Cherry Point, because the aircraft typically fly all around houses instead of only on one side.

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3.0 Building Elements

This section provides specific guidelines for modifying standard construction designs and practices to meet the need for aircraft sound insulation in new homes. A general discussion of construction materials and methods is given in Section 3.1. Sections 3.2 through 3.8 address techniques for use with weatherstripping, windows, doors, walls, ceilings and roofs, floors and crawl spaces, and mechanical systems and building penetrations. Section 3.9 provides cost estimates for sound insulation treatments.

In high wind (velocity) zones the building code requires using windows and doors that are rated for impact resistance. Any acoustically rated windows or doors must also be able to meet these criteria.

The recommendations apply to all habitable rooms, as well as to rooms that are open to habitable rooms.

3.1 Evaluating Construction Materials and Methods*Informed Use of STC Ratings*

STC ratings are the most common measures of acoustical performance given by manufacturers of building materials. For this reason, it is important to understand how to use STC ratings to evaluate construction materials and systems.

Two different construction methods or components may have identical STC ratings and yet may block aircraft noise differently because of their response at different frequencies. One method or component may perform better than another at some important frequencies. Selecting a construction method or component from a group only on the basis of the highest STC rating may not provide the intended sound insulation. This is because the STC rating does not take into account the strong low-frequency nature of both civilian and military aircraft noise. This guide has taken into account the ability of typical products currently available to block aircraft noise. The recommended materials listed in Section 4.0 and Appendix A (and their STC ratings) were evaluated for frequency response prior to formulating the design packages.

Combining Building Elements

As mentioned earlier, the acoustical performance of the building depends on the combined performances of each of the elements. The final result depends on the transmission loss (or STC) and the relative surface areas of the elements. If any of the components has poor insulation properties the overall performance can be seriously weakened. This is why it is important to focus on the weaker elements and to consider the relative areas of the components.

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As a rule-of-thumb, if a weaker element will be included in the assembly, its size should be kept to a minimum. For example, if a pane of glass is to be used for a vision panel in a door, it should be kept small and should be constructed of insulated glass. Similarly, very large windows degrade the noise level reduction of an otherwise effective concrete wall. If a cathedral ceiling is included, it should be designed so that there is a larger-than-standard air space between the ceiling and the roofing system. Sensible compromises can be made to preserve the noise level reduction of the home without sacrificing aesthetics, provided the principles explained in this Guide are employed.

3.2 Sealing and Weatherstripping

Good weatherstripping and caulking around windows and doors is crucial to effective sound insulation. The STC rating of the overall assembly can vary by as much as 2 to 4 points, depending on perimeter infiltration. For these assemblies, any perimeter leakage will degrade the performance of the window or door and can be the controlling factor in the noise isolation. This is generally not an issue with new construction, but homeowners must understand the importance of maintaining weatherstripping in good condition.

For acoustical purposes, compressible neoprene weatherstripping is preferred over felt or other fibrous types. Neoprene is not as porous and compresses better against the window or doorframe. Also, felt and fibrous weatherstripping materials tend to deteriorate more quickly than neoprene and must be replaced more often.

3.3 Windows

Options Overview

The exterior windows are usually one of the weakest elements in the dwelling's sound insulation performance. Improving the acoustical properties of the windows is one of the simplest ways of lowering the overall sound transmission into the house. Design modification options include using thicker glass and wider airspaces between the panes of glass. Specialized acoustical windows provide maximum sound insulation, and should be used in the loudest environments, as specified in Section 4.0 and Appendix A. See Appendix G for additional information on high wind zone requirements.

Acoustical Performance

The thicker, high-quality insulated glass units should be ¾ inch to 1 inch thick and, for the best noise level reduction, should incorporate at least one lite (pane) of laminated glass, preferably ¼ inch thick. Laminated glass provides significantly better transmission loss than standard, float glass. Tempered glass is also acoustically superior to standard glass, but is not nearly as effective as laminated glass. Off-the-shelf thermopane units are typically available with ratings ranging

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from STC 24 to 29, and upgraded acoustical units with thicker glass may provide ratings as high as STC 30 to 36.

Acoustical windows differ significantly from ordinary residential windows. The design of an acoustical window has a greater frame depth, the glass lites are heavier, the frame extrusions may be thicker, and the weatherstripping and seals are more substantial. All of these measures are necessary to provide the high degree of sound insulation required for the window assembly.

In order to achieve ratings above approximately STC 36 it is typically necessary to use either a double pane window with a storm unit attached (often referred to as a "combination" window), or an assembly of two single or double pane windows connected together (often referred to as a "dual" window). Figure 3-1 shows a typical acoustical combination window installation with the most important features highlighted. Figure 3-2 shows schematically the features of an acoustical dual window. Combination and dual acoustical windows with STC ratings of 37 to 46 are available in a variety of styles and finishes, including aluminum and vinyl, and special windows with STC ratings in the 50s are available from a few manufacturers. Manufacturers of specialized acoustical windows are listed in Appendix D. They are considerably more expensive than typical residential windows.

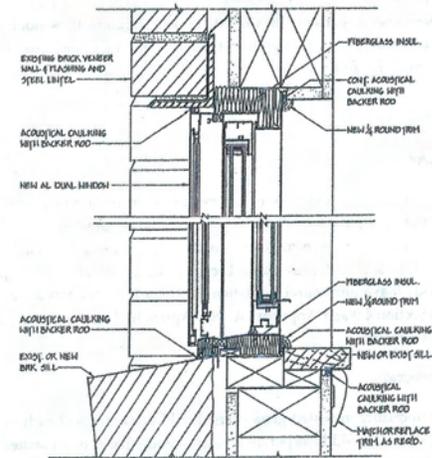


Figure 3-1. Typical Combination Window Installation Detail

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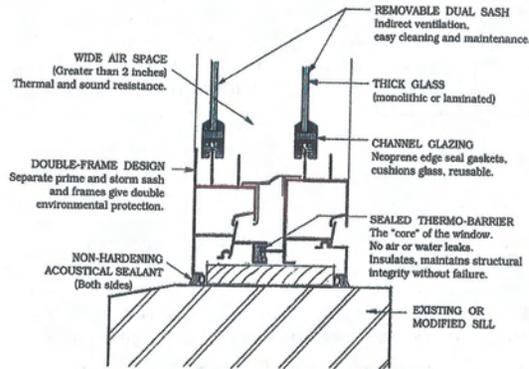


Figure 3-2. Typical Dual Acoustical Window

Thermal Performance

Insulated glass windows are recognized to block the transmission of heat (in winter or summer) much more effectively than single pane glazing. Increasing the thickness of the glass and the airspace, as recommended for noise level reduction, further improves their thermal performance.

Because of the above-mentioned design features, plus the common inclusion of thermal barriers at the frames, acoustical windows perform exceptionally well as thermal barriers. They allow significantly less air infiltration and have a higher R-value (a measure of thermal resistance) than most off-the-shelf single pane and double pane windows.

Installation Considerations

For the windows to provide the required noise reduction they must remain tightly closed. Ways to maintain ventilation will be discussed in Section 3.8. Any type of window, such as double-hung, single-hung, horizontal rolling/sliding, casement, fixed, and awning/hopper, is acceptable for noise reduction, provided it has the required STC rating. However, it must be noted that the STC ratings vary a few points between these various operational types for a given window manufacturer or model. Fixed windows normally have the highest STC rating, sliding/rolling windows have the next highest, hung windows have slightly lower ratings, while casement and awning/hopper windows tend to have the lowest STC ratings.

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Other considerations when preparing window specifications include maintainability, warranty, manufacturer's service, and proper installation. It is possible to install the best acoustical window improperly. If it does not fit tightly enough, air infiltration will significantly reduce the effectiveness. Starting with a too-small window unit and filling in the void around the window with a low-mass material such as fiberglass batt insulation is unacceptable. Continuous wood blocking infill is recommended with fiberglass insulation filling small voids.

3.4 Doors

Options Overview

Doors are comparable to windows in the amount of sound they allow to enter the dwelling. Many typical residential doors require modification or substitution to provide the necessary protection from aircraft noise. As with windows, there are specialized acoustical units available, as well as acoustical storm doors. See Appendix G for additional information on high wind zone requirements. The following factors are important in evaluating doors for sound insulation:

- ▶ Door composition: insulated metal or fiberglass, sliding glass; core material, additional internal insulation, etc.
- ▶ Door weight (can be estimated by pull-weight).
- ▶ Presence and type of fixed window panels.
- ▶ Quality of seals and weatherstripping and how tightly they seal.

Some of the options for improving the noise level reduction of residential doors include:

- ▶ Selecting a door with a high STC rating.
- ▶ Installation of a tightly fitting storm door with thick (or laminated) glass; or use of a specialty acoustical storm door.
- ▶ Use of thicker glass in sliding glass doors or specialty acoustical sliding glass doors.

Standard Doors

STC requirements are outlined in Section 4.0 and Appendix A for each type of door (swinging and sliding doors).

Glass panels in the primary door can reduce the STC rating by several points, depending on the thickness of the lite and the surface area. The thinner the glass and the larger the area it covers, the more it decreases the sound insulation of the door. When vision panels are required, it is best to keep them small and use insulated glass units with thick glass.

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Swinging Storm Doors

External storm doors are sometimes used in the MCAS Cherry Point area and can improve the STC rating by approximately 5 to 9 points, and up to 19 points with special acoustical storm doors. In order for storm doors to be effective for sound insulation, they should incorporate thick glass (ideally 1/4-inch-thick laminated glass in high noise zones) and have a heavy core. Storm doors must be mounted year-round to provide an acoustical benefit. Replacing the glass panel with a screen insert in the summer months will reduce the sound insulation of the home considerably but many homeowners may wish to exercise this option for periods when aircraft activity is light. A list of acoustical storm door suppliers is included in Appendix D. It can be assumed that the rating of a prime-and-storm door combination is STC 37 provided the rating of the storm door alone is at least STC 30 and the airspace between the prime and storm door is at least 2".

Acoustical Swinging Doors

Acoustical doors, with a typical rating of STC 29 to 43, are often similar in appearance to standard entrance doors. However, due to the high cost of acoustical doors, it is often preferable instead to use more typical residential doors with acoustical storm doors.

Because of their specialized construction and superior sealing design they provide a very noticeable improvement in noise reduction. Whether metal or wood, the internal construction of acoustical doors differs substantially from standard doors. Layering of materials, along with added absorption and mass, increases their weight to approximately 12 to 14 pounds per square foot.

To eliminate sound flanking between the closed door and the jamb, acoustic doors are designed with special fixed acoustical seals at the sides and top. A drop seal along the bottom activated by a cam rod when the door is closed is sometimes used to make tight contact with the threshold. In other cases, fixed bottom seals that contact a raised threshold or saddle are used. Also, because of their extra weight, acoustical doors usually require reinforcement of the door frame and heavy-duty mounting hardware and hinges. Manufacturers often provide customized frames with their acoustical doors.

Sliding Glass Doors

There are two options for improving the sound-insulating properties of sliding glass doors: using acoustical units, or using primary and secondary doors. The disadvantages of acoustical sliding glass doors are that they are very expensive, very heavy, and can have a high threshold. The disadvantages of using primary and secondary sliding glass doors is having to open two doors to leave the building, and that the two frames would not fit in the width of a typical 2x4 stud wall. This same secondary door concept can be used with hinged patio doors. Of course, the installer

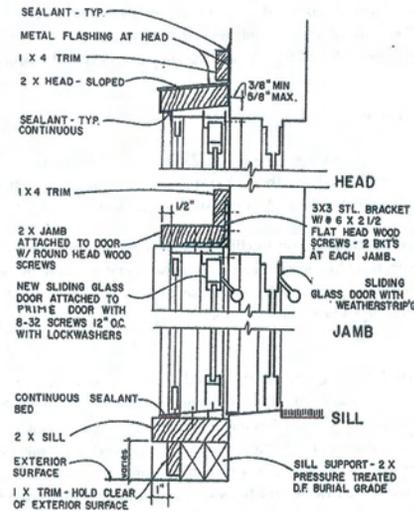
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must ensure that there is no conflict in the operation and opening hardware of the two door sets. Good weatherstripping should be installed on both doors.

Installing a secondary sliding glass door generally requires building a second frame positioned to mount the door approximately 3 to 4 inches away from the primary door. This dual-door assembly has proven successful in that it raises the STC rating by 14 to 16 points (when the secondary door has an STC 29 rating and utilizes 1/4" laminated glass, and there is at least 3.5" airspace between the primary and secondary door). Figure 3-3 shows a system of two sliding glass doors with the secondary door mounted outside of the typical door position.



NOTES: 1. NEW SLIDING GLASS DOOR TO HAVE DUAL OPERABLE PANELS TO FACILITATE CLEANING OF DOORS.

Figure 3-3. Secondary Sliding Glass Door Detail

Door Sidelights and Window and Door Transoms

Door sidelights and window and door transoms should not be neglected. However, there rarely are acoustical test results available for the window or door assembly that include the applicable

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transoms or sidelights. Therefore, when identifying STC ratings in Section 4.0 and Appendix A, we recommend treating transoms and sidelights as separate windows, even if they are attached to a window or door.

Installation Considerations

As with windows, it is of critical importance to ensure that the door fits well, that all gaps and leaks are sealed, and that the door remains closed. High-quality acoustical weatherstripping is recommended to ensure the acoustical performance of the door. Sound attenuation through standard doors can be improved by fitting them with special acoustical seals, including drop seals mounted to the back or fully mortised in the door's bottom rail, and compressible bulb-type neoprene gaskets at the jambs (sides) and head (top). If the door does not fit squarely into the frame it will not seal properly and unnecessary noise infiltration will result. In all cases, avoid openings such as mail slots in doors or the use of pet doors.

3.5 Walls*Determining Wall Designs*

Depending on the dwelling's exterior construction and materials, it may be necessary to use specialized designs for walls. Generally, walls that have vinyl or cement board siding require improvements such as staggered studs or resilient channels in the highest noise impact zones. Dwellings that use insulating concrete forms or other masonry systems typically do not.

For the purposes of this design guide, walls in the MCAS Cherry Point area can be classified as one of the two following types:

- ▶ **Insulated Concrete Form (ICF) Construction:** At least four-inch thick normal weight concrete between approximately 1-3/4" to 2" insulating forms, with 1/2" gypsumboard at the interior. The entire wall must have concrete, not just a portion of it, for this designation to apply. If siding or a skim coat of stucco is applied over insulated concrete forms, the wall is still designated an insulated concrete form wall.
- ▶ **Siding on Wood-Frame Construction:** All types of siding including vinyl and cement board. Construction includes siding on 1/2" nominal OSB or plywood sheathing on 2x4 or 2x6 wood studs spaced 16" on center with batt insulation, and 1/2" gypsumboard at the interior. If a portion of the wall is ICF and a portion wood-framed, consider the wall to be sided on wood-frame construction.

The rare instances of Exterior Insulating Finish Systems (EIFS) on wood framing should be designated "Siding on Wood-Frame Construction" for the purposes of this Guide. The rare instances of Stucco on concrete masonry should be designated "Insulated Concrete Form

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Construction" for the purposes of this Guide. The rare instances of 4" brick veneer or 8" concrete block should be designated ICF.

When studs are spaced 24" on center the acoustical performance may be slightly better than for other sided wood-framed walls. Conversely, when the stud spacing is 8" or 12" on center the acoustical performance may be worse; using this stud spacing is common for the first floor of a three-floor home, in high-wind (velocity) zones, or when windows or doors comprise a large proportion of the wall.

It is sometimes necessary for structural reasons to use a layer of plywood or OSB at the interior surface of the wood studs behind the gypsum board. This should not adversely affect the STC rating.

Specific Interior Wall Designs for Siding on Wood-Frame Construction

One technique for increasing the mass and resiliency of the wall or ceiling is to attach the gypsumboard to the studs with 1/2-inch, resilient, vibration-isolation channels ("resilient channels", or "RC"). This will provide an STC rating improvement of 7 points over that for a typical wood frame wall construction. The resilient channels should be attached to the studs so that they run horizontally for walls (and perpendicular to the joists for ceilings). This minimizes the vibration transmission from the supporting studs (or joists) to the channels and the gypsumboard. The spacing of the channels should be no closer together than specified by the channel manufacturer; typically this is 24" on center. The screws used to attach the gypsum board to the channels must be short enough that they do not contact the studs (or joists). The common installation error of using too long screws allows vibration to travel from the stud to the gypsumboard, rendering the system ineffective. An alternative to this design is to use a new product called resilient sound isolation clips with rigid steel channels. This product is available from PAC International. It is more costly than resilient channels and uses more wall thickness but provides significantly better acoustical performance.

A second technique involves using the resilient channels mentioned above, and changing the wall construction from 2 x 4 studs to 2 x 6 studs. This will increase the STC by 11 points over typical siding on 2x4 stud construction, and will allow space for R-19 insulation.

The third, and most effective, option is to construct the interior wall on a set of staggered studs so that the interior and exterior finish surfaces are not rigidly connected to each other except through the top and bottom plates. This system uses two rows of studs: one row of studs spaced 16" on center supporting the sheathing, and a second row spaced 16" on center supporting the interior wall finish. The end result is that there are studs each 8" on center. Figure 3-4 shows how to implement this construction. This modification provides acoustical decoupling and separation between the exterior and the interior of the room, resulting in a 13-point increase in the STC rating over standard siding on 2x4 studs. A larger space between the interior and

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exterior panels will yield a greater STC improvement. In a staggered stud wall, at windows and doors it is necessary to use 2x6 framing; therefore, the acoustical benefit of staggered studs is dramatically reduced when there are many windows or doors. If it is necessary to have 2x6 studs for strength, a variation on this design is to use 2x6 studs staggered on a 2x8 base. Such a design should provide a generally similar acoustical performance as the 2x4 studs staggered on a 2x6 base. With any staggered stud design it might be necessary to provide additional fire stopping.

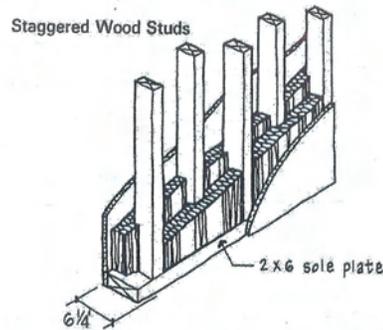


Figure 3-4. Staggered Wood Stud Construction

To absorb sound, fiberglass batts or blankets are placed between the studs in the wall cavity. Batts or blankets should be held firmly in place between studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance. Blown-in insulation is not recommended in walls for acoustical purposes because of the tendency to compact over time.

Specific Interior Wall Designs for Insulating Concrete Form (ICF) Construction

The primary way to improve the STC rating of an ICF wall is to select a wider wall that allows a wider pour of concrete. The typical wall was assumed to have a 4" thick pour of concrete. The next thicker wall considered was with a 6" thick pour of concrete. The STC ratings of this assembly will vary based on the thickness of the forms and the type of exterior finish.

The wall construction designs referenced above are summarized in Table 3-1. In this table O.C. is the on-center spacing of the studs. The STC rating for walls with 4" brick veneer will be slightly higher than for ICF walls due to the presence of the wood studs.

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Table 3-1. Acoustical Wall Designs and STC Ratings

	Exterior Side	Structure	Interior Side	STC Rating	
Resilient Channel on 2x4 studs	Siding, sheathing	Wood	2x4 16" O.C. with batt insulation	RC on studs, 1 layer 1/2" gypsumboard	43
Resilient Channel on 2x6 studs	Siding, sheathing	Wood	2x6 16" O.C. with batt insulation	RC on studs, 1 layer 1/2" gypsumboard	47
Staggered 2x4 on 2x6 base	Siding, sheathing	Wood	2x4 16" O.C. for each row (staggered on 2x6 base plate) with batt insulation	1 layer 1/2" gypsumboard (attached only to interior-side studs)	49
Staggered 2x6 on 2x8 base	Siding, sheathing	Wood	2x6 16" O.C. for each row (staggered on 2x8 base plate) with batt insulation	1 layer 1/2" gypsumboard (attached only to interior-side studs)	Approx. 50
ICF with 4" Concrete	1-3/4" Form	4" normal weight concrete		1/2" Gypsumboard on 1-3/4" Form	High 40s
ICF with 6" Concrete	1-3/4" Form	6" normal weight concrete		1/2" Gypsumboard on 1-3/4" Form	Low 50s

3.6 Ceilings and Roofs

Improved ceilings are sometimes necessary where there is a roof over noise-sensitive rooms such as bedrooms, kitchens, living rooms, family rooms, etc. There is no need to modify the ceiling of any first-floor rooms where they are completely covered by a second story room. Non-habitable rooms, such as garages and mudrooms in breezeways, are generally not given improved ceilings unless they open directly to habitable rooms without interior doors in between the rooms.

Specific Interior Ceiling Modifications

The ceilings of top-floor rooms may need to be modified to provide increased noise protection. The same methods that are used in wall constructions can be used for ceilings. The standard roof construction in the MCAS Cherry Point area is assumed to be: asphalt shingles or standing seam metal roofing, plywood or OSB roof deck, ridge and soffit vents, engineered wood trusses at least 14" deep throughout the span, 10" minimum thickness of blown-in or batt insulation, and 1/2" gypsumboard at the interior. This design is designated "vented attic" construction and has an STC 45 rating. Resilient channels mounted perpendicular to the bottom of the ceiling joists with the gypsumboard attached to the channels will increase the rating to approximately STC 55.

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With some vaulted ceilings the roof framing is less than 14" deep and the STC rating is significantly lower. One such design is shingles, wood roof deck, 2x10 rafters with batt insulation, and 1/2" gypsumboard. This design has a rating of only STC 33. To provide good acoustical performance the roof framing should be at least 14" deep (throughout the span), when sound insulation is being considered.

Attic access panels, pull-down stairs, and whole-house ceiling fans should have movable or operable covers consisting of 3/4" plywood, or other equally massive material, with continuous neoprene perimeter seals.

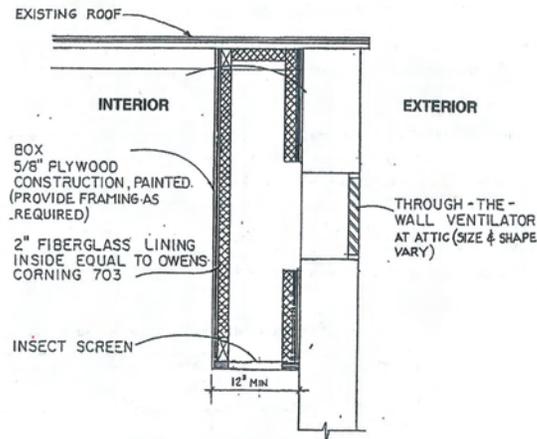


Figure 3-5. Built-in Place Gable Baffle

Attic Vents

Attics typically have open-air vents at the gable ends or a combination of ridge and soffit vents. Soffit vents are shielded by the roof and generally need no modification. Off-the-shelf acoustical louvers can be applied to baffle the sound passing through gable-end vents. Built-in-place baffles could be used beside gable end vents or under ridge vents to reduce noise intrusion (see Figure 3-5). These consist of 3/4" plywood covered with 2" thick rigid fiberglass insulation; the plywood panels are oriented in such a way that noise (and air) must be reflected on at least one fiberglass-

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lined surface before it can move into the attic. However, these baffles must be designed so as not to reduce attic ventilation.

Attic Insulation

When considering the upgrade of thermal insulation to reduce noise levels it is important to understand what the insulation will do. Thermal insulation materials will act to absorb sound that is reverberating in the attic or in the space between flat panels. It does not prevent noise from entering the space. That is, it has no appreciable acoustic "insulating" properties but acts as an absorbent instead. To keep sound out, barriers must be used which increase the mass of the roof or ceiling. As a sound absorbent, fiberglass, or mineral fiber batts and blown-in fiberglass or cellulose can be applied between the rafters or ceiling joists.

The sound absorption of a material should not be confused with noise level reduction (NLR). There is no direct relationship between a material's sound absorptive properties and the overall NLR.

A simple method for determining the proper thickness of sound-absorbent materials is to use the concept of the material's thermal rating (R-value). This R-rating is a commonly used and well-known rating for building products. The R-values and thickness for several common insulation materials are given in Table 3-2. The value of the sound absorption at lower frequencies depends on the thickness of the material. For noise sources with a significant low-frequency component, such as aircraft flyovers, the thickness is the most important parameter. Thicker materials provide better low-frequency sound absorption.

Table 3-2. Material Thickness and R-Value for Common Insulating Materials

Material	Thickness, Inches		
	R-11	R-19	R-30
Roll or Batt Fiberglass	3.5	5.25	9
Blown-in Fiberglass	5	8	13
Mineral Fiber	4	6.5	11

Skylights

Skylights are rare in the MCAS Cherry Point area for new homes. There are possible measures to improve the sound insulation of skylights such as using products with high STC ratings or using secondary interior glass panels with acoustical seals. For the purposes of this guide it is assumed that skylights will not be provided.

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3.7 Floors and Crawl Spaces

Options Overview

Dwellings in the MCAS Cherry Point will usually have one of these three types of floor systems at the lowest level:

- ▶ Concrete slab
- ▶ Crawlspace
- ▶ Pylon foundations (e.g., for a beach house)

Since noise control measures are concerned with the external building envelope, floors between stories in a home are not addressed.

There are three stages of floor design improvements for sound insulation:

- ▶ Eliminating, sealing or baffling any openings.
- ▶ Installing insulation between the floor joists.
- ▶ Attaching a barrier panel to the underside of the floor joists or between the perimeter of the house and the ground (a skirt).

Concrete slabs require no treatment. Crawl spaces and pylon foundations will be discussed below.

Crawl Spaces

One common floor system for new residences consists of wood joist construction over a vented crawl space. Typically, the crawl space has 8" nominal concrete block walls. The simplest way to improve the acoustical performance of a house that has a crawl space with masonry walls is to install off-the-shelf noise control louvers to the under-floor vents (see Appendix D for a list of manufacturers); this is similar to the idea discussed above for roof vents. These louvers provide a noticeable quieting in the rest of the house. If crawl spaces do not have masonry walls, a massive barrier panel can be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels would be ideal. Alternatively, 2x4 pressure-treated wood studs with 3/4" pressure-treated plywood on each side could be used, as long as the joints between the plywood are covered with batten strips. Where double-swing doors are required in flood plains use a similar construction to improve sound insulation.

Pylon Foundations

Many beach houses are elevated one story using large (e.g., 8x8 wood) posts called pylons. This design allows some aircraft noise to enter the house through the floor. The typical floor construction in the MCAS Cherry Point area is 3/4" plywood on joists (open web wood trusses,

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plywood joists, or 2x10 joists), with R-19 batt insulation, and 3/8" plywood covering the bottom of the joists. This assembly has a poor STC rating. However, it will receive a significant amount of shielding from the aircraft flight path by the house. Although it is difficult to quantify this shielding effect, it is likely on the order of 10 STC points. The resulting effective rating is STC 43 if 2x10 joists are used, and higher if deeper structural members are used.

3.8 Mechanical Systems and Building Penetrations

In order to maintain the noise reduction benefits of improving windows and doors and sealing leakage paths, it is important to keep these openings closed. While an acoustically well insulated home can provide 30 to 35 dB of noise reduction, this figure drops to 15 dB whenever the windows and doors are open. Heating, ventilation, and air-conditioning (HVAC) systems do not directly affect the sound insulation performance (except when they have vents to the outdoors), but they enable residents to keep the windows and doors shut year-round and benefit from the sound insulation modifications. The following information is not referenced in Section 4.0 but the ventilation features discussed here are strongly recommended and are included in Appendix A.

HVAC Systems

In the MCAS Cherry Point area the furnaces are typically located in attics. This location unfortunately allows some noise to enter the home through penetrations of the ceiling. This furnace location is acceptable provided ducts in the attic receive special treatments (see Appendix A). Flexible ductwork should not be used in attics and crawl spaces; heavier sheet metal ducts will provide better sound insulation.

Do not use in-window, through-wall, or through-floor air-conditioners, ventilators, or heaters, i.e., units for which air ducts pass through the building envelope (windows, walls, or floors). On the other hand it is acceptable if only natural gas or refrigerant pipes pass through the building envelope, since these will not allow noise to enter the building. The preferred air-conditioning system is a split system utilizing an outdoor condensing unit.

Ducts to the outside, whether air intake or air exhaust, and all air ducts in the attic or crawl space can be lined with 1-inch acoustical internal lining material, or have at least two 90-degree (right angle) elbows (turns) thereby breaking the line-of-sight to the outside as shown in Figure 3-6. It must be noted that there is concern that this fibrous acoustical lining material will affect air quality. Installing a duct sound attenuator (silencer) is an alternative to this technique; there are silencers available that do not contain fibrous lining. To prevent moisture and grease buildup exhaust fans (bathroom, dryer, kitchen, and range) must not have internal sound lining or silencers that use fibrous lining; the use of the 90-degree elbows and/or fiber-free silencers are

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appropriate in these cases. These measures ensure that the ventilation system is not bringing additional aircraft noise into the house.

Combustion Air Intake

Fuel-burning appliances such as gas furnaces, gas hot water heaters, and gas dryers can introduce carbon monoxide into the house. To minimize this concern, especially in sound-insulated houses, it is useful to introduce air from the outdoors to the area near the appliance. This is often required in building codes as well. This can be accomplished with small fans called combustion air enforcers.

Combustion Air Exhausts

The exhaust ducts for fuel-burning appliances such as water heaters, furnaces, and gas dryers can also be paths for aircraft noise to enter the home. These ducts should be located in closets and never in habitable spaces. These ducts should also have at least two 90-degree elbows as discussed above for HVAC ducts.

Dryers

Dryer exhaust ducts can also be paths for aircraft noise to enter the home. Dryers must not be located in habitable spaces. If electric dryers are located near bedrooms or other habitable rooms they may be located in enclosed closets with solid (non-louvered) doors. Always use rigid metal dryer ducts instead of flexible ducts to minimize aircraft noise entering the house.

Fresh Air

It is assumed that all new homes in the MCAS Cherry Point area will have central air-conditioning. Whether the air needs to be heated, cooled, dehumidified, or simply circulated and replenished depends on the season. Refreshing the air supply and moving it around is important for health and comfort no matter what the outside temperature. A fresh-air intake could be installed on an air-handling system to provide the required percentage of fresh makeup air combined with the recirculating air. However, when the system is not operating during mild weather no fresh air would be provided. Therefore, fresh-air systems should have a fresh-air intake and allow for ventilation alone when the residents do not want heating or cooling.

In order to ensure that fresh air is provided year-round, the preferred solution is to use active ventilators. The building code does not require these systems unless the house is considered "unusually tight" and meets three conditions. However, for acoustical purposes the use of active ventilation is recommended, especially in high noise zones. To heat the air in winter these systems typically incorporate an electrically operated heating coil or heat recovery feature.

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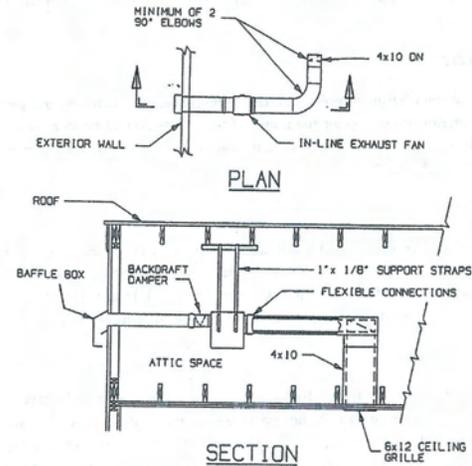
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Whatever ventilation system is used, penetrations of the building envelope must be minimized and located as far as possible from habitable areas of the house.

HVAC Noise and Vibration Control

It is important to limit the amount of noise the HVAC system generates and the noise it carries in from the outside. Provide vibration isolation mounting for all equipment and locate it so that the structure-borne sound and vibration are kept to a minimum.



ALL DUCTWORK BETWEEN THE CEILING GRILLE AND THE EXHAUST FAN SHALL BE ACOUSTICALLY LINED.

Figure 3-6. Controlling Noise Entering Through Ducts in Attic Space

Kitchen and Bath Fans

Most kitchen and bathroom designs for new homes already incorporate fans for ventilation purposes. A ducting scheme that incorporates at least one and preferably two right-angle turns is effective at reducing noise infiltration and there should be no direct line-of-sight through the duct from the outside to the inside. In other words, if the duct interior and exterior grilles or covers were removed, it should not be possible to see daylight through the duct. All ducts in the attic

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should be rigid metal and not flexible; noise may pass through these elements to other rooms of the house. Refer to the manufacturer for allowable duct lengths, numbers of elbows, and sizes of ducts. Kitchen ranges should have re-circulating fans utilizing a charcoal filter instead of a vented range fan.

Fireplaces and Wood Stoves

Some homes in the MCAS Cherry Point area will have prefabricated fuel-burning fireplaces; wood stoves are rare. Ventless units are strongly recommended. For the purposes of this Guide, it is assumed that no vented fireplaces or wood stoves will be allowed in the highest noise zones. In the lower noise zones use acoustical chimney top dampers and tight-fitting 1/4" tempered glass fireplace doors.

Whole-house Fans

Some homes in the MCAS Cherry Point area will have whole-house fans. These fans are located in the ceiling of the top floor of the house, usually over a hallway. They allow a significant amount of sound to enter the house. Their use is discouraged in high noise zones.

3.9 Costs

The cost to sound insulate a new house can vary greatly from one house to the next. Sound insulation costs are affected by home size, home design, exterior noise exposure zone, and which products are locally available or preferred. Table 3-3 provides the additional costs for using the products and methods recommended in this guide.

The window cost estimates in Table 3-3 are for some typical STC ratings and typical sizes. The costs for lower STC ratings would vary significantly. Many off-the-shelf products can meet the STC 26, 28, 30, and even 32 ratings specified in this guide. Therefore, the additional costs could be zero in some cases.

The cost estimate in Table 3-3 for storm doors assumes that the house would not have used storm doors otherwise; the tabulated cost is the total cost for the storm door, not just an incremental cost for a better product.

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Table 3-3. Additional Costs for Sound Insulation

Item	Unit	Average Additional Unit Cost
30"x48" STC 36 window	Each	\$ 66.00
36"x72" STC 36 window	Each	\$ 91.00
30"x48" STC 40 window	Each	\$ 147.00
36"x72" STC 40 window	Each	\$ 203.00
30"x48" STC 44 window	Each	\$ 195.00
36"x72" STC 44 window	Each	\$ 270.00
STC 29 swinging acoustical storm door	Each	\$ 300.00
STC 34 swinging acoustical prime door	Each	\$ 486.00
STC 40 swinging acoustical prime door	Each	\$ 873.00
6'-0"x6'-8" STC 34 sliding glass door	Each	\$ 437.00
6'-0"x6'-8" STC 37 sliding glass door	Each	\$ 1,312.00
6'-0"x6'-8" secondary sliding glass door	Each	\$ 500.00
Adding second layer of gypsum board to walls	Square-foot	\$ 0.70
Adding resilient channels to walls	Square-foot	\$ 1.10
Adding second layer of gypsum board to sloped ceilings	Square-foot	\$ 1.41
Adding resilient channels to sloped ceilings	Square-foot	\$ 2.31
Additional cost for using staggered 2x4 wood studs	Square-foot	\$ 1.68
Cover over attic pull-down stairs	Each	\$ 400.00

4.0 Material Selection Chart

The following selection chart is to be used to determine the acoustical design needs of the walls, windows, doors, roof, and floor of each habitable room of a dwelling. Additional requirements are provided in Appendix A; this material selection chart is supplemental to Appendix A. These recommendations also apply to non-habitable rooms that do not have a door separating them from habitable rooms. For each room, design recommendations are determined by following the chart from left to right. First, the required noise level reduction (NLR) must be determined for the dwelling based on its location in a certain noise contour zone. Second, the type of exterior walls must be selected. If the wall has Insulated Concrete Forms (ICF), concrete block, or brick veneer use the "ICF" designation, even if the wall also has wood framing at the interior. Use the "Wood Frame" designation if one of the exterior walls or a portion of one of the walls is wood framed. Third, the number of exterior walls must be selected. Count partial walls as full walls. Count two-story walls as two walls. For example, a room with two two-story exterior walls is considered to have four exterior walls. Fourth, calculate the ratio of the area of windows and doors to the total exterior façade area (including the gross wall/window/door area) of the room. The last five columns contain the recommended modifications for the walls, windows, doors, roof, and floor that must be used to achieve the desired noise level reduction.

The wall modifications apply only to exterior walls. Recommended modifications for wood frame walls are either to use single-leaf resilient channels to hang the gypsumboard ("RC"), to use staggered 2x4 studs on 2x6 plates ("stag"), or to use staggered studs with two layers of 1/2" minimum gypsumboard ("stag 2 gyp"). If the studs must be 2x6 for structural reasons, and the table calls for staggered studs, use 2x6 studs staggered on 2x8 plates.

The door and window modifications only apply to doors and windows that open to the exterior or to partially enclosed spaces such as screened-in porches or garages. The table lists the minimum allowable STC rating.

The roof modifications apply to the roof/ceiling assembly of rooms on the top floor of the house (a room below an attic is considered to be on the top floor). The modifications are either to use two layers of 1/2" minimum gypsumboard ("2 gyp"), or to hang the gypsumboard using single-leaf resilient channels ("RC").

The floor modifications only apply to houses elevated on pylons (e.g., beach houses). The recommended modification for some houses is to use floor framing members that are at least 14" deep with at least 10" thick insulation with 1/2" minimum plywood or OSB at the bottom chords of the trusses ("deep" in Table 4-1).

Table 4-1. Material Selection Chart and Corresponding STC Ratings

NLR	Wall Type	Exterior Walls	Window + Door Ratio	Recommended Modification				
				Wall	Window	Door	Roof	Floor
20	Wd Frame Brick or ICF	1		None	STC 28	None	None	None
		2+	< 75%	None	None	None	None	
		>= 75%	None	STC 28	None	None	None	
		< 25%	None	STC 26	None	None	None	
25	Wood Frame	1	25-40%	None	STC 28	None	None	None
			> 40%	None	STC 30	STC 29	None	None
			> 40%	None	STC 30	STC 29	None	None
		2+	< 20%	None	STC 28	None	None	None
			20-35%	None	STC 30	STC 29	None	None
			> 35%	None	STC 32	STC 29	None	None
	Brick or ICF	1	< 40%	None	STC 26	None	None	None
			>= 40%	None	STC 30	STC 29	None	None
		2+	< 20%	None	STC 26	None	None	None
			20-30%	None	STC 28	None	None	None
			30-75%	None	STC 30	STC 29	None	None
			> 75%	None	STC 32	STC 29	None	None
30	Wood Frame	1	< 20%	None	STC 32	STC 31	2 gyp	Deep
			20-30%	None	STC 34	STC 34	2 gyp	Deep
			30-50%	RC	STC 32	STC 31	2 gyp	Deep
		2	> 50%	RC	STC 34	STC 34	2 gyp	Deep
			< 20%	RC	STC 34	STC 31	2 gyp	Deep
			>= 20%	RC	STC 34	STC 34	2 gyp	Deep
	Brick or ICF	1	< 20%	None	STC 30	STC 29	2 gyp	None
			20-50%	None	STC 32	STC 31	2 gyp	None
			> 50%	None	STC 34	STC 34	2 gyp	None
		2	< 20%	None	STC 34	STC 31	2 gyp	None
			>= 20%	None	STC 34	STC 34	2 gyp	None
			< 20%	None	STC 34	STC 31	2 gyp	None
35	Wood Frame	1	< 25%	RC	STC 36	STC 34	RC	Deep
			>= 25%	Stag	STC 40	STC 40	RC	Deep
			< 15%	RC	STC 38	STC 37	RC	Deep
		2+	15-20%	Stag	STC 38	STC 37	RC	Deep
			20-30%	Stag	STC 42	STC 37	RC	Deep
			> 30%	Stag, 2 gyp	STC 42	STC 40	RC	Deep
	Brick or ICF	1	< 15%	None	STC 34	STC 34	RC	None
			15-25%	None	STC 36	STC 34	RC	None
			25-50%	None	STC 38	STC 37	RC	None
		2+	> 50%	None	STC 40	STC 40	RC	None
			< 15%	None	STC 40	STC 37	RC	None
			15-20%	None	STC 40	STC 40	RC	None

5.0 Limitations

There are many variables affecting the acoustical performance of a room. The recommendations contained in this Guide are based on assumptions of typical parameters. If the actual building design and construction used don't match these assumptions the noise level reduction will be different. Due to the interrelationship between each of these variables there are no upper limits on individual parameters.

In developing recommendations, typical types of rooms were considered. Conditions that would tend to reduce the acoustical performance include:

1. Using a greater area of windows or doors.
2. Having a greater area of exterior walls.
3. Using *smaller* rooms.
4. Adding wall penetrations such as through-wall air-conditioners, heaters, or fans.
5. Using hard room finishes such as ceramic tile or wood floors, and using few furnishings.

The modifications recommended in this Guide are packages designed to work together. That is, improvements to the windows, doors, and mechanical systems complement improvements to the walls and roof. There are always alternative packages of modifications that would be acceptable from an acoustical standpoint. The goal of this Guide was to present one package of modifications for each situation that is reasonable and cost-effective.

The determination of which rooms these recommendations apply to is not always simple. Generally, they apply to habitable spaces (kitchens, living rooms, family rooms, bedrooms, offices, dens, sun rooms, etc.) and do not apply to closets, typical bathrooms, most hallways, garages, utility rooms, and screened-in porches. Some large bathrooms, open foyers, or all spaces that are relatively open to a habitable space should be sound insulated.

The recommendations contained in this Guide are based on calculations using a large number of assumptions and averages of acoustical data for many products. Due to the large variability in acoustical performance of different buildings, and the imprecision of acoustical calculations the performance of a given building may vary from that predicted using this report. There is also no margin for error embedded into these recommendations, except to the extent that houses are grouped in ranges of 5-dB outdoor noise exposure. If a margin of error were desired it would be appropriate to use the recommendations for the next higher noise zone or consult a qualified acoustical consultant. To ensure that the recommended measures comply with building codes consult with an architect.

APPENDIX A

NOISE LEVEL REDUCTION DESIGN REQUIREMENTS

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Appendix A

New Construction: Noise Level Reduction Design Requirements

SECTION 1: PURPOSE

Exterior noise may be isolated and reduced in homes through construction techniques that selectively increase the sound insulating quality of the exterior of occupied structures. The noise level reduction values specified are 20, 25, 30, and 35 dB.

SECTION 2: GENERAL REQUIREMENTS

- A. The Noise Level Reduction (NLR) requirements specified herein may be achieved by any suitable combination of building designs, choices of building materials, and execution of construction details in accordance with established architectural and acoustical principles. The NLR requirements should be applied to all occupied rooms having one or more exterior walls or exterior ceiling. A room without any exterior walls, and which has an occupied space above its entire area, will not be subject to these requirements.
- B. Compliance with the construction standards herein is sufficient to comply with the NLR requirements specified in the various noise zones. These standards are applicable to plans and specifications for any proposed residence. A variety of assumptions were necessary to develop these standards. If the plans and specifications do not indicate compliance with the construction standards herein, the applicant shall provide a written statement from a qualified acoustical consultant certifying that the construction of the building as indicated in the plans and specifications will result in a NLR for appropriate occupied rooms at least as great as the specified NLR requirement.
- C. An "exterior" door or window opens to the exterior or to a partially enclosed space such as a screened-in porch. In this standard whenever the words "doors" or "windows" are used it shall be assumed that the standard provision applies only to exterior doors and exterior windows, unless the word "interior" is specifically used for that provision.
- D. Sound Transmission Class (STC) ratings for windows and doors are valid only if they are determined by laboratory (not field) tests performed by an independent laboratory for the product. A rating estimated for glass alone is not an acceptable substitute for STC tests of windows or doors, except for determining the rating of sidelights and transoms. Likewise, ratings estimated for door leafs alone are not an acceptable substitute for STC ratings of doors. The installed products must have the same composition and overall configuration such as storm panels, glass type (laminated, tempered, or float glass), glass thickness, spacing between panes of insulated glass, door core, gaskets, weatherstripping, door bottom seals, thresholds, etc., and the same overall configuration as the tested assembly. The overall configuration includes the operational type (casement, double hung, fixed, slider, etc.) in the case of windows, and the general size of glazing (1/8-, 1/4-, 1/2-, or full-view) in the case of doors. Issues that do not affect the acoustical performance such as glass obscuration, internal window muntins, door and window hardware, screens, and applied door moldings can be neglected.



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- E. Door sidelights and door and window transoms shall be considered "windows" and shall meet the provisions for windows. For these products it is acceptable to reference the laboratory STC rating of the glass alone. However, for the adjacent windows and doors it is still necessary to reference STC tests for the entire assembly, not just the glass or door leaf.
- F. For this standard it can be assumed that the rating of a prime-and-storm window combination is STC 36 provided the rating of the storm window alone is at least STC 29 and the airspace between the prime and storm window is at least 1-3/4" for all sashes.
- G. For this standard it can be assumed that the rating of a prime-and-storm door combination is STC 37 provided the rating of the storm door alone is at least STC 30 and the airspace between the prime and storm door is at least 2".
- H. In order to achieve the STC ratings specified herein special measures are necessary to install doors and windows. These include the use of non-hardening (acoustical) caulk at all hidden surfaces, flexible caulk at all exposed surfaces, and solid continuous blocking to fill all voids over 1/4" around windows and doors.
- I. The phrase "Total Exterior Wall Area" as used in this standard includes the exterior wall area of the room as well as the area of all windows and doors contained within the exterior walls.
- J. The phrase "Roof" as used in this standard shall refer to a ceiling attached to the bottom edge of roof structural members that are at least 14" deep (the depth is the clear distance between the ceiling gypsumboard and the roof deck) for the portion of the structural member over a living space. The use of shallower roof framing is not allowed without a written statement from a qualified acoustical consultant (see section B above). The best acoustical performance is achieved when there are horizontal ceilings, an accessible attic space above, and a sloped roof.
- K. The phrase "Exposed Floor" in this standard shall refer to the floor of a house elevated above the ground without the use of a crawl space. This includes primarily beach houses on pylons.
- L. It is difficult to predict the acoustical performance of open plan spaces. Adjacent habitable spaces that are fully open to each other shall be grouped and treated as one room. When the rooms are only partially open to each other, group them if the partitions separating the rooms are more than 30% open.
- M. The number of exterior walls is a parameter that affects the acoustical performance of the room. If the exterior wall is over 12 feet tall it shall count as two exterior walls. Partial walls count as one exterior wall.
- N. The phrase "wood-framed walls" refers to any walls that do not have brick veneer, concrete blocks, or poured concrete.

SECTION 3: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 20 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.
2. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed



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continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may *slightly reduce* its acoustical (and thermal) performance.

3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms that have at least one wood-framed exterior wall: Windows shall have a laboratory sound transmission class rating of at least STC 28.
2. For rooms that have all ICF exterior walls: If the exterior windows and doors together comprise 75% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.

C. Doors

1. Exterior doors, and interior doors between occupied spaces and attached garages, unfinished attics, and other non-habitable spaces with an exterior wall or ceiling, shall be fully weatherstripped.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations.
2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.
3. Roof framing members shall be at least 14" deep for their entire span.
4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.
5. Skylights shall not be provided.

E. Floors, Foundations and Basements

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.
2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.



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F. Ventilation and Wall Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.
2. Through-the-wall/door mailboxes or mail slots shall not be used.
3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.
4. Gravity vent openings in attics shall not exceed the code minimum in number and size.
5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.
6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).
7. Vented domestic range fans shall be not used.
8. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.
9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g. kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.
10. Whole-house fans shall not be provided.
11. All ducts in attics shall be rigid metal.
12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 4: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 25 dB.

A. Exterior walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.
2. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may *slightly reduce* its acoustical (and thermal) performance.



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3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:
 - a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
 - ii. If the exterior windows and doors together comprise 25-40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
 - iii. If the exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
 - b. If there are two or more exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
 - ii. If the exterior windows and doors together comprise 20-35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
 - iii. If the exterior windows and doors together comprise more than 35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
2. For rooms with all ICF walls:
 - a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
 - ii. If the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
 - b. If there are two or more exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
 - ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
 - iii. If the exterior windows and doors together comprise 30-75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
 - iv. If the exterior windows and doors together comprise more than 75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.

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C. Doors

1. For rooms with at least one wood-framed wall:
 - a. If there is only one exterior wall: If exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
 - b. If there are more than one exterior wall: If exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
2. For rooms with all ICF walls:
 - a. If there is only one exterior wall and the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
 - b. If there are more than one exterior wall and the exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 23.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provide a gypsum board enclosure around the lighting fixture and seal the gypsum board joints with caulk or joint compound.
2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.
3. Roof framing members shall be at least 14" deep for their entire span.
4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.
5. Skylights shall not be provided.

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E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.
2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.
2. Through-the-wall/door mailboxes or mail slots shall not be used.
3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.
4. Gravity vent openings in attics shall not exceed the code minimum in number and size.
5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.
6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).
7. Vented domestic range fans shall be not used.
8. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.
9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g. kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.
10. Whole-house fans shall not be provided.
11. All ducts in attics shall be rigid metal.
12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.



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SECTION 5: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 30 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.
2. For wood-framed walls:
 - a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.
 - b. If there is one only one exterior wall: If exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area, single-leaf resilient channels shall be used between the studs and gypsum board.
 - c. If there are two or more exterior walls single-leaf resilient channels shall be used between the studs and gypsum board.
3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:
 - a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
 - ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
 - iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
 - iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
 - b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.
 - c. If there are three or more exterior walls:
 - i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
 - ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.



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2. For rooms with all ICF walls:

- a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
 - ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
 - iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
- b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.
- c. If there are three or more exterior walls:
 - i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
 - ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

C. Doors

1. For rooms with at least one wood-framed wall:

- a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
 - iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
- b. If there are two exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
- c. If there are three or more exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

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2. For rooms with all ICF walls:

- a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
 - ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
 - b. If there are two exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
 - c. If there are three or more exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
 - ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Ceilings consisting of at least two layers of at least 1/2-inch thick gypsum board shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provide a gypsum board enclosure around the lighting fixture and seal the gypsum board joints with caulk or joint compound.
2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.
3. Roof framing members shall be at least 14" deep for their entire span.
4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.
5. Skylights shall not be provided.

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E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of floor joists that are at least 14" deep with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.
2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.
2. Through-the-wall/door mailboxes or mail slots shall not be used.
3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.
4. Gravity vent openings in attics shall not exceed the code minimum in number and size.
5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.
6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).
7. Vented domestic range fans shall be not used.
8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.
9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g. kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.
10. Whole-house fans shall not be provided.
11. All ducts in attics shall be rigid metal.
12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.



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SECTION 6: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 35 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.
2. For wood-framed walls:
 - a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.
 - b. If there is one only one exterior wall:
 - i. If exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
 - ii. If exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).
 - c. If there are two or more exterior walls:
 - i. If exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
 - ii. If exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).
 - iii. If exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates), and two layers of 1/2" gypsum board shall be provided at the interior surface of the room.
3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:
 - a. If there is only one exterior wall:
 - i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.
 - ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.
 - b. If there are two or more exterior walls:
 - i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.



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- ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 42.

2. For rooms with all ICF walls:

a. If there is only one exterior wall:

- i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
- ii. If the exterior windows and doors together comprise 15 to 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.
- iii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.
- iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:

- i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.
- ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 44.

C. Doors

1. For rooms with at least one wood-framed wall:

a. If there is only one exterior wall:

- i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
- ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:

- i. If the exterior windows and doors together comprise 30% or less of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
- ii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

2. For rooms with all ICF walls:

a. If there is only one exterior wall:

- i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
- ii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
- iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.



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b. If there are two or more exterior walls:

- i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
 - ii. If the exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.
 - iii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 43.
3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Single-leaf resilient channels shall be used to hang the gypsum board at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Recessed lights shall not be used in top-floor ceilings.
2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.
3. Roof framing members shall be at least 14" deep for their entire span.
4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.
5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of floor joists that are at least 14" deep with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.
2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.
2. Through-the-wall/door mailboxes or mail slots shall not be used.
3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh



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air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.
5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.
6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).
7. Vented domestic range fans shall be not used.
8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.
9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g. kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning driven appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.
10. Whole-house fans shall not be provided.
11. All ducts in attics shall be rigid metal.
12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.



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APPENDIX B
DESIGN REVIEW CHECKLIST



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Appendix B
Design Review Checklist

This checklist will be useful for plan reviewers in determining whether a new house design complies with the recommendations contained in the Design Guide. Various sections of the Design Guide are referenced below.

1. **Required NLR.** Determine the required Noise Level Reduction (NLR) based on the outdoor noise (DNL) zone or from the local zoning ordinance if the community has adopted one.
2. **List of Rooms.** Develop a list of rooms for which the recommendations of the Design Guide apply. Determine which rooms are habitable and have any exterior exposure through the roof/ceiling assembly, walls, windows, or doors. For a discussion of habitable rooms see section 1.1. The recommendations apply to all habitable rooms, to all rooms that open to habitable rooms, and to all attics and crawl spaces. Group rooms of open plan spaces if the partitions separating the rooms are more than 30% open.
3. **Determine Recommendations.** For each applicable room, determine the recommendations. Appendix A includes a complete list of recommendations, while Table 4-1 provides a summary of the key recommendations for walls, windows, doors, roofs, and floors. Additional optional treatments for attic and crawl space vent baffles and louvers are included in section 3.6 and 3.7. For a discussion of the use of Table 4-1 see section 4. Consider the recommendations for walls, windows, doors, roofs, and floors, as well as the following:
 - a. Through-wall, through-floor, or in-window heating, ventilating, or air-conditioning units
 - b. Through-wall or through-door mail slots
 - c. Active fresh-air ventilation
 - d. Attic gravity vents
 - e. Attic fans
 - f. Bath exhaust fans
 - g. Dryer location
 - h. Dryer exhaust duct
 - i. Vented range fans
 - j. Vented fireplaces, wood stoves, and gas-powered prefabricated units
 - k. Fuel-burning appliance (boiler, furnace, water heater, dryer, etc.) combustion exhaust ducts
 - l. Whole-house fans
 - m. Skylights
 - n. Combustion air enforcers
 - o. Attic access panels
 - p. Pull-down attic stair covers
 - q. Heating, ventilating, and air-conditioning ducts in the attic
 - r. Attic vent baffles or louvers (optional)
 - s. Crawl space vent baffles or louvers (optional)
4. **Resilient Channels.** If resilient channels are proposed, verify that they are flexible and single-leaf. Alternatively, rigid channels in combination with resilient sound isolation clips (manufactured by PAC International) may be used. All resilient channels and resilient sound isolation clips must be attached directly to studs or joists, and not to interior sheets of OSB, plywood, or gypsum board.
5. **Implement Recommendations.** Verify that the recommendations have been incorporated into the house design.
6. **Window and Door STC Test Reports.** For windows and doors, a complete laboratory acoustical test report

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performed in accordance with ASTM E 90 for the proposed product is required (don't forget about doors between garages and the house meeting the requirements of Appendix A):

- a. Verify that the report has a complete product description noting glazing type, thickness and spacing; prime and storm frame and sash material and thickness; the operational configuration (hung, sliding, etc.); and the weatherstripping type. Reports with portions, such as proprietary product descriptions, blacked out are not acceptable. If the report has a product model number but does not have a complete product description, obtain supplemental product shop drawings.
 - b. Verify that the report is presented in its entirety.
 - c. Verify that the report was prepared by an independent laboratory accredited through the National Voluntary Laboratory Accreditation Program (NVLAP).
 - d. Verify that the test was performed in a laboratory in accordance with standard ASTM E 90 as opposed to in the field (in accordance with standard ASTM E 336, E 966, or some other standard).
 - e. Verify that the test was performed recently enough. This determination could consider whether material suppliers are the same now as when the test was performed, whether the fabrication location is the same, whether fabrication equipment is the same, the age of fabrication equipment, etc. Ideally, the test would have been performed in the past five years; however, due to the cost of acoustical tests a relaxing of this requirement might be appropriate in some cases.
 - f. Verify that the test was performed on an operable (if the proposed product is operable) complete door or window assembly. Unacceptable tests are those performed using only the glass of a window, not the complete window, or using windows or doors glued, caulked, or nailed closed.
 - g. Verify that the proposed windows are the same as the one that was described in the test report. If a tested window had a storm window the proposed one must also. The model numbers, the glazing thickness and spacing, the sash construction (welded or bolted), and the frame and sash material and thickness must be the same as for the tested product. However, it is acceptable for the proposed window to have internal or applied muntins, glass obscuration, different hardware, and different screens without affecting the acoustical performance. Generally, fixed (picture) windows perform best, horizontally operated (sliding/rolling) windows are next best, vertically operated (hung) windows are next, and swinging (awning/hopper/casement) windows are the worst. The proposed window must be the same configuration as the tested window or at least be expected to perform better than the tested window based on the previous sentence.
 - h. Verify that the proposed doors are the same as the one that was described in the test report. The door hardware, applied moldings, and screen doors are irrelevant. However, the glazing type, weatherstripping type, bottom seal type, threshold or saddle type, and door leaf construction must be the same as the tested product, and ideally, the general glazing area should be the same.
 - i. Door and window sidelights and transoms may be tested with the doors or windows or alone (glass only), whichever is more convenient. Tests for glass alone are acceptable for demonstrating the performance of these products; the test for glass could even be an old test referenced in a textbook. For example, two panes of double strength glass (1/8" thick) separated by a 3/8" airspace can achieve approximately STC
7. **Acoustical Consulting.** The applicant may hire a qualified acoustical consultant to perform a detailed acoustical analysis of the proposed house. If the report is submitted it could be reviewed in lieu of steps 3 through 6 above. Some qualifications of acoustical consultants to consider include whether the firm is a member of the National Council of Acoustical Consultants (NCAC), whether the engineer is a Professional Engineer (PE), whether the engineer is a member of the Institute of Noise Control Engineers (INCE), whether the engineer has a bachelors degree in engineering from an ABET-accredited college or university, how many years of experience the engineer has, and whether the engineer has experience evaluating the sound insulating performance of buildings.

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APPENDIX C
CONSTRUCTION INSPECTION CHECKLIST



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Appendix C
Construction Inspection Checklist

This checklist will be useful for construction inspectors in determining whether the recommendations contained in the Design Guide were implemented. Various sections of the Design Guide are referenced below.

2. Collect the notes of the plan reviewer to determine the applicable recommendations for each room of the house.
3. For windows and doors, compare the installed product to the description in the acoustical test report to ensure that the correct product (and therefore the correct STC rating) was used in each room. If the report listed product model numbers but did not have a complete description, compare the installed product to the product shop drawings. Focus on the glazing type, thickness and spacing; prime and storm frame and sash material and thickness; the operational configuration (hung, sliding, etc.); the weatherstripping and bottom door seal; and the door saddle or threshold type.
4. Don't forget about doors between garages and the house meeting the requirements of Appendix A.
5. Inspect the door and window installation. Verify that there is no racking of the frame causing gaps to form between the sashes or door panels and the frame. Voids between the rough opening and the frame greater than 1/4" must be filled with solid wood blocking, as opposed to batt insulation. Voids between the rough opening and the frame less than 1/4" may be filled with batt insulation. Hidden (protected) gaps must be filled with non-hardening (acoustical) sealant at the interior and exterior. Exposed gaps must be filled with flexible caulk at the interior and exterior.
6. Verify that the modifications for walls and ceilings have been implemented in each room.
7. Verify that all wood-framed walls have fiberglass, mineral fiber, or cellulose batt or blanket insulation, and never blown-in insulation.
8. If resilient channels are specified for walls or ceilings verify that they are installed in accordance with the channel manufacturer's instructions. Common mistakes are:
 - a. *Using drywall screws that are so long* that the screws used to hang the gypsum board contact the wood framing, thereby allowing noise to transmit through the screw. Contact is bad, even if the screw does not grab the wood. Use 7/8" (not 1") long screws with 1/2" gypsum board.
 - b. *Using closer channel spacing.* The channel manufacturer specifies the maximum allowable resilient channel spacing based on the gypsum board weight for walls and ceilings. For acoustical purposes, use the exact maximum allowable, not a closer spacing. Typically, this is 24" on center.
 - c. *Using rigid channels.* The channels must be single-leaf resilient channels, not rigid channels. A resilient channel is typically 25-gage steel, shaped like half of a hat channel, with holes in the web.
 - d. *Installing resilient channels over a solid sheet material.* It is never acceptable to attach OSB, plywood, or gypsum board directly to the studs or joists and then attach resilient channels (or resilient sound isolation clips) to that board with an additional layer of gypsum board. Whenever resilient channels are used they must always be attached directly to the studs or joists. If it were necessary to use an interior layer of OSB or plywood for structural reasons, resilient channels would not be effective; in this case, use ICF walls, furr out an interior wall, or have an acoustical consultant propose an alternative design.
 - e. *Orienting the channels incorrectly.* The channels were designed to have the stud-side leg lower than the gypsum board-side leg. This makes it more likely that the gypsum board will be floating resiliently.
 - f. *Blocking at the base.* To provide kick-resistance at the base of walls and to allow attachment of solid base molding a filler strip of gypsum board is sometimes used between the studs and the gypsum board panels. This is acceptable, but will reduce the acoustical performance of the wall.



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9. Staggered studs consist of 2x4 studs staggered on a 2x6 plate, or 2x6 studs staggered on a 2x8 base. If staggered studs are specified for walls verify:
 - a. No interior studs contact an exterior stud; the two rows of studs must be independent. Of course, at windows and doors it is necessary to use single studs the same width as the plate; this unfortunately diminishes the acoustical performance.
 - b. Insulation is not compressed. For example, do not use a single piece of R-19 batt insulation packed between a stud and gypsum board.
 - c. Interior boxes (outlets, switches, etc.) must never contact exterior studs, and exterior boxes must never contact interior studs.
 - d. Stud spacing should be maximized. Where feasible for strength use 16 or 24 inch spacing for both the interior and exterior rows of studs.
10. Verify that all exterior wall and ceiling gypsum board is at least 1/2" thick.
11. If two layers of gypsum board are specified for walls or ceilings verify that the layers are each at least 1/2" thick.
12. If ICF walls are used verify that the concrete is at least as massive as 4" thick normal weight concrete.
13. Verify that attic insulation is at least 10" thick cellulose, mineral fiber, fiberglass.
14. Above sloped ceilings use only batt insulation.
15. Verify that there is at least 14" clear space between the bottom of the roof deck and the top of the ceiling, for the entire area over habitable rooms.
16. If "deep" floor trusses are specified in Table 4-1 and Appendix A for the floors of elevated (beach) houses:
 - a. Verify that the depth of the trusses is at least 14" throughout the span.
 - b. Verify that the batt insulation is at least 10" thick.
 - c. Verify that the bottom cords of trusses are covered with nominal 1/2" (min.) OSB or plywood.
17. If crawl spaces do not have masonry walls, verify that a massive barrier panel (masonry or 3/4" nominal plywood) is used as a skirt connecting the bottom of the walls to the ground.
18. For crawl spaces in flood zones use double-swing 3/4" thick plywood doors in lieu of open louvers where allowable by code.
19. Verify that all miscellaneous building penetrations are addressed in accordance with the recommendations in Appendix A including:
 - a. Through-wall, through-floor, or in-window heating, ventilating, or air-conditioning units
 - b. Through-wall or through-door mail slots
 - c. Active fresh-air ventilation
 - d. Attic gravity vents
 - e. Attic fans
 - f. Bath exhaust fans
 - g. Dryer location
 - h. Dryer exhaust duct
 - i. Vented range fans
 - j. Vented fireplaces, wood stoves, and gas-powered prefabricated units
 - k. Fuel-burning appliance (boiler, furnace, water heater, dryer, etc.) combustion exhaust ducts
 - l. Whole-house fans
 - m. Skylights
 - n. Combustion air enforcers
 - o. Attic access panels
 - p. Pull-down attic stair covers
 - q. Heating, ventilating, and air-conditioning ducts in the attic
 - r. Attic vent baffles or louvers (optional)
 - s. Crawl space vent baffles or louvers (optional)



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APPENDIX D
MANUFACTURERS OF ACOUSTICAL MATERIALS



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Appendix D Manufacturers of Acoustical Materials

This list represents a partial list of manufacturers of specialty acoustical products. Other manufacturers not listed may have comparable products. The list below does not imply a product endorsement or recommendation by Wyle Laboratories.

INSULATION

CertainTeed
Headquarters
P.O. Box 860 or
750E Swedesford Rd.
Valley Forge, PA 19482
Tel: 800-233-8990
www.certainteed.com

Johns Manville
P.O. Box 5108
Denver, CO 80217-5108
Tel: 800-654-3103
www.jm.com

Knauf Fiberglass
One Knaff Drive
Shelbyville, IN 46176
Tel: 800-625-4434
Fax: 317-398-3675

Owens Corning Fiberglass Corp.
One Owens Corning Parkway
Toledo, OH 43659
Tel: 800-438-7465 (800-GET-PINK)
www.owenscorning.com

ACOUSTICALLY TESTED DOORS

Algoma Hardwoods
1001 Perry Street
Algoma, WI 54201
Tel: 800-678-8910
www.algomahardwoods.com

Armaclad, Inc.
P.O. Box 70
Waynesboro, PA 17268
Tel: 800-541-6666
www.armaclad.com

Buell Door Company
5200 East Grand Ave.
Suite 500
Dallas, TX 75223
Tel: 800-556-0155
www.buelldoor.com

Ceco Door Products
9159 Telecom Drive
Milan, TN 38358
Tel: 888-232-6366
www.cecodoor.com

Eggers Industries
P.O. Box 1050
Neenah, WI 54957-1050
Tel: 920-722-6444
www.eggersindustries.com

Frieger Specialty Products
9880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries, Inc.
1400 Main Street
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com



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ACOUSTICALLY TESTED DOORS - Concluded

Jamison Door Company
55 J.V. Jamison Drive
P.O. Box 70
Hagerstown, MD 21741-0070
Tel: 800-532-3667
www.jamison-door.com

Krieger Specialty Products
4880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Larson Doors
Tel: 800-352-3360
www.larsondoors.com

Marshfield Doors Systems, Inc.
1401 East 4th Street
Marshfield, WI 54449-7780
Tel: 800-869-3667
www.marshfielddoors.com

Mohawk Flush Doors, Inc.
980 Point Township Road
P.O. Box 112
Northumberland, PA 17857-0112
Tel: 570-473-3557
www.mohawkdoors.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, MN 55427-4432
Tel: 800-544-3646
www.monray.com

Overly Door Company
574 West Otterman St.
Greensburg, PA 15601
Tel: 800-979-7300
www.overly.com

PGT Industries, Inc.
Tel: 877-550-6006
www.pgtindustries.com

P.H. Tech Corp.
144 Ferry Street
Buncher Industrial Park
Leetsdale, PA 15056
www.phtech.ca

Pioneer Industries
171 South Newman Street
Hackensack, NJ 07601
Tel: 201-933-1900
www.pioneerindustries.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
930 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Vancouver Door Company
203 5th St., N.W.
P.O. Box 1418
Puyallup, WA 98371
Tel: 800-999-3667
www.vancouverdoorco.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

Whisper-Like
P.O. Box 2949
Toledo, OH 43606
Tel: 800-227-8246
whisper-like.com

Windor Supply and Manufacturing
4237 S. 74th E. Ave.
Tulsa, OK 74145
Tel: 800-324-1947
www.windor.com



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DUCT AND FAN NOISE CONTROL AND ACOUSTICAL LOUVERS

Acoustical Surfaces, Inc.
123 Columbia Court North, Suite 201
Chaska, MN 55318
Tel: 800-448-0737

Aeroacoustic Corporation
3300 Corporation Way
Darlington, SC 29532
Tel: 843-398-1006
www.aeroacoustic.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

McGill Airflow Corporation
One Mission Park
Groveport, OH 43125
Tel: 614-836-9981
www.mcgillairflow.com

DOOR SEALS AND WEATHERSTRIPPING

National Guard Products, Inc.
4985 East Raines Rd.
Memphis, TN 38118
Tel: 800-647-7874
www.ngpinc.com

Pemko Manufacturing Co.
5535 Distribution Drive
Memphis, TN 38141
Tel: 800-824-3018
www.pemko.com

Zero International, Inc.
415 Concord Avenue
Bronx, NY 10455
Tel: 800-635-5335
www.zerointernational.com

ACOUSTICALLY TESTED WINDOWS

Century Manufacturing, Inc.
4620 Andrews St.
North Las Vegas, NV 89031
Tel: 800-654-7027
www.windowtech.com

DeVAC (see Mon-Ray, Inc.)

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries Inc.
1400 Main Street
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com

Loewen, Inc.
6465 East Johns Crossing, Suite 400
Duluth, GA 30097
Tel: 800-563-9367
www.loewen.com

Milgard Windows
965 54th Ave. East
Tacoma, WA 98424
Tel: 800-645-4273 (800-MIL-GARD)
www.milgard.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, N 55427-4432
Tel: 800-544-3646
www.monray.com



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NRG, Inc.
22520 Ecorse Rd.
Taylor, MI 48180
Tel: 312-295-4100

Peerless Products, Inc.
2403 S. Main Street
Fort Scott, KS 66701
Tel: 866-420-4000
www.peerlessproducts.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
900 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

St. Cloud Window, Inc.
P.O. Box 1577
St. Cloud, MN 56302
Tel: 800-383-9311
www.stcloudwindow.com

Therm-o-lite
635 S. Lafayette Blvd.
South Bend, IN 46601
Tel: 574-234-4004
www.therm-o-lite-windows.com

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

WALL AND CEILING TREATMENTS

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
Tel: 704-365-7300
www.nationalgypsum.com

PAC International Inc.
10680 S.W. Industrial Way
Tualatin, OR 97062-9502
Tel: 866-774-2100
www.pac-intl.com

Quiet Solution, Inc.
522 Almanor Ave.
Sunnyvale, CA 94085
Tel: 800-797-8438
www.quietsolution.com

USG
125 South Franklin
Chicago, IL 60606
Tel: 312-606-4000
www.usg.com



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APPENDIX E

INDEPENDENT CERTIFIED ACOUSTICAL TESTING LABORATORIES



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Appendix E
Independent Certified Acoustical Testing Laboratories

This list represents a partial list of Certified Acoustical Testing Laboratories that have the capability to perform tests in accordance with ASTM E90. This standard is used to determine the transmission loss and STC ratings of building systems and components. The list below does not imply an endorsement or recommendation by Wyle Laboratories. The National Voluntary Laboratory Accreditation Program (NVLAP) maintains a Directory of Accredited Laboratories on their website:

<http://ts.nist.gov/ts/htdocs/210/214/scopes/acots.htm>

Acoustic Systems Acoustical
Research Facility
415 East St., Elmo Road
P.O. Box 3610
Austin, TX 78764
Tel: 512-444-1961
www.acousticsystems.com

Architectural Testing Inc.
130 Derry Cl.
York, PA 17402
717-764-7700
www.archtest.com

Intertek Testing Services
3933 US Route 11
Cortland, NY 13045
Tel: 607-758-6215
www.intertek.com

Johns Manville Technical Center
10100 West Ute Ave.
Littleton, CO 80162
Tel: 303-978-3611
www.jm.com/mtc/appliedtechnology

National Gypsum Co.
(NGC) Testing Services
1650 Military Road
Buffalo, NY 14217-1198
Tel: 716-873-9750
www.ngctestingservices.com

Orfield Laboratories, Inc.
2709 E. 25th Street
Minneapolis, MN 55406
Tel: 612-721-2455
www.orfieldlabs.com

Riverbank Acoustical Labs, Inc.
1512 S. Batavia Avenue
Geneva, IL 60134
Tel: 630-232-0104
www.riverbank.alionscience.com

Steelcase Acoustical Test Laboratory
P.O. Box 1967
Mail Stop CD2W06
Grand Rapids, MI 49501
Tel: 616-698-5527

Stork-Twin City Testing, Inc.
662 Cromwell Avenue
St. Paul, MN 55114-1776
Tel: 651-645-3601
www.storkct.com

United States Gypsum Co.
(USG) Research Construction
Systems Laboratory
700 N. Highway 45
Libertyville, IL 60048-1296
Tel: 847-970-5255
www.usg.com

Western Electro-Acoustic Lab., Inc.
25132 Rye Canyon Loop
Santa Clarita, CA 91355
Tel: 661-775-3741



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Appendix F Glossary

- Absorption Coefficient** The sound-absorbing ability of a material. Values of absorption coefficient are a function of the frequency of the incident sound. The values of sound absorption coefficients usually range from about 0.01 (for hard smooth surfaces) to about 1.0 (for thick absorptive fiberglass).
- Acoustical Treatment** Applying design principles in architectural acoustics to reduce noise or vibration and to correct acoustical problems.
- Acoustics** The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible.
- Airborne Sound** Sound traveling through air rather than through solid materials or the structure of the building.
- Ambient Noise Level** Sometimes called the “background” noise, the level of noise that is all-encompassing within a given environment. It is usually made up of many different sounds, some originating near to and far from the receiver.
- American National Standards Institute (ANSI)** A voluntary federation of organizations concerned with developing standards covering a broad spectrum of topics.
- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)** A professional organization which identifies and publishes specifications and standard practices relating to all aspects of heating, ventilation, refrigeration, and air conditioning.
- American Society for Testing and Materials (ASTM)** An organization which develops and publishes recommended practices and standards for a broad range of testing and material properties issues.
- Architectural Acoustics** The science of sound, including its production, transmission, control, and effects within buildings.
- Attenuation** The reduction of sound.
- A-Weighted Sound Level** A sound measure, in decibels, that reflects the heightened sensitivity of the human ear to sound frequencies between 1000 and 6000 Hz, and the relatively reduced sensitivity to sound below 1000 Hz or above 6000 Hz. The A-weighted sound level is used to predict the relative “noisiness” or “annoyance” of many common sounds.
- Background Noise** Ambient noise from all sources unrelated to a any particular sound. Background noise may include airborne, structureborne, and instrument noise.
- Balanced Design** A noise control design in which all important noise paths transmit the same amount of acoustic energy into the space, avoiding any “weak links” so that the combined effect ensures an acceptable noise level.
- Building Officials and Code Administrators International (BOCA)** See *International Building Code*.
- Dampen** To cause a reduction, usually through dissipation, of the sound energy.
- Day-Night Average Sound Level (DNL or Ldn)** The day-night average sound level is a measure of the average noise environment over a 24-hour day. It is the 24-hour energy-averaged, A-weighted sound level with a 10 dB penalty applied to the nighttime levels which occur between 10:00 p.m. to 7:00 a.m.
- Decibel (dB)** The term used to describe sound levels.

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- Design Criteria** Design goals used in acoustical and noise control design of buildings. Design criteria may be stated either as the maximum allowable noise levels inside buildings or as noise reduction values (from outside to inside) required for certain types of buildings or rooms.
- DNL** See Day-Night Average Sound Level.
- Environmental Noise** Unwanted sound from various outdoor noise sources. Environmental noise sources include aircraft, cars, trucks, buses, railways, industrial plants, construction activities, lawnmowers, etc.
- Frequency** The number of oscillations per second of a vibrating object, measured in Hertz (Hz).
- Hertz** The unit used to designate frequency. Specifically, the number of cycles per second.
- International Building Code (IBC)** A comprehensive building code published by the International Code Council (ICC) covering the fire, life, and structural safety aspects of all buildings and related structures. As of January 2003, the three largest building code organizations in America merged. Building Officials and Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), and the International Conference of Building Officials (ICBO) integrated to form the International Code Council (ICC). Municipalities may still reference earlier versions of BOCA, UBC, and SBC (as well as IBC). Also, states typically have their own building codes that may incorporate all or part of these codes.
- Loudness** The attribute of a sound, on a scale extending from very soft to very loud. Loudness depends most on the sound pressure or energy of the source, but it also depends upon the frequency and wave form of the source (because the human ear is more sensitive to some frequencies and forms than others).
- Masking** The ability of one sound to block out the perception of another sound. For example, radio static may mask voices in a nearby room. Masking may involve the intentional use of an unobtrusive background noise to cover some other specific intruding sound.
- Noise** Any sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.
- Noise Contours** Lines or “footprints” of noise level usually drawn around a noise source (such as an airport, industrial plant or highway). The lines are generally drawn in 5-decibel increments so that they resemble elevation contours found in topographic maps.
- Noise Exposure** The cumulative noise reaching the ear of a person over a specified period of time (e.g., a work shift, a day, a working life, or a lifetime).
- Noise Level Reduction (NLR)** The difference between A-weighted sound levels indoors and outdoors.
- Noise Reduction (NR)** The difference, in decibels, of the average sound levels in two adjacent areas or rooms. Noise reduction could be from outside to inside, or from one room to another. Noise reduction combines the effects of the building construction plus the effect of acoustic absorption present in the receiving room. By knowing the noise reduction values and the outdoor noise levels one can determine the Noise Level Reduction (NLR).
- Octave** The interval between two sound frequencies having a ratio of 2. For example, if the center frequency of one octave is 125 Hz, the next octave up will be centered at 250 Hz, and the octave above that will be at 500 Hz.
- Octave Band** A frequency range which is one octave wide. Standard octave bands are designed by their center frequency.
- Octave Band Center Frequency** The average of the upper and lower frequencies of the octave. Standard octave band center frequencies in the audible range are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 hertz.

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One-Third Octave Band A frequency range which is one-third octave wide. Standard one-third octave bands are designed by their center frequency.

One-Third Octave Band Center Frequency The average of the upper and lower frequencies of the one-third octave bands. Standard one-third octave band center frequencies in the audible range are:

25.0	100	400	1600	6300
31.5	125	500	2000	8000
40.0	160	630	2500	10,000
50.0	200	800	3150	12,500
63.0	250	1000	4000	16,000
80.0	315	1250	5000	20,000

Receiver The listener who hears a sound or the measuring microphone which detects the sound transmitted by the source.

Reverberation The persistence of sound in an enclosed space, as a result of multiple reflections, after the sound source has stopped. The more absorptive the room is, the shorter the reverberation time will be. Generally, if the reverberation time is too short, people feel that the room is “dead” while if it is too long, there is confusion among sounds.

Shielding The ability of hills or structures to physically block sound or create shadow zones where sound levels are reduced.

Sound Absorption The ability of sound-absorbing materials to trap sound and convert it to heat or some other form of energy.

Sound Insulation Reducing the sound level inside a building through the use of specific building construction materials, and component assemblies which provide noise reduction.

Sound Transmission Class (STC) A single-number rating derived from measured values of transmission loss, in accordance with ASTM Classification E413, “Determination of Sound Transmission Class”. It provides an evaluation of the sound-isolating properties of built construction against sounds of speech, radio, television, etc.

Sound Transmission Loss (TL) A measure of a built construction’s ability to reduce sound passing through it, expressed in decibels.

Source The object which generates the sound.

Southern Building Code (SBC) See *International Building Code*.

Spectral Characteristics/Spectrum The frequency content of the noise produced by the source.

Structureborne Sound Sound energy transmitted through a solid medium such as the building structure.

Thermal Insulation A material or assembly of materials used primarily to provide resistance to heat flow.

TL See Sound Transmission Loss.

Uniform Building Code (UBC) See *International Building Code*.

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Cherry Point New Construction
Acoustical Design Guide

FINAL – Appendix G

APPENDIX G DESIGN PRESSURE REQUIREMENTS

November 2004
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Acoustical Design Guide

FINAL – Appendix G

Appendix G Design Pressure Requirements

Chapter 44 of the North Carolina Building Code includes requirements for High Wind Zones. These requirements have a significant impact on the sound insulation process, since they affect which window and door products can be used in the area. Table 4402(a) of the Code lists the required design pressures in pounds per-square-foot (psf) for windows and doors (not including garage doors), as a function of two parameters: the wind velocity (mph) in the area, and the mean roof height (feet). Many locations near MCAS Cherry Point and MCALF Bogue Field are within the highest velocity zone of 130 mph. The highest design pressure required in this velocity zone is 47 psf; this applies when the mean roof height is 35 feet. Reduced design pressures are allowable when the roof slope is 10 degrees or less, or when the window or door is more than four feet from a corner.

Many of the manufacturers listed in Appendix D cannot provide products that achieve both a high STC rating and a high design pressure. Below is a discussion of some products that can meet both the STC and design pressure requirements. There are likely many more options – this discussion is not all-inclusive. Note that the design pressure a window can achieve varies significantly based on the operational type; fixed windows are the best, casements are in the middle, and hung and sliding windows are the worst.

WINDOWS

For windows one solution is to use hurricane shutters than can meet the design pressure requirement over acoustical windows that can meet the STC requirement.

Another option is to use an acoustical aluminum dual window. These windows can achieve design pressures of 50 to 90 psf; three manufacturers of this product are St. Cloud, DeVAC, and Graham.

One acoustical combination window (aluminum storm with vinyl prime) that can meet the design pressure requirement is manufactured by Harvey Industries, Inc. Some of the Harvey vinyl windows that do not have storm panels may also be able to meet the design pressure requirement.

DOORS

There are many storm doors that can meet the design pressure requirements. These include PGT Industries, Inc., Armaclad, and Whisper-Like. These storm doors should be used in combination with a prime door that has a high STC rating.

There is at least one prime door that can meet a design pressure of 50 psf without the use of a storm door: Armaclad.

Section 13.8 - Joint Land Use Team Implementation Charter

Mission Statement

- To promote compatible development while maintaining the current and future missions of the Joint Base
- To collaborate on land use planning and development
- To enlighten the public on joint base mission changes
- To facilitate discussion, debate, and dialogue concerning these issues in a friendly and open atmosphere

Guiding Precepts

- Joint Land Use Study is baseline
- Open communications
- Sound land use principles
- Community safety and well being are paramount
- Semi-annual Joint Land Use Team meetings
- Joint base participation in municipal planning board meetings

Scope

Includes the ten neighboring communities which participated in the Joint Land Use Study and Joint Base McGuire-Dix-Lakehurst

Organization

Municipal leadership, joint base leadership, county, regional and joint base planning professionals

Oversight

One representative from each County and the Joint Base will have oversight responsibilities to ensure the intent and spirit of the Joint Land Use Study is complied with, that meetings are scheduled and that necessary logistics are addressed.

Committee Signature Page

Mayor, Jackson Township

Mayor, Lakehurst Borough

Mayor, Manchester Township

Mayor, New Hanover Township

Mayor, North Hanover Township

Mayor, Pemberton Borough

Mayor, Pemberton Township

Mayor, Plumsted Township

Mayor, Springfield Township

Mayor, Wrightstown Borough

Freeholder, Ocean County

Freeholder, Burlington County

Commander
Joint Base McGuire Dix Lakehurst

Installation Commander, Fort Dix

Installation Commander,
McGuire AFB

Commanding Officer,
Naval Air Engineering Station

Director, Ocean County
Planning Department

Director, Burlington County
Office of Economic Development
and Regional Planning

Commissioner, Pinelands Commission

Joint Land Use Study Public Meeting
Primary School Multi-Purpose Room
131 Evergreen Road, Plumsted NJ
March 30, 2009
6:30pm – 8:30pm

At 6:30pm David McKeon, Ocean County Planning Department Planning Director, began the meeting by thanking Mayor Ron Dancer for hosting the Public Meeting. He also informed the public that there would be plenty of time after the presentation for comments. David McKeon asked all members of the public present to sign-in if they had not done so already. David McKeon then introduced Brandi Bartolomeo from Paulus, Sokolowski & Sartor (PS&S) and Bret Gordon from Sabre Systems.

Brandi Bartolomeo thanked the members of the public for attending and informed the crowd that PS&S had done the land use and noise analysis, Sabre Systems the military analysis, and HR&A the economic analysis for the study. The County of Ocean and the Department of Defense Office of Economic Adjustment sponsored the study. Ocean County Planning Department, Burlington County Department of Economic Development and Regional Planning, the Department of Defense Office of Economic Adjustment, and the consulting team collaborated during the study. Brandi informed the public that core Joint Land Use Study team members and the consultant staff would be available to field comments and answer questions after the meeting for those public members not comfortable with speaking in a crowd.

Brandi described the agenda for the night; quick summary of the Joint Land Use Study Report one section at a time, discussion of suggested recommendations, followed by question and answer session. She proceeded with introducing the definition of a JLUS.

JLUS is an acronym standing for Joint Land Use Study. There are three military installations around the area, Lakehurst Naval Engineering Station, Fort Dix Post, and McGuire Air Force Base. These installations were formed in the early twentieth century, when the communities weren't as developed as they are now. The military missions grew at the same time the surrounding municipalities' land use expanded creating impacts for both the military and the surrounding municipalities. In 1985, the Department of Defense created the Joint Land Use Study program (JLUS) to encourage cooperative growth with the communities and seek ways to reduce impacts created by the communities that affect the military and impacts created by the military that affect the community.

Each Joint Land Use Study has their own objectives. In this Joint Land Use Study, the objectives were broken up into community objectives and military objectives. The community objectives were to protect the health, safety and welfare of the residents, maintain quality of life for everybody in the community, guide growth away from the air strips and high noise areas, and maintain economic vitality and sustainable growth. The military objectives are to protect the health, safety, and welfare of the military personnel, preserve the Joint Base missions so that they can protect the country and continue to grow. A framework for communication will be created for both the military and communities and this study is initiating the process. Brandi introduced Bret Gordon.

Bret Gordon asked the crowd to identify which county they are from. There was a good showing from both counties, however the majority of public members reside in Burlington County municipalities. Bret Gordon gave a summary of plans for the Joint Base.

The Joint Base is a large area in central New Jersey that impacts two counties, ten municipalities, and three military installations. This study focused predominantly on the three military installations, the surrounding area, and the two-mile perimeter around the installations.

In 1995 the military installations were informed that there was a possibility of being selected for base closure. The three adjacent military installations started communicating with each other to find solutions for preserving their installations and missions. They figured that there was strength in numbers and pushed the idea of becoming a large consolidated base. Former Congressman Jim Saxton, was a large advocate of the "mega-base" known today as the Joint Base, especially during the Base Realignment and Closure process.

In 2005 the McGuire, Fort Dix, and Lakehurst installations were selected to become a joint base. Twelve Joint bases were created throughout the United States. Typically Joint Bases consist of two services with consolidated installation management services. Joint base McGuire, Dix, Lakehurst was identified as the only tri-service Joint Base in the United States. The three services will consolidate installation management services, thereby reducing the cost of operation.

The combining of the three installations has raised complexities and issues not seen in other Joint Bases. When the Joint Base stands as one there will be concern about losing the rich heritage of each individual installation from the military personnel and surrounding communities. This is not the intent of the joining of the three installations. One of the challenges for the new commander of the Joint Base, Col. Grasso, will be to ensure that the three military installations operate as one and continue to maintain each of their own identities.

Lakehurst NAES has been around since around 1917. It started off as a Russian proving ground that eventually morphed into a US Army proving ground and then into a Naval Air Station. The Naval Air Station then became the Naval Engineering Center and finally morphed into the current configuration of Lakehurst Naval Air Engineering Station (NAES). Lakehurst NAES has many missions, however their predominant mission is supporting aircraft carriers with catapults and arresting gear. This mission is extremely important because the aircraft carriers are ineffective without this gear and Lakehurst NAES is one of the few installations with the technological knowledge to do this type of mission in the world. Lakehurst NAES is adjacent to and directly impacts the municipalities of Jackson, Manchester, and Lakehurst.

Fort Dix Post has been around almost as long as Lakehurst NAES. Fort Dix has had a long rich history and has morphed into a reserve mobilization base. Soldiers are sent to Fort Dix when they are activated for training before being sent abroad for their missions. Fort Dix covers about 40,000 acres of the entire Joint Base. They have the most land and therefore impact six of the ten municipalities participating in the Joint Land Use Study. The adjacent and directly impacted municipalities are Manchester, Jackson, and Plumsted Townships in Ocean County and Pemberton, Springfield, and New Hanover Townships in Burlington County.

McGuire Air Force Base's predominant mission is the transport of materials and personnel all over the world. There are three municipalities directly impacted by the McGuire Air Force Base. These municipalities are Wrightstown, North Hanover, and New Hanover.

All three installations independently provide an important link to the battle against terrorism. Fort Dix provides the soldiers, McGuire Air Force Base transports the soldiers and materials, and Navy Lakehurst helps train the Army and Air Force personnel and provides technological support for the aircraft carriers. The significance of this Joint Land Use Study is to maintain these missions while meeting the needs of the community as well.

Brandi Bartolomeo summarized the year long Joint Land Use Study process. The process included 8 policy committee meetings, 6 consultant meetings, technical committee meetings, and 10 municipality meetings. The Municipal meetings were an opportunity for each separate municipality to present an overview of their concerns, relationship with the adjacent military installations, and municipal planning board's goals and objectives. Numerous military meetings with commanding officers and their staff took place as well. Public outreach was done in September through two public open houses, one in Ocean County and the other in Burlington County.

In September of 2008 two Open Houses were hosted for the public to inform them about the Joint Land Use Study and offer them an opportunity to have input regarding concerns they have about the Joint Base and their municipality. The "Base Next Door" video was presented at the open houses, the video gave a history of the Joint Land Use Study program. Individual municipal displays and military displays were also presented. The individual municipal displays presented land use, zoning, preserved lands, proximity to the Joint Base, and environmental constraints for each municipality. Each military installation was represented by military personnel to answer public questions and concerns.

Other medias for public outreach included the online surveys, interactive mapper, and Joint Land Use Study public website. The online surveys were available at computer stations at the open houses and kept on the Joint Land Use Study website for six months. There were fifty responses from the public, lower than what had been expected. A Joint Land Use Interactive Mapper was also created and posted onto the JLUS website, which allows respondents to enter their address and shows them their location relative to the Joint Base. The mapper is still available on the JLUS website. The website also has posted presentation meetings from policy and technical meetings, PowerPoint presentations, JLUS in the news, "Doing Business with the Military" a contracting workshop summary and contact information, and the Draft JLUS report.

The Draft Joint Land Use Report is divided into sections. The executive summary is the "cliff-notes" of the report. Other sections discuss the background of the study, the need for the study, the study area defined, the base mission and projected missions (which was just summarized by Bret Gordon), community analysis, state planning considerations such as the Pinelands and state plans, infrastructure capacity for the nearby municipalities, economic

considerations, and existing land protection strategies, and recommendations. Brandi recommended reading the executive summary and recommendations section for a thorough summary of the study.

Brandi introduced Mark Hoffman, Noise Analyst from Paulus, Sokolowski, and Sartor, to define noise and summarize how it pertains to the Joint Land Use Study. Noise and Sound are interchangeable. Noise is essentially unwanted sound. Noise is an issue of perception such as our attitude towards the source of the sound, physical ability to hear, past experiences, and the components of sound (tonality and loudness). Sound is measured with the decimal scale. Calibration for sound levels: noisy urban daytime is about 80 decibels, quiet urban daytime is about 50 decibels, suburban quiet night time is about 40 decibels. Speech is the best gauge of sound. Speech at about 3 to 5 feet from source is about 60 to 65 decibels. When background sound levels approach 65 decibels or greater overcompensation occurs by raising the voice in order to be heard.

The JLUS analysis was based on previous studies such as AICUZ, IMNP, etc. These previous studies essentially did modeling of sound level outputs. Two of the studies were associated with aircrafts from McGuire and Lakehurst. One of the studies was from Fort Dix, which showed the small arms and artillery sound outputs. The distribution of sound was analyzed and points of equal sound were connected into contours. These contours are not physical lines and can change depending on environmental conditions. The models are conservative and show maximum noise levels, however new models have not been done recently for the entire Joint Base. The perceived sound can be lower or higher than what is modeled.

The Federal guidelines create noise zones for land use planning purposes. Mark presented maps depicting the noise zones around the Joint Base. The A-rated scale is the most relative to human hearing and is weighted on center frequency of sounds of the octave bands. C-wave rating accounts for the lower frequencies, which may create vibrations due to sound. The peak sounds are associated with intense sounds such as small arms.

The range of sounds were divided into three noise zones. Noise zone one represents 55 decibels to 65 decibels and generally allows development of sensitive land uses. Noise zone two represents 65-75 decibels and generally does not allow incompatible land uses such as sensitive land uses. Noise zone three represents 75 decibels or greater and does not allow incompatible land uses such as sensitive land uses. Sensitive land uses are residential, hotels, hospitals, schools, and other high-density uses. The Land Use Planning Zone (LUPZ) is a zone that takes into account the expansion of the noise zones, which on some days can expand further into the community based on conditions and other variables.

Mark described the Accident Potential Zones, which takes into account aircraft safety. The Accident Potential Zones are the Clear Zone, Accident Potential Zone 1 (APZ 1) and Accident Potential Zone 2 (APZ 2). The clear zone is a zone that extends 3000 ft from the ends of the runways and 3000ft wide. It is based on the statistical potential for an accident, based on data gathered from previous military accidents throughout history. The percentage of accidents that have occurred in the clear zone is twenty-seven percent. Development is discouraged in the clear zones. Accident Potential Zone 1 extends another 5,000 ft beyond the clear zone and is also 3,000 ft. wide. About ten percent of accidents occur in APZ 1. High-density development such as high-density residential, commercial, and public uses are discouraged in APZ 1. Accident Potential Zone 2 extends 7000 ft beyond APZ 1 and is also 3,000 ft. wide. About five percent of accidents occur in this zone.

In general the noise zones and Accident Potential Zones should be used as guidelines to restrict development and encourage it elsewhere. Brandi informed the attendees that if they wanted more information regarding the noise zones and APZ's that they should read section six of the report, which goes into further detail.

The community was analyzed in section seven. The community analysis took into account vacant lands, existing zoning, municipal ordinances, and environmental constraints to construct a built out analysis for each municipality. Only the two-mile buffer area of the municipalities was analyzed. All preserved land, such as farmland and natural lands, were extracted out to calculate residential density. The total vacant land was accounted by using tax records. Farmland was viewed as an active use, and was looked at for a possibility of development. North Hanover Township and Pemberton Township had the most possibility of non-preserved farmland being developed in the future. The recommendation is to keep the existing farmland surrounding the Joint Base in its current use.

Economic considerations were analyzed in section ten. The evolving Joint Base mission and the surrounding demographics were taken into account. The joint base is both a negative and positive factor for the local economy. The three military bases are the largest employers for the two counties. A summary of the civilian population wage rates and residential information was presented. Lakehurst NAES has a high median income because of all the research and engineering high wage jobs. Fort Dix Post has over 70 percent of their civilian workers living in Burlington County municipalities.

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Willow Grove base will be sending their missions and personnel to the Joint Base by 2011. There will be 625 active duty military personnel with a projection of 331 spouses and 682 total family members arriving at the Joint Base. There will be an increase of school children, commuters, and in the tax base because some of these new families will become homeowners.

Major growth sectors such as manufacturing, retail, health, and education were also analyzed in the economic section. Burlington County has a high manufacturing sector and should consider partnering up with the joint base. Both Ocean County and Burlington County have a large senior citizen population who will need health care in the future, therefore this sector will continue to grow. Retail growth will occur both from the demand of the large senior citizen population and new personnel moving to the Joint Base. Both counties should focus on education. The joint base has stable high paying jobs with an older civilian workforce that will be retiring and will need to be replaced. Ocean County College and Burlington Community College should partner with the Joint Base to create curriculums that will prepare the younger population for future joint base vacancies. Sites were chosen within the two-mile buffer for possible economic development.

Suggested Implementation issues were identified: lack of communicational procedures between the Joint Base and the surrounding municipalities, collaboration between the communities and the joint base, lack of public awareness of the joint base, implementation procedures and support system after the study has been completed, decrease urban growth around the joint base, restrict height of development, mitigate noise complaints from the community and develop programs for retrofitting of existing structures, reduce development in Accident Potential Zones, availability of affordable housing, commercial competition between the base and communities, and real estate disclosure mechanisms for the 2-mile area.

The JLUS report is intended to be a dynamic document that will guide the implementation phase. A charter will be created to ensure that the community and Joint Base agree to keep working together during the implementation process. Other communication solutions are to create an operational manual for base commanders and local politicians, designate a Joint Base planner to attend municipal planning board meetings, create a Joint land Use study website for the military and communities to communicate with the residents about missions, events and local issues. Land use solutions are to add the Joint Base into municipal master plans, rezone areas of non-compatible uses in high noise zones and Accident Potential Zones, and completion of an AICUZ for the whole entire Joint Base that takes into account the new missions. Other land use solutions were to create a Municipal Transfer Development Rights program as a tool to steer development away from high noise areas and Accident Potential Zones and continue to preserve agriculture and open space around the Joint Base, which is compatible development. Another solution is suggesting to COAH that they remove areas located in high noise areas and Accident Potential Zones as developable lands, which would reduce the amount of affordable housing obligations for the municipalities and protect low/moderate income clientele from buying those units.

The floor was opened to the public for the Question and Answer session:

Q: Is their going to be a Warren Grove Joint Land Use Study and is it associated with this Joint Land Use Study?

A: Yes there is going to be a Joint Land Use Study for Warren Grove, and it is a separate study from this one. Burlington County is working to get it underway.

Q: The Analysis includes build out of existing buildings and Master Plans should include the Joint Land Use Study?

A: The municipal Master plans should acknowledge the Joint Base, their missions, noise zones and accident potential zones. The study is a recommendation to the municipalities.

Q: What happens if the municipality is proposing a Master Plan that is changing the zoning to increase density within the two-mile area and is lacking in addressing the Joint Base?

A: The Study is not saying that all development within the two-mile buffer is a bad thing, but for municipal planners to add the noise zones and accident potential zones in the master plans and develop away from those areas. Municipal planners should make residents in the 2-mile area around the base aware of the Joint Base, but not necessarily prevent them from developing if they're not in a high noise or accident potential area. The study wants to prevent unilateral decisions from being made by the military or the municipalities. A unilateral decision without considering the impact on the military or the surrounding municipalities can have adverse affects. It would be better to have all parties involved get together to weight the pros and cons and make a decision that takes into account the military missions and the community needs. The Joint Land Use Study Report should act as a catalyst for open communication between the entities.

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Q: In 1950 a jet did crash within the 2-mile buffer area. It's very important for people to take this into consideration.

A: That is why it is important to take the military into account in land use decisions and provide real estate disclosure for those new residents moving into the area. Real estate disclosures aren't supposed to be a negative on property value but an awareness of the Joint Base next door. The military safety record has increased since that time. However, it is important to provide low-density areas for emergency landings that could be caused from natural incidents (bird strike).

Q: Is their going to be an area for comments and questions on the website for those who have not had the chance to read the Joint Land Use Study report from the website?

A: Yes, Brandi's email address will be provided for comments and questions for a two-week window. Brandi will answer questions sent to her.

Q: Were the rural areas in the Pinelands considered for Transfer of Development Rights, because only areas outside of the Pinelands were mentioned?

A: Yes, the Pinelands have a TDR program that will be used and the development of a TDR program for those areas lying outside of the Pinelands region has also been recommended. The rural areas in the pinelands can also be considered for TDR by municipalities. More information is provided in section eight of the report.

Q: What specific planes are coming from Willow Grove? We're used to having transports operating from specific runways. Old KC-135's are still flying and they are very noisy. Were actual studies done pertaining to these airplanes or where generic airplane noise levels used?

A: Actual studies were done of the aircraft at the installations. The noise data is from AICUZ and ICUZ done at McGuire and Lakehurst NAES. An AICUZ study will be done around 2010 or 2011 that will incorporate the new aircraft arriving at the Joint Base as well as the existing missions for the entire Joint Base. Helicopters are the majority of aircraft arriving from Willow Grove

Q: Does anybody have a decibel limit on military helicopters?

A: That data has not been gathered in this report. It was mentioned in the study and recommended that they be taken into account. The types of aircraft that will be coming to the base is mentioned in the noise section, section six.

Q: Are fighter planes coming? War hogs?

A: No War Hogs, but A-10's will be coming from the National Reserves.

Q: So there are three types of aircrafts that will be operating at the Joint Base. They all operate under separate conditions. Helicopters have separate approaches and departures from the base. They usually fly outside of the clear zones and APZ zones of other aircrafts, usually to the side. The fighters and transports are so different that they have to fly different patterns. Pemberton Twp. has designated an area within the 2-mile buffer for high-density development. You've mentioned that you would like to slow down the growth and that's a good idea. However, the administration of the township has turned their back on all recommendations. Willow Grove is a very noisy operation and until there is certainty about the actual missions and how they will operate at the Joint Base, the township should hold off on developing.

A: Pemberton Township just came out with a new Master Plan. They have asked for input from the JLUS consultant team. They have incorporated the noise contours and Accident Potential Zones, as recommended. The section they want to develop falls well outside of the noise contours and Accident Potential Zones currently mapped. We are concerned about the Brown's Mill area for future infill development. The McGuire just redid their AICUZ and their noise footprint is smaller than it used to be but still effects the Brown's Mill area.

Q: The area is north of the safe zone, but still within the 2-mile buffer.

A: An area can still be developed within the 2-mile buffer, as long as it doesn't lie in the noise zone or APZ zones.

Q: The last time they did an AICUZ was in September 1999. In 2011 they're going to do another AICUZ study with the Army Black-Hacks from Trenton and other aircraft from Willow Grove. However the Helicopters are extremely loud. They won't plug the runways, but they're very slow and noisy. What is going to be their flight path?

A: McGuire just completed an AICUZ in 2008. All aircraft will be taken into account in the 2011 first Joint Base AICUZ study. The National Guard helicopters relocating to Lakehurst are oversees until 2011. The flight paths will probably be east of McGuire and west of Lakehurst.

Q: Where is the area of North of Pemberton? Give some boundaries.

A: Brandi presented a map of the Joint Base area and pointed to the region. The area was outside of the Joint land use planning zone created for the Joint Base noise contours and APZ's. The land use planning zone only shows the current situation and does not project the incoming aircrafts and missions. There could be more or less noise in the future outside of the Land Use Planning Zone (LUPZ).

Q: Is Wrightstown Borough going to be developed with new businesses?

A: Wrightstown is going to be redeveloped. A four star hotel, Lady of Our Lords hospital clinic and Burlington Community College classrooms and office space is underway and is part of phase one. In the next 60 days, an announcement for phase two will be announced, which will house most of the retail on Saylor's Pond Road. Wrightstown will not survive just with the military support, but also needs the community to support it.

Q: Some planes in the flight path screech over my house and the mortars from Fort Dix shake the house. Will the increase in traffic cause more problems?

A: Most of the new planes coming to McGuire will be transport aircraft, which are quieter. They are also new models with the latest technology. Fort Dix starts their missions at 6:00am and ends by 11:00pm. The website will have contact numbers for noise complaints if they get worse.

Q: James Durr, North Hanover Mayor, stated that a full-circle of land has been preserved as farmland. The demographics from the surrounding community will not support commercial districts without the military demographics supporting it as well. Continuing retail use behind the military gates has been rumored. Should we be investing tens of thousands of dollars into a commercial area that the military might not use? Should the municipality look at other means of supporting the local economy? There is a 60% vacancy for retail. We need the military to have direct communication with us to ensure that we are on the right track and that they support the municipal initiatives.

A: The JLUS report recommends that the military designate a Joint Land Use military planner, who would be able to be approached for such issues. Sites in North Hanover have been suggested for development in the Economic section.

Q: Mary Anne Reinhart, Burlington County Freeholder, asked about the number of planes coming to the joint base and the percentage of increase for the missions.

A: Yes, that information can be found in section 5 of the JLUS report. About 25 new aircrafts will be relocated to the Joint Base.

Q: Which municipality will have the most increase in school age children?

A: The new children coming to the Joint Base and their school designation have been mentioned in the study as a situation to monitor. However it is outside the scope of the study. The last Commander of McGuire had wanted to combine all the school children into one school system. However that is a litigation situation and more of a state level situation. There is a new commander, Col. Grasso, and that is something that should be further discussed with her.

Q: What is the time line?

A: For the built out analysis there was no time line but represents the natural progression over time if zoning and regulations remained constant.

Q: Do the local municipalities receive a hosting fee and would the federal government consider it now that the missions are expanding?

A: The municipalities do not receive any funds now, but that is something that could be brought up to Col. Grasso.

Q: Is the military willing to reveal how many bird strikes they get on the Joint Land Use website? The federal government has requested that airlines give out those bird strike numbers.

A: Lakehurst NAES has not had a bird strike in years. Bird strikes are not a huge problem for the area, but it was put into the report for everybody to be aware of the potential problem and to mitigate it before it becomes a problem.

Q: Has a study been done to show the overflow onto adjacent municipalities of the ten participating municipalities?

A: The Joint Land Use Study is a moment in time. The counties and ten municipalities chose to be a part of this study. In the future, if these surrounding areas need to be brought in they will.

Q: How are the additional aircraft going to be covered in regards to fire or catastrophe?

A: The fire protection mechanisms are in place and they cover more than one aircraft. The addition of these planes will not cause any additional hardships. The posture will not change because safety is paramount. Brandi suggested acknowledging the problem and offering solutions if a fire gets out of hand on the base and how to handle it.

Q: Will Lakehurst receive more aircraft and traffic?

A: Lakehurst will not receive more aircraft assignments. However an Assault Landing Zone has been built for training of C-17's stationed on McGuire. This training has increased the traffic flow into Lakehurst. Dover Air Force Base also does training flights at Lakehurst. The traffic will increase about ten fold from the level currently there now.

Q: Why do some planes screech overhead and others are so quiet?

A: Some of the aircraft are older and will be replaced by the new models. That will decrease the amount of noise you hear from the screeching aircraft.

Q: What is the projection of the dollar amount coming in from the base?

A: Rutgers did a study about ten years ago that showed significant dollar amounts flowing from the military installations into the community. Those figures have not been updated but those figures can be used if inflation is taken into consideration.

Q: Will the dollar amounts be self-contained on the base or will it flow out into the community through housing and retail?

A: If industry is attracted then it will flow out. Housing doesn't attract jobs other than when they're built through construction. Industry and education attract jobs. Partnership with local community colleges, Georgian Court, and other State Colleges and Universities, to build satellite campuses will attract other industries that want to be around educational facilities that they can draw from.

Q: Is that a community model or military model?

A: It's a community model, but the base is the catalyst in some regard. Lakehurst hires engineers and logisticians. They are government workers and over time government gets an aging workforce. This aging workforce needs to be replaced. It's the community colleges and local colleges that will develop the curriculum to educate the next wave of government workers. As the base mission grows they will need more contractors. Currently the government workforce has a large baby boomer population that will need to be replaced within the next ten to fifteen years. Now would be the time to get the local younger population educated to ensure the jobs stay local.

Q: Was the Increase of traffic flow because of the road closures through Fort Dix mentioned?

A: Yes, the increase in traffic flow, road closures, as well as vehicle weight impacts is mentioned in the report. Range Road and other road closures took place because of 911 and the pizza delivery terrorism plot.

Q: Was an alternate route looked at for those who now have to go the long way around?

A: A more in depth traffic study for the Joint Base area was recommended. There is a possibility that DOD could fund this study.

Q: When is the final report going to be done?

A: Public comments are going to be considered and then a final report will be done by the end of April.

Q: What is the timeline for implementation?

A: In the recommendations section each recommendation has a timeline for implementation when it should be completed. Range is months to 5 years depending on the importance of the recommendation.

Q: In regards to the industry, are their examples where the military has lead the industry such as the creation of satellite campus you are speaking of?

A: In the economic section in the report there are examples where these industries have thrived with the assistance of the military.

Q: What kind of industry would be good for this area?

A: Manufacturing because of the proximity to Philadelphia. The Joint Base could act as a catalyst by attracting consultants that might need those manufacturing goods. Also the new military personnel would attract retail.

Q: Would this development look more like Princeton?

A: It depends on the mission of the base. There is research and development that takes place on Lakehurst NAES, however none on McGuire or Fort Dix. Lakehurst contracts annually \$789 million dollars for research and manufacturing. It is a tremendous opportunity, if the community wants to respond. A reduction in force in military personnel during peacetimes will be supplemented with consultants because the missions do not change. Open communication will allow for opportunities for the local community to fill in the gaps where there is less military.

Elected officials are working to create economic opportunities using the Joint Base as a driving force. Tenants such as Homeland Security can be stationed at the Joint Base, which would hire many workers in an office style setting.

Q: These tenant facilities do attract jobs, but what about housing retail and facilities off-base so the municipalities can reap some benefits?

A: Open communication is the best solution, so that when the Joint Base has to make a decision they can make an informed decision with all viewpoints rather than just with their own personnel need.

Q: The military installations are considered federal land and businesses do not have to pay local taxes, so the communities do not reap the benefit of ratables.

A: A future study that might come out of this study is an economic study that further analysis the impacts the military installation is having on the local economies. Several municipalities on the Burlington County side have mentioned this as a problem for their municipalities.

David McKeon stated that the Joint Land Use Study is looking at encroachments specifically at this point but further studies and opportunities will be looked at. The report is on the web. The many issues brought forth by the study will be ongoing. The report is not a final conclusion but will continue. The Policy Committee and Technical Committees will continue to meet to resolve the issues brought forth. Congressmen Smith, Saxton, and Adler's offices have been actively participating in the Joint land Use process. US Senator Mendezes office sent a representative tonight.

A final question was asked regarding the length of time the public had to comment on the report. Brandi Bartolomeo gave a two-week window (March 30 to April 12, 2009) for public comments. Comments should be sent to her email address found on the Joint Land Use Study website and will be taken into account.

David McKeon thanked the audience for coming out.

Meeting was adjourned at 8:30pm.

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Joint Base McGuire-Dix-Lakehurst Joint Land Use Study for Counties of Ocean and Burlington

Final Report: April 2009

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