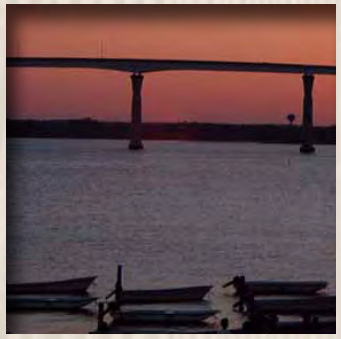
Background Report

January 2015

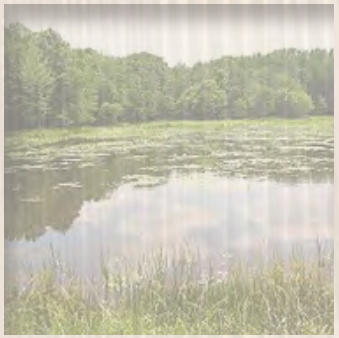
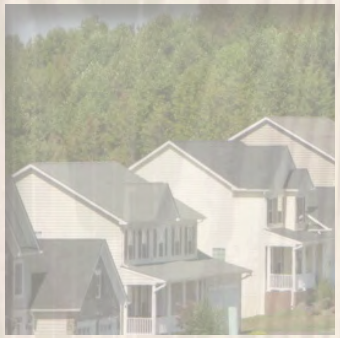
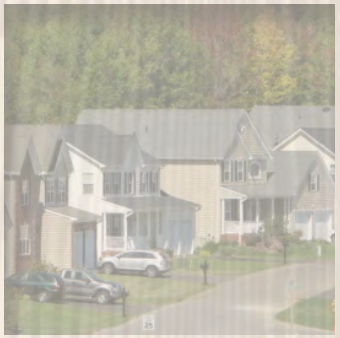
NAVAL AIR STATION PAX JOINT LAND USE STUDY

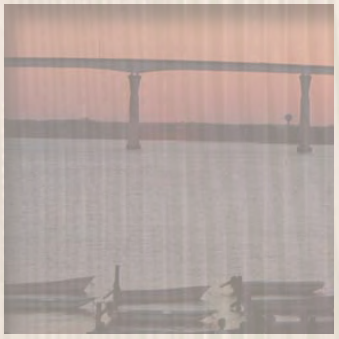


NAVAL AIR STATION PAX JOINT LAND USE STUDY

Background Report

January 2015



This study was prepared under contract with the Tri-County Council for Southern Maryland, with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of the key JLUS partners involved in the development of this study and does not necessarily reflect the views of the Office of Economic Adjustment.

Matrix DESIGN GROUP

Joint Naval Air Station PAX
Joint Land Use Study

Background Report

Tri-County Council for Southern Maryland
P.O. Box 745
Hughesville, MD 20637

prepared by

Matrix DESIGN GROUP

January 2015

Please see the next page.

Policy Committee

The Policy Committee (PC) served an active and important role in providing policy direction during the development of the Naval Air Station Patuxent River (NAS PAX) Joint Land Use Study (JLUS). The Policy Committee comprised the following individuals:

- **Todd Morgan,** *Commissioner*
  St. Mary's County
- **Candice Quinn-Kelly,** *Commissioner President*
  Charles County
- **Ken Robinson,** *Commissioner*
  Charles County
- **Kathleen Freeman,** *Director*
  Caroline County Department of Planning
- **Debbie Herr-Comwell,** *Program Administrator*
  Caroline County Department of Planning
- **Cynthia Jones,** *Commissioner*
  St. Mary's County
- **Kenneth Eades,** *Country Administrator*
  Northumberland County Administration Office
- **Luttrell Tadlock,** *Assistant Country Administrator*
  Northumberland County Administration Office
- **Corey Pack,** *Vice President*
  Talbot County Council
- **Dirck Bartlett**, *President*
  Talbot County Council
- **Robert Fink,** *Director*
  Westmoreland County Planning and Community Development
- **Karen Lewis,** *Assistant County Administrator*
  Westmoreland County
- **Tom Bradshaw,** *Councilmember*
  Dorchester County Council
- **Gerald Clark,** *Commissioner*
  Calvert County Board of Commissioners
- **Terry Shannon,** *County Administrator*
  Calvert County
- **Walter Chase,** Chairman
  Mid Shore Regional Council
- **James Purnell, Jr.,** Chairman
  Tri-County Council of the Lower Eastern Shore
- **Jerry W. Davis,** Executive Director
  Northern Neck Planning District Commission
- **Victoria Jackson-Stanley,** Mayor
  City of Cambridge, Maryland
- **Dan Burris,** Mayor
  Town of Leonardtown, Maryland
- **Hayden Hammett,** Councilmember
  Town of Leonardtown, Maryland
- **Thomas Evans,** Councilmember
  Maryland Department of Business and Economic Development
- **Richard Pollitt, Jr.,** County Executive
  Wicomico County
- **Steve Duboyce, AICP,** *Liaison Officer*
  Naval District Washington Regional Community Planning
- **Norm Risavi,** County Administrator
  Westmoreland County
- **Percy Purnell Jr.,** *Mayor*
  City of Crisfield, MD

Policy Committee Non-Voting Members

- **CAPT Heidi Fleming,** *Commanding Officer*
  NAS Patuxent River
- **Mike Aimone,** *Executive Director*
  Department of Defense Siting Clearinghouse
- **George Clark,** *Tri County Council for Southern Maryland*
- **John Hartline,** *Tri County Council for Southern Maryland*

Technical Advisory Group(s)

The Technical Advisory Group(s) served a key role in the development of the NAS PAX JLUS, providing the overall advisory support, review, and guidance of the study. The Technical Advisory Group(s) comprised the following individuals:

- **Stephen Schmeiser,** *DCG / DBU Account Manager*
  TASC
- **Jared Parks,** *Land Protection Specialist*
  Eastern Shore Land Conservancy
- **Florence "Betsy" Burian,** *Executive Director*
  Charles County Chamber of Commerce
- **Linda Vassallo,** *Director*
  Calvert County Department of Economic Development
- **Kate Patton,** *Executive Director*
  Lower Shore Land Trust
- **Bob Tenanty, P.E.,** *Senior Engineer / Airport Manager*
  Dorchester County Department of Public Works
- **Patricia Haddon, AICP,** *Principal Planner*
  Calvert County Planning Commission
- **Francis Jack Russell,** *President*
  St. Mary's County Commissioners
- **Kwasi Holman,** *Director*
  Charles County Department of Economic Development
- **Jeffrey Breeden, AICP,** *Airport Planner*
  FAA- Washington-Dulles Airports District Office
- **Alan Silverstein, IOM,** *President & CEO*
  Talbot County Chamber of Commerce
- **Robert Bryant, AAE,** *Airport Manager*
  Salisbury-Ocean City Wicomico Regional Airport
- **David Ryan,** *Director*
  Salisbury-Wicomico Economic Dev., Inc
- **Stephen Garvin,** *Planner*
  Dorchester County Emergency Management
- **Ken Barbour,** *AICUZ / RAICUZ Manager*
  Naval District Washington, NAS Air Operations Department
- **Clark Meadows,** *Zoning Administrator*
  Salisbury-Wicomico County Department of Planning
- **Phillip Shire,** *Director*
  St. Mary's County Government
- **Christopher Jarboe,** *Team Lead*
  NAVAIR Ranges Sustainability Office
- **Paige Bethke,** Director
  Talbot County Office of Economic Development
- **Amy Blessinger,** *Planner III*
  Charles County Government
- **Deborah Divins**, *Executive Director*
  Dorchester Chamber of Commerce
- **Sabrina Hetch,** *Asset Manager*
  NAVFAC
- **Mike Paone,** *Airport Manager*
  Maryland Department of Planning
- **Greg Gillingham,** *Senior Program Manager*
  Southern Maryland Navy Alliance
- **Bill Scarafia,** *Member*
  St. Mary's County Chamber of Commerce
- **Wendell Meekins,** *Director*
  Dorchester County Farm Bureau

Technical Advisory Group(s) (continued)

- **Mike Henry,** *Airport Manager*
  Easton Airport
- **Andrew Gohn,** *Senior Program Manager*
  Maryland Energy Administration
- **Danny Ervin, Ph.D.,** *Professor of Finance*
  Salisbury University
- **John Lenox, AICP,** *Director*
  Salisbury-Wicomico County Department of Planning
- **Keasha Haythe,** *Director*
  Dorchester County Economic Development
- **Laschelle McKay,** *Administrator*
  Town of Leonardtown, Maryland
- **Nancy Kresnesky,** *Community Planner*
  NAVFAC Washington
- **Robert Harrell,** *US Navy, Chief of Naval Operations*
- **Robin Finnacom,** *Acting Director*
  St. Mary's County Department of Economic & Community Development
- **Steve Dodd,** *Director*
  Dorchester County Planning and Zoning
- **James Raley,**
  St. Mary's County Farm Bureau
- **Martin Sokolich,** *Long Range Planner*
  Talbot County Planning
- **Kenneth Jurman,** *Program Manager*
  Division of Energy
- **Ann Roane,** *City Planner*
  City of Cambridge
- **Amy Ingraham,** *Management Analyst*
  NAVAIR Warfare Ranges Sustainability Office
- **Michael Quigley,** *Executive Director*
  NAS Patuxent River
- **Richard Saxer,** *Executive Director*
  Northumberland County Economic Development Commission
- **Sandy Coyman,** *Director*
  Talbot County Office of Planning and Zoning
- **Tom Briscoe,** *Director*
  Calvert County Farm Bureau

JLUS Consultant/ Technical Advisors

Matrix DESIGN GROUP

- **Celeste Werner, AICP**
  Project Manager
- **Mike Hrapla**
  Deputy Project Manager
- **Rick Rust, AICP**
  Technical Manager
- **Jeannette Studley and Patrick Small, AICP**
  Planning Leads

Please see the next page.

TABLE OF CONTENTS

ACRONYMS ..... **v**

1. INTRODUCTION **1-1**

What Is a Joint Land Use Study? 1-2
JLUS Goal and Objectives 1-2
Why Prepare a Joint Land Use Study? 1-3
Public Outreach 1-4
JLUS Study Area 1-9
JLUS Background Report Organization 1-12

2. COMMUNITY PROFILES **2-1**

Introduction 2-1
Regional Overview 2-2
Study Area Growth Trends 2-7
Economic Development 2-9
Housing Value and Trends 2-12
Transportation 2-16

3. MILITARY PROFILE **3-1**

NAS Patuxent River Profile 3-1
Economic Impact 3-1
Base History 3-4
Installation Setting 3-5
Military Mission 3-8
Military Footprint 3-14

4. COMPATIBILITY TOOLS **4-1**

Introduction 4-1
Federal Plans and Programs 4-2

State of Maryland Plans and Programs 4-8
Maryland County and Municipal Plans and Programs 4-13
Commonwealth of Virginia Plans and Programs 4-28
Virginia County and Municipal Plans and Programs 4-33
Regional Planning Entities 4-35
Other References 4-36

5. COMPATIBILITY ASSESSMENT 5-1

Compatibility 5-1
Anti-Terrorism / Force Protection 5-2
Biological Resources 5-6
Energy Development 5-7
Frequency Spectrum 5-12
Interagency Coordination / Communication 5-28
Land / Air / Sea Space Competition (LS) 5-43
Land Use 5-45
Legislative Initiatives 5-46
Light and Glare 5-49
Noise 5-53
Roadway Capacity 5-80
Safety Zones 5-84
Vertical Obstructions 5-94
Water Quality / Quantity 5-102

APPENDIX A-1

TABLES AND FIGURES

Table 1.1 JLUS Sponsor Responsibilities and Participants 1-5
Table 1-2 JLUS Policy Committee Responsibilities and Participants 1-5
Table 1-3 JLUS Technical Advisory Group Responsibilities and Participants 1-6
Table 2-1 Population Change 2000-2010; Growth through 2030 2-8
Table 2-2 Median Monthly Gross Rent 2000 – 2010 2-12
Table 2-3 BAH Rates at NAS PAX, 2013 2-13
Table 2-4 Median Housing Values 2000 – 2010 NAS PAX JLUS Study Area 2-14
Table 3-1 NAS PAX Spending Impact 3-2
Table 3-2 NAS PAX Economic Impact 3-2
Table 3-3 NAS PAX Workforce Distribution 3-4
Table 3-4 Current Aircraft Inventory at NAS PAX 3-11
Table 3-5 Restricted Airspace 3-16
Table 3-6 Military Training Routes Associated with NAS PAX 3-18
Table 5-1 Height Restrictions within NAS PAX Radar Instrument Viewshed by Jurisdiction 5-16
Table 5-2a Zoning Compatibility in St Mary's County Noise Zones Surrounding NAS PAX Main Station Part I 5-56
Zoning Compatibility in St Mary's County Noise Zones Surrounding NAS PAX Main Station Part II 5-58
Table 5-2b Zoning Compatibility in Calvert County Noise Zones Surrounding NAS PAX Main Station 5-61
Table 5-3 Zoning Compatibility in Noise Zones Surrounding Webster Field 5-64
Table 5-4 Zoning Compatibility in Noise Zones in Westmoreland County 5-67
Table 5-5 Subsonic and Supersonic Complaints to NAS PAX, 2006-2012 5-70
Table 5-6 Supersonic Events and Sonic Boom Complaints to NAS PAX, 2004-2012 5-71
Table 5-7 Sonic Boom Complaints to NAS PAX by County by Year 5-71

Figure 1-1 Regional Context 1-10
Figure 1-2 NAS PAX JLUS Study Area 1-11
Figure 2-1 Single-Family Building Permits in the NAS PAX Study Area, 2000-2012 2-15
Figure 2-2 Multi-Family Building Permits in the NAS PAX JLUS Study Area, 2000-2012 2-15
Figure 3-1 Naval District Washington Military Installations 3-3
Figure 3-2 NAX PAX Complex Operating Areas 3-6
Figure 3-3 ADAMS Radar Viewshed 3-10
Figure 3-4 NAS PAX Airspace Classifications 3-15
Figure 3-5 Restricted Airspace 3-17
Figure 3-6 Military Training Routes 3-19
Figure 3-7 Helicopter Operating Areas 3-20

Figure 3-8 Unmanned Aerial Systems Operating Areas....3-21
Figure 3-9 Atlantic Warning Area Test Track....3-22
Figure 3-10 Imaginary Surfaces Cross Section....3-23
Figure 3-11 NAS PAX Main Station Imaginary Surfaces....3-24
Figure 3-12 Webster Field Imaginary Surfaces....3-26
Figure 3-13 NAS PAX Main Station Part 77 Obstruction Evaluation Area....3-28
Figure 3-14 NAS PAX Main Station Part 77 Obstruction Evaluation Area....3-29
Figure 3-15 NAS PAX Main Station Safety Zones....3-31
Figure 3-16 Webster Field Clear Zones....3-33
Figure 3-17 NAS PAX Main Station Noise Contours....3-35
Figure 3-18 Webster Field Noise Contours....3-36
Figure 3-19 Atlantic Test Range Inner Range Targets....3-37
Figure 3-20 High Risk of Adverse Impact Zone....3-41
Figure 3-21 BASH Relevancy Area....3-42
Figure 5-1 Height Concerns within ADAMS Radar Viewshed....5-22
Figure 5-2 Sound Levels Comparison in dB....5-54
Figure 5-3 Zoning in Noise Zones I and II Surrounding NAS PAX Main Station....5-63
Figure 5-4 Zoning in Noise Zones I and II Surrounding Webster Field....5-65
Figure 5-5 Zoning in Noise Zone I in MTR Over Westmoreland and St. Mary's County....5-68
Figure 5-6 NAS PAX Roadway Map....5-83
Figure 5-7 ATR Inner Range Aerial Firing Range....5-85
Figure 5-8 Zoning Within Webster Field Clear Zones....5-88
Figure 5-9 Existing Land Use Within Webster Field Clear Zones....5-89
Figure 5-10 Zoning Within NAS PAX Main Station Safety Zones....5-91
Figure 5-11 Existing Land Use Within NAS PAX Main Station Safety Zones....5-92
Figure 5-12 Wind Energy Project and Tower Considerations within Military Training Routes....5-95
Figure 5-13 Vertical Obstructions Affecting Navigable Airspace Surrounding NAS PAX Main Station....5-97
Figure 5-14 Vertical Obstructions Affecting Navigable Airspace Surrounding Webster Field....5-99

* * *

Acronyms

A

Acq	Acquisition
ADAMS	Advanced Dynamic Aircraft Measurement System
AGL	Above Ground Level
AICUZ	Air Installation Compatibility Use Zone
APZ	Accident Potential Zone
ATFP	Antiterrorism/ Force Protection
ATC	Air Traffic Control
ATR	Atlantic Test Range

B

BASH	Bird Air Strike Hazard
BIO	Biological Resources
BIP	Bay Impact Point
BIR	Bloodsworth Island Range

C

CDNL	Day Night Average Sound Level
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
COM	Communication / Coordination
CZ	Clear Zone
CZMA	Coastal Zone Management Act

D

dB	Decibel
DC	District of Columbia
Disc	Real Estate Disclosures
DNL	Day-Night Level
DOD	Department of Defense

E

EAP	Encroachment Action Plan
ED	Energy Development
ESQD	Explosive Safety Quantity Distance Arcs

F

FAA	Federal Aviation Administration
FACSFAC VACAPES	Fleet Area Control & Surveillance Facility, Virginia Capes
FCC	Federal Communications Commission
FL	Flight Level
FS	Frequency Spectrum

H

Hab	Habitat Conservation Tools
HRAIZ	High Risk of Adverse Impact Zone

I

IFR	Instrument Flight Rule
IT	Information Technology

J

JLUS	Joint Land Use Study

L

LAS	Land, Air, and Sea Space Competition
LEG	Legislative Initiatives / Tools
LG	Light and Glare
Ldnmr	Onset-Rate Adjusted DNL
LNG	Liquefied Natural Gas
LU	Land Use

M

MCA	Military Compatibility Area
MCAOD	Military Compatibility Area Overlay District
MD	Maryland
MDBED	Maryland Department of Business and Economic Development
MHz	Megahertz
MIA	Military Influence Area
MMIC	Maryland Military Installation Council
MOA	Military Operating Area / Memorandum of Agreement
MOU	Memorandum of Understanding
MSL	Mean Sea Level
MTR	Military Training Route

N

NAICS	North American Industry Classification System
NAVAIR	Naval Air Systems Command
NAS (PAX)	Naval Air Station (Patuxent River)
NAWCAD	Naval Air Warfare Center Aircraft Division
NGO	Nongovernmental Organization
NO	Noise (and Vibration)
NOAA	National Oceanic and Atmospheric Administration
NTWL	Naval Test Wing Atlantic

O

OEA	Office of Economic Adjustment
OLF	Outlying landing field
OPNAVIST	Office of Navy Instruction

P

PAX	Patuxent River
PC	Policy Committee
PEP	Personal Excellence Partnership
PFA	Priority Funding Area

R

R	Restricted Airspace
RAICUZ	Range Air Installation Compatible Use Zone
RC	Roadway Capacity
RDAT & E	Research, Development, Acquisition, Testing and Evaluation

S

SAF	Safety Zones
SEL	Sound Exposure Level
SUA	Special Use Airspace
STEM	Science, Technology, Engineering and Math

T

TAG	Technical Advisory Group
TCCSMD	Tri-County Council for Southern Maryland

U

UAS	Unmanned Aerial Systems
US	United States
USBC	Uniform State Building Code

V

VA	Virginia
VFR	Visual Flight Rule
VO	Vertical Obstruction

W

W	Warning Area
WQQ	Water Quality / Quantity

Y, Z

Zon	Zoning

1. Introduction

Inside Chapter 1 . . .

What Is a Joint Land Use Study? 1-2
JLUS Goal and Objectives 1-2
Why Prepare a Joint Land Use Study? 1-3
Public Outreach 1-4
JLUS Study Area 1-9
JLUS Background Report Organization 1-12

Introduction

Military installations are critical to local, regional, and state economies, generating thousands of jobs and millions of dollars in annual economic activity and tax revenue. In the past, incompatible development has been a factor in the loss of operational capabilities and restructuring of mission-critical components to other military installations. The loss of military missions and closure of military installations have been detrimental to their host communities. To protect the missions of military installations and health of local economies and industries that rely on them, encroachment must be addressed through collaboration and joint planning between installations and local communities. This Joint Land Use Study (JLUS) attempts to mitigate existing compatibility issues, facilitate the prevention of future issues, and improve coordination between the local communities and Naval Air Station Patuxent River (NAS PAX).

NAS PAX is situated in St. Mary's County in Southern Maryland, at the mouth of the Patuxent River, a major tributary of Chesapeake Bay. Because the NAS PAX mission operating area is expansive, several Maryland and Virginia communities and agencies participated in the JLUS as partners: Calvert County, Caroline County, Charles County, Dorchester County, St. Mary's County, Talbot County, Wicomico County, the City of Cambridge, and the Town of Leonardtown in Maryland; and Northumberland County and Westmoreland County in Virginia.

As a means to promote and coordinate the compatibility of future growth around the installation with military mission activities, an organized communication effort between NAS PAX, partner jurisdictions, and other stakeholder entities that own or manage land and / or resources in the region is needed.

The NAS PAX JLUS is a proactive approach for mitigating existing and preventing future military compatibility issues by facilitating collaboration between local communities, agencies, the public, and the Navy. This JLUS advocates increased communication for decisions relative to land use regulation, conservation, and natural resource management affecting both the community and the military. This study seeks to prevent conflicts experienced between the United States (US) military and local communities in other areas of the US and throughout the world by engaging the military and local decision-makers in a collaborative multi-agency planning process.

What Is a Joint Land Use Study?

A JLUS is a planning process accomplished through the collaborative efforts of stakeholders in a defined study area to identify compatible land uses and growth management guidelines within, and adjacent to, active military installation. These stakeholders include local community, state, and federal officials, residents, business owners, local tribal governments, nongovernmental organizations, and the military. The process is intended to establish and encourage a working relationship among military installations and proximate communities to prevent and / or reduce encroachment issues associated with future mission expansion and local growth. Although primarily funded by the Department of Defense (DOD), Office of Economic Adjustment (OEA), a JLUS is produced by and for local communities. The project management entity for the NAS PAX JLUS is the Tri-County Council for Southern Maryland (TCCSMD).

JLUS Goal and Objectives

The goal of the NAS PAX JLUS is to protect the viability of current and future military mission and operating, while simultaneously guiding community growth, sustaining the environmental and economic health of the region, and protecting public health, safety, and welfare.

To achieve this goal, three primary JLUS objectives were identified.

- **Understanding.** Convene community and military representatives to identify, confirm, and understand compatibility issues and concerns in an open forum, considering both the community and military perspectives and needs. This includes increasing public awareness, education, and opportunities for input organized in a cohesive outreach program.
- **Collaboration.** Encourage cooperative land use and resource planning among NAS PAX and surrounding communities so that future community growth and development are compatible with the NAS PAX missions and operations, while seeking ways to reduce operational impacts on land within the study area.
- **Actions.** Provide a set of mutually supported tools, activities, and procedures from which local jurisdictions, agencies, and NAS PAX can select, prepare, and approve / adopt in order to implement recommendations developed during the JLUS process. The actions include both operational measures to mitigate installation impacts on surrounding communities and local government and agency approaches to reduce community impacts on military operations. These tools help decision makers resolve compatibility issues and prioritize projects within their annual budgeting cycles.

Why Prepare a Joint Land Use Study?

Although military installations and nearby communities are separated by a defined property boundary, they often share natural and manmade resources such as land use, airspace, water, and infrastructure. Operational areas such as flight patterns and specialized airspace expand the military influence area footprint beyond defined property boundaries. Despite the many positive interactions among local jurisdictions, agencies, and the military, and because so many resources are shared, the activities or actions of one entity can create unintended impacts on another, resulting in conflicts. As communities develop and expand in response to growth and market demands, land use approvals have the ability to locate potentially incompatible development closer to military installations and operational areas. The result can generate new, or exacerbate existing, land use and other compatibility issues, often referred to as encroachment, which can negatively affect community safety, economic development, and sustainment of military activities and readiness. This threat to military readiness is currently one of the military's greatest concerns.

Collaboration and joint planning among military installations, local jurisdictions, and agencies protects the long-term viability of existing and future military missions. Working together also enhances local economies and industries before incompatibility becomes an issue. Recognizing the close relationship that should exist between installations and adjacent communities, the OEA implemented the JLUS program to mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. This program aims to preserve the sustainability of local communities while protecting current and future research, development, acquisition, testing, and evaluation (RDAT&E) missions at NAS PAX.

Strategic and Economic Importance

NAS PAX is a unique asset within the DOD supporting naval aviation operations focused on RDAT&E of aircraft, aircraft components, and related products. Three major Navy commands hosted by NAS PAX are the Naval Air Systems Command (NAVAIR) Headquarters, Naval Air Warfare Center Aircraft Division (NAWCAD), and Naval Test Wing Atlantic (NTWL). With facilities including flight simulators, electronic warfare systems, communications and navigation, warfare simulation, and threat air defense laboratories, NAS PAX is the busiest flight test center in the world. The facilities of NAWCAD are also used by foreign governments, academic institutions, and private industry for similar projects.

The most recent economic indicators illustrate the economic significance of the installation's presence in the region. Although exact employment and operational activity levels fluctuate annually, NAS PAX is the largest regional employer. According to the Maryland Department of Business and Economic Development (MDBED), NAS PAX either creates or supports over 41,000 jobs, with an annual payroll of $2.4 billion. NAS PAX contributes over $8 billion annually in Maryland, with a direct impact of $2.59 billion, an indirect impact of $2.44 billion, and an induced impact of $1.54 billion. A substantial portion of this direct impact is derived from purchases, mostly made from in-state businesses totaling $1.71 billion annually. As a national security asset, NAS PAX also provides a benefit to the US as a whole, both strategically and economically.

Sources: NAVAIR NAWCAD PAX Brief, 2013; Mission MD, Maryland Department of Business and Economic Development, 2011.

Community Activities and Stewardship

In addition to the economic benefits NAS PAX provides to the region, the installation is involved with a variety of community outreach and educational programs. The Patuxent Partnership is a non-profit member organization that works with government, industry, and academia to advance education through science, technology, engineering and math (STEM) based initiatives. The intent of this partnership is to foster cooperation and collaboration among academia, private industry, and government to bring together the key economic drivers in Southern Maryland.

Through this partnership, educational programs and opportunities are offered to K-12 school districts, colleges, and universities to address the declining enrollment rates in technology-related fields across the nation. The STEM program promotes technological knowledge and skills and provides opportunities for career exploration in numerous science and engineering pathways. A key feature of the STEM program is the involvement of local business and industry individuals from science, mathematics, and engineering career fields. Student mentoring and teacher training are offered to local schools. Students are given the opportunity to attend the Summer Space Camp sponsored by the Patuxent Partnership. Field excursions may include trips to NAS PAX.

NAS PAX's community stewardship has been awarded on multiple occasions, including its four 2013 Community Service Flagship Awards within NDW for Environmental Stewardship; Health, Safety, and Fitness; Personal Excellence Partnership; and Project Good Neighbor.

The Environmental Stewardship Flagship Award was granted to NAS PAX for the 15th time in December 2013, for their environmental outreach program that shows students how they can protect the environment and how the Navy preserves and protects the natural and cultural resources entrusted to its care. With an environmental staff comprising fish and wildlife biologists, foresters, environmental engineers, geologists, chemists, hydrogeologists, an archaeologist, and an architectural historian, the installation reaches out to thousands of students at nearly three dozen public and parochial schools in St. Mary's County.

NAS PAX was bestowed the Health, Safety and Fitness Flagship award as a result of logging nearly 1,300 volunteer hours with the Special Olympics; helping more than 250 disabled athletes with physical fitness, motor skills, and building courage and self-confidence. More than 185 NAS PAX volunteers participated in the competition by setting-up and disassembling events; distributing 1,000 brown bag lunches to the athletes; and serving as Special Olympic coaches and assistant coaches.

The Personal Excellence Partnership (PEP) Flagship award was given as a result of NAS PAX's volunteer PEP program to develop Southern Maryland youth to their fullest potential in academic achievement, healthy lifestyles, and civic responsibility. This is accomplished through tutoring, mentoring, providing technical expertise, and serving as positive role models by more than 300 NAS PAX personnel logging 5,800 volunteer hours in various public, private, and parochial schools in Southern Maryland.

Through the NAS PAX Community Service Program (CSP), volunteers from across the installation are provided with opportunities to participate in various volunteer activities and charitable activities in the local community. Some of the top efforts that earned NAS PAX the 2013 Project Good Neighbor Flagship Award include Christmas in April, Honor Flight Network, Potomac River Waterfowl Show, Jefferson Patterson Park and Museum, Warrior Dash and Sail Regatta, Feds Feed Families, and the Patuxent River Naval Air Museum's Meet the Airplanes. Each event brought hundreds of Sailor and civilian volunteers from across the installation who logged thousands of hours.

These are just several examples of the many community benefits and stewardship activities to which NAS PAX contributes.

Public Outreach

The JLUS process was designed to create a locally relevant document that builds consensus and garners stakeholder support. To achieve the JLUS goals and objectives, the NAS PAX JLUS process included a public outreach program providing a variety of participation opportunities for interested parties.

Stakeholders

An early step in any planning process is stakeholder identification. Informing and involving them early is instrumental to identifying, understanding, and resolving their most important issues through the development of integrated strategies and measures. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the JLUS document. Stakeholders identified for the NAS PAX JLUS include:

- Local jurisdictions (counties, cities, and towns)
- DOD officials (including OEA representatives) and military installation personnel
- Local, county, regional, and state planning, regulatory, and land management agencies
- Landholding and regulatory federal agencies
- The public (including residents, businesses, and landowners)
- Environmental advocacy organizations
- Nongovernmental organizations (NGOs)
- Other special interest groups (including local educational institutions and school districts)

Policy Committee and Technical Advisory Groups

The development of the NAS PAX JLUS was guided by two committees, comprising community leaders, NAS PAX personnel, federal and state agencies, resource agencies, local governments, and other stakeholders.

JLUS Policy Committee (PC). The PC consists of officials from participating jurisdictions, military installation leadership, and representatives from other interested and affected agencies. The PC is responsible for the overall direction of the JLUS, preparation, and approval of the study design, policy recommendations, and draft and final JLUS documents.

JLUS Technical Advisory Groups (TAGs). The purpose of the Technical Advisory Groups (TAGs) is to provide technical expertise, feedback, and suggestions to the JLUS team and to serve as communications liaisons to their respective organizations. An East Area and West Area TAG assisted in the technical aspects of the NAS PAX JLUS. The East Area TAG focused on the portions of the study area located to the east of the Chesapeake Bay, including Caroline, Dorchester, Wicomico, Somerset, and Talbot counties, and the City of Cambridge. The West Area TAG focused on the portions of the study area located to the west of the Chesapeake Bay including Calvert, Charles, Northumberland, St. Mary's, and Westmoreland counties, and the Town of Leonardtown.

The TAGs identified and addressed technical issues, provided feedback on report development, and assisted in the development and evaluation of implementation strategies and tools. These stakeholders engaged with the PC, in an advisory role, and attended PC meetings. The responsibilities and list of participants for the JLUS sponsors, the PC, and the TAGs are identified in Tables 1-1, 1-2, and 1-3, respectively.

Table 1-1. JLUS Sponsor Responsibilities and Participants

Responsibilities	Participants
■ Coordination ■ Financial Contribution ■ Accountability ■ Grant Management	■ Office of Economic Adjustment ■ Tri-County Council for Southern Maryland

Table 1-2. JLUS Policy Committee Responsibilities and Participants

Responsibilities	Participants
■ Policy Direction ■ Study Oversight ■ Monitoring Report Acceptance	■ Calvert County, MD ■ Caroline County, MD ■ Charles County, MD ■ Dorchester County, MD ■ City of Cambridge, MD ■ Northumberland County, VA ■ St. Mary's County, MD ■ Town of Leonardtown, MD ■ Talbot County, MD ■ Westmoreland County, VA ■ Wicomico County, MD ■ NAS PAX

Table 1-3. JLUS Technical Advisory Group Responsibilities and Participants

Responsibilities	Participants
■ Identify Issues ■ Provide Expertise to Address Technical Issues ■ Evaluate and Recommend Implementation Options to the PG ■ Provide Draft and Final Report Recommendations to the PC	■ Calvert County ■ Caroline County ■ Charles County ■ Dorchester County ■ Talbot County ■ Northumberland County ■ St. Mary's County ■ Westmoreland County ■ Wicomico County ■ Easton Airport ■ Federal Aviation Administration ■ The Nature Conservancy ■ St. Mary's County Chamber of Commerce ■ Southern Maryland Navy Alliance ■ Charles County Chamber of Commerce ■ NAS PAX

Meetings were conducted throughout the process to identify and appropriately address local issues:

- **Kick-Off Meeting / PC Meeting #1 (May 2013).** The first committee meeting was held with the PC members and served as the initial kick-off for the project. This meeting provided an overview of the NAS PAX mission, introduced the JLUS process and participants, and presented information on the compatibility factors evaluated in this JLUS.

- **TAG Meeting #1 (May 2013).** The second committee meeting was held with the TAGs to provide an update on the JLUS process, review compatibility issues identified to date and conduct an exercise to prioritize each compatibility factor. Compatibility issues were also characterized by geographic location.

- **TAG Meeting #2 (October 2014).** The next set of TAG meetings were held in March 2014 to obtain consensus on priority compatibility factors and issues, and identify existing tools for addressing compatibility issues and tools concepts with the PC.

- **PC Meeting #2 (March 2014).** A PC meeting was conducted in March 2014 to review JLUS progress, present and describe priority compatibility factors and issues. A discussion of potential approaches to resolving compatibility issues also occurred.

- **TAG Meeting #3 (March 2014).** This set of TAG meetings was conducted to review the Committee Review Draft JLUS and review the compatibility issues as they apply to each location and jurisdiction. The meetings focused on the development of conceptual conflict resolution strategies and compatibility planning tools; a review of public input received to date; and revisions for the final JLUS.

- **TAG Meeting #4 (June 2014).** This set of TAG meetings was conducted to introduce the preliminary strategies that address the compatibility issues identified by the committees and from public workshops and existing plans and programs.

- **TAG Meetings #5 (August 2014).** This set of TAG meetings was held to obtain comments and feedback on the compatibility strategy recommendations and to review and discuss the Background Report comments.

- **TAG Meeting #6 (October 2014).** This set of TAG meetings was conducted to review and refine the strategies developed at the previous TAG meetings and to validate the parameters of each strategy.

- **PC Meeting #3 (December 2014).** This meeting was conducted to review comment received during the Public Draft Review period and obtain consensus that the project has successfully addressed all issues before moving forward with a final version.

Public Workshops

A series of public workshops were held throughout the development of the JLUS. These workshops provided an opportunity for the exchange of information with the greater community, assisted in identifying issues to be addressed, and provided an opportunity for input on proposed strategies. Each workshop included a traditional presentation and a facilitated exercise providing a "hands on," interactive opportunity for the public to participate in the JLUS development. The public workshops were conducted as follows:

- **Public Workshop #1 (October 2013).** The first set of public workshops was held throughout the region between September 30 and October 3, 2013. These meetings provided an opportunity to familiarize community members with JLUS process and products, partners and roles, and provide opportunities for public input. Attendees participated both individually and in small working groups. Individual participation included input on compatibility concerns through the use of an interactive audience response system displaying real time results. Small group participation facilitated the geographic location of concerns through tabletop exercise including large scale study area maps. The JLUS Overview / Compatibility Factors Fact Sheet was distributed for completing the exercise.

- **Public Workshop #2 (March 2014).** The second set of public workshops were held on March 26 and 27, 2014 to review the status of the JLUS process, refine compatibility issues identified to date, and obtain community input to refine and classify issues. Meetings were held in four sub-area locations throughout the study area: Easton, MD for the Middle Eastern Shore sub-area; Salisbury, MD for the Lower Eastern Shore sub-area; California, MD for the Southern Maryland sub-area; and Warsaw, VA for the Virginia Northern Neck sub-area.

- **Public Workshop #3 (November 2014).** The third set of workshops was held on November 5 and 6, 2014 to present and obtain feedback on the draft JLUS, including findings, existing policies and regulations and recommendations incorporated in the study. The JLUS was made available for public download on the website and for review and comment during the public comment period.

- **Public Workshop #4 (January 2014).** The final set of public workshops was held as public hearings within JLUS Study Areas to accept the Final JLUS documents and recommendations. All public comments were reviewed and considered for inclusion in the Final JLUS.

JLUS Public Workshop in Southern Maryland, September 2013

Public Outreach Materials

JLUS Fact Sheet / Compatibility Factors Brochure. At the beginning of the JLUS process, a Fact Sheet was developed describing the JLUS program, objectives, methods for public input, and proposed the NAS PAX JLUS study area. This Fact Sheet was made available at the meetings for review by interested members of the public.

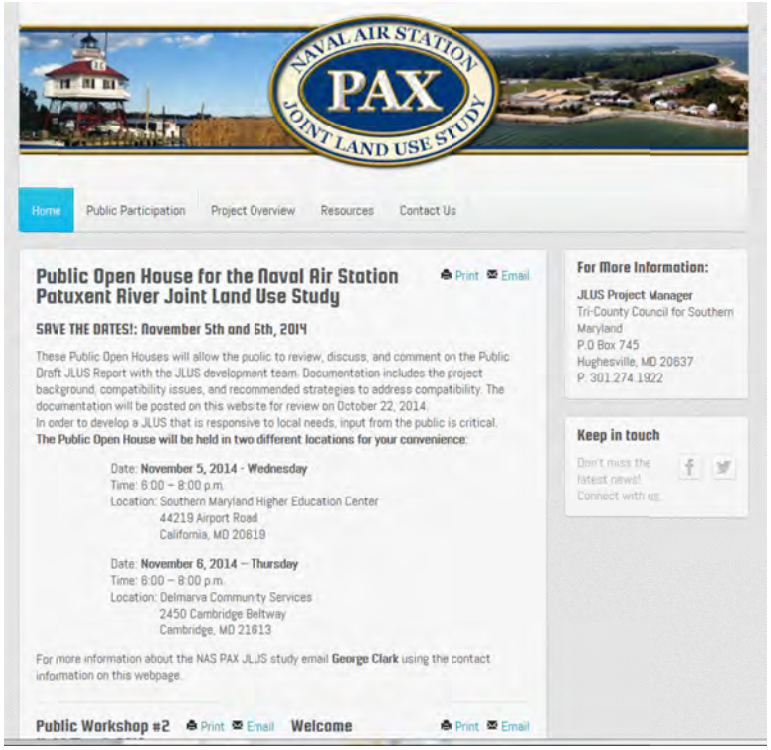
This Fact Sheet served as an informational brochure describing each compatibility factor considered for JLUS development. While not every factor may apply to the NAS PAX JLUS, this list provided an effective tool to conduct a comprehensive evaluation of compatibility factors within the study area.

Strategy Tools Brochure. JLUS strategies incorporate a variety of actions that local governments, military installations, agencies, and other stakeholders can take to promote compatible land use planning. This brochure provided an overview of strategy types that can be applied to address study area compatibility issues.

Website. A project website was developed to provide stakeholders, the public, and media representatives with access to project information. The website was maintained for the entire duration of the project to make information easily accessible. Information contained on the website included program points of contact, schedules, relevant documents and maps, public meeting information, and downloadable comment forms. The project website is located at www.paxjlus.com.

NAS PAX JLUS Fact Sheet

NAS PAX Strategy Tools Brochure



NAS PAX JLUS Website

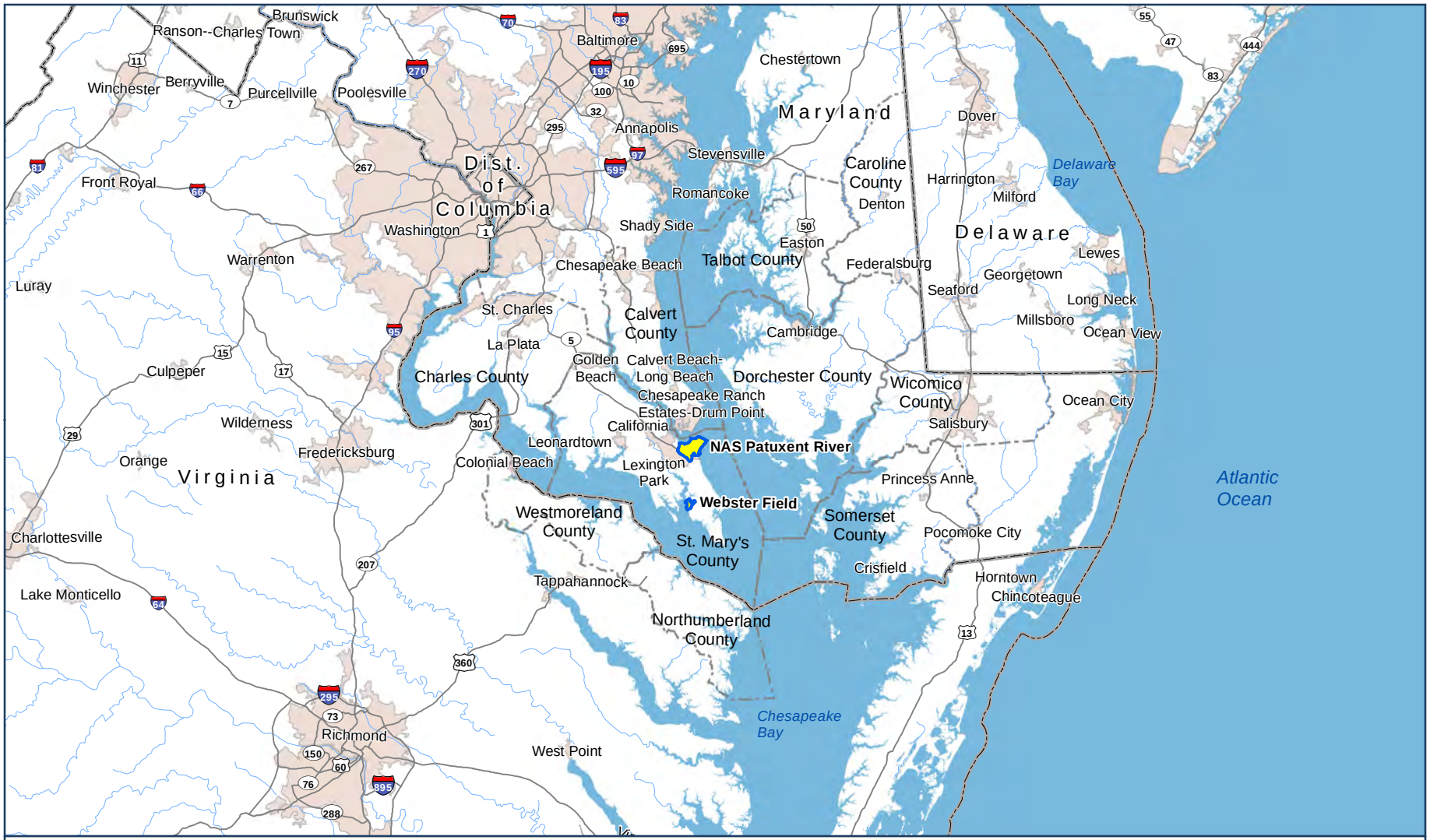
JLUS Study Area

NAS PAX is situated in Southern Maryland on a peninsula at the mouth of the Patuxent River, a major tributary of Chesapeake Bay and comprises three separate areas - the Main Station, Webster Outlying Field (Webster Field), and Navy Recreational Area Solomons. The Main Station and Webster Field occupy approximately 6,500 acres and 85 acres respectively within St. Mary's County. The Navy Recreational Area Solomons is not included in the JLUS since it has minimal impact on the surrounding community. The overall NAS PAX operating area, including airspace well beyond St Mary's County, extends throughout Maryland, Virginia, and Delaware.

NAS PAX is approximately 70 miles south of the Maryland state capital of Annapolis and strategically located between major cities - approximately 90 miles south of Baltimore, MD; 115 miles northeast of Richmond, VA; 75 miles southeast of Washington, DC, and 190 miles southwest of Philadelphia, PA. The regional context of NAS PAX is illustrated on Figure 1-1.

The NAS PAX Study Area was defined to address the communities that may impact current or future NAS PAX military operations or be impacted by military operations. Due to its location and affiliated operations within Maryland, Virginia and Delaware, the general JLUS Study Area, depicted Figure 1-2, was identified as NAS PAX Main Station, Webster Field, and the overall area utilized by NAS PAX throughout the region. The preliminary Study Area was determined by the jurisdictions within this operational area that are participating JLUS partners and refined based on input from the JLUS committees and subject matter experts. Due to the regional expanse of the study area, smaller manageable sub-areas have been defined that are likely to be affected by the same or similar issues. These sub-areas are:

- **Middle Eastern Shore Sub-Area:** The counties in this sub-area are Caroline, Dorchester, and Talbot.
- **Lower Eastern Shore Sub-Area:** The counties included in this sub-area are Somerset and Wicomico.
- **Southern Maryland Sub-Area:** Counties included in this sub-area are Calvert, Charles, and St. Mary's. This is also where NAS PAX Main Station and Webster Field are located.
- **Virginia Northern Neck Sub-Area:** Two of the participating counties are located in Virginia's Northern Neck, Northumberland and Westmoreland counties.



Legend

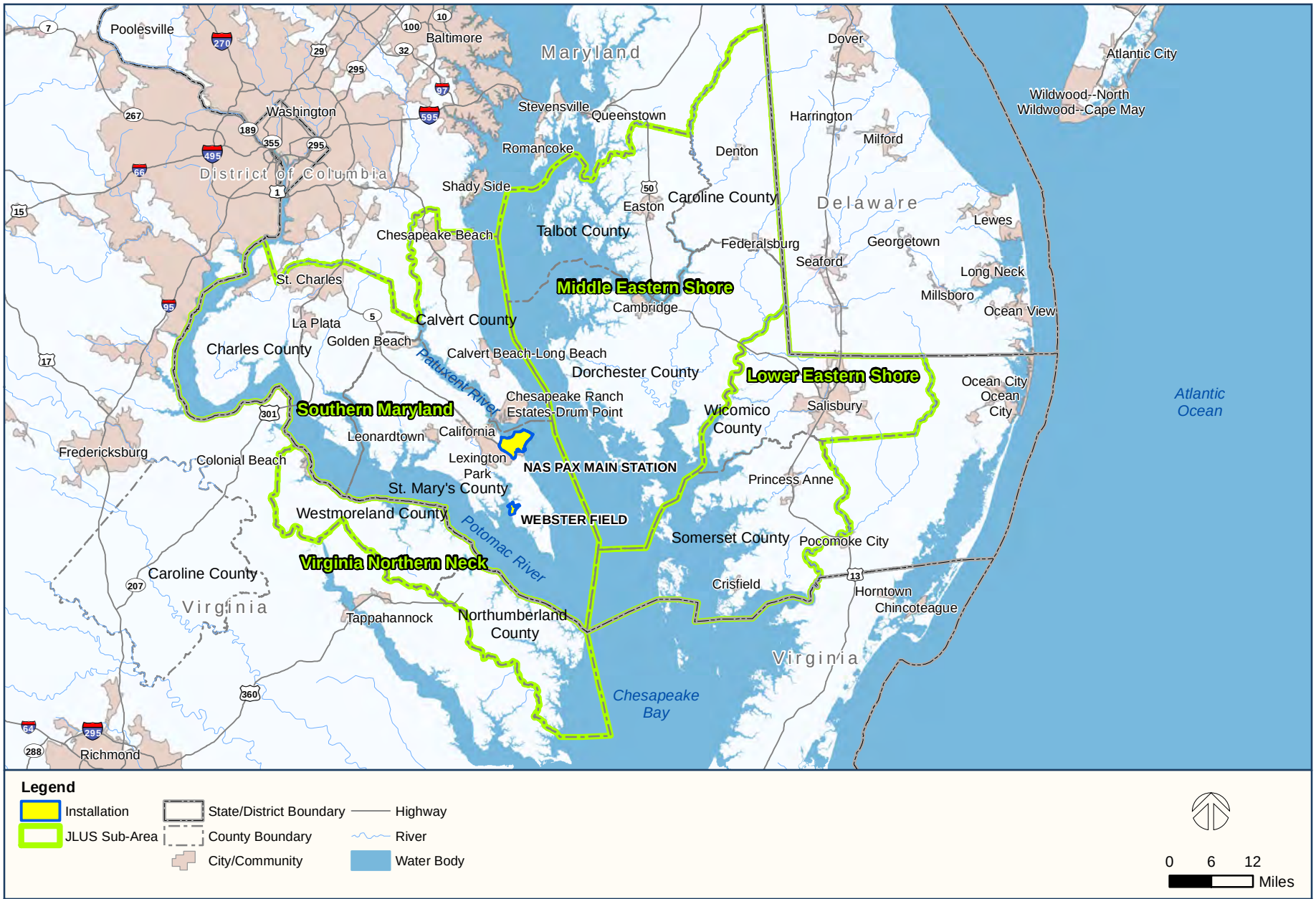
- Installation
- State/District Boundary
- County Boundary
- City/Community
- Highway
- River
- Water Body

0 10 20 Miles

Source:ESRI, 2010

Figure 1-1
Regional Context

NAS_PAX_Fig1-1_Regional_20141211_CJM.pdf



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig1-2_StudyArea_20141211_CJM.pdf

Figure 1-2
NAS PAX JLUS Study Area

JLUS Background Report Organization

The following is a brief overview of the organization of the NAS PAX JLUS Background Report, including the contents of each chapter.

Chapter 1: Introduction. Chapter 1 provides an introduction and overview of the NAS PAX JLUS. This chapter describes the working relationships among the entities, background and intent of the JLUS, study area, objectives used to guide development of the JLUS, stakeholders involved in developing the JLUS, public outreach methods, implementation premise, and the document organization.

Chapter 2: Community Profile. Chapter 2 provides a profile of the local jurisdictions followed by an overview of regional growth potential.

Chapter 3: Military Profile. This chapter introduces NAS PAX and discusses installation mission, strategic and economic importance of NAS PAX, importance of mission sustainment, facility and operations, installation role in national defense, and potential future missions. This chapter also includes an overview of the installation's setting including a history to provide the military baseline context for the JLUS.

Chapter 4: Existing Compatibility Tools. This chapter provides an overview of existing relevant plans, programs, and studies at the federal, state, and local levels that provide tools to address compatibility issues in the JLUS study area. The purpose of this chapter is to filter the tools readily available to stakeholders and assess whether the tool is adequate or in need of modification or development to achieve compatibility planning objectives.

Chapter 5: Compatibility Assessment. This chapter presents the issues identified by the PC, TAGs, the public, and JLUS team and provides an assessment of issues based on existing tools to address compatibility and feedback collected throughout the planning process. This chapter enumerates the compatibility issues and categorizes them by compatibility factor.

2. Community Profiles

Inside Chapter 2 . . .

Regional Overview 2-2
Study Area Growth Trends 2-7
Economic Development 2-9
Housing Value and Trends 2-12
Transportation 2-16

Introduction

This chapter provides information about the civilian communities within the Naval Air Station Patuxent River (NAS PAX) Joint Land Use Study (JLUS) area. Understanding certain demographic characteristics of participating JLUS communities provide a baseline context from which informed decisions can be made when assessing compatibility issues and developing strategies. The goal is to provide an understanding of population and development trends with the potential to affect the future of NAS PAX.

Information presented includes data and descriptions of general land use, population growth, economic development, housing, and transportation systems within the region to better understand the relationship between the JLUS study area communities and NAS PAX. This chapter provides information to foster a greater understanding of the types of activities occurring “outside the fence” by the military when considering future missions and operations.

Regional Overview

The NAS PAX JLUS study area encompasses the areas surrounding the military installation influenced by military operations. The overall study area extends across Maryland and beyond to portions of Virginia and Delaware including the NAS PAX Main Station; NAS PAX's Webster Outlying Field (WOLF); and the airspace utilized for military operations as well as communities affected by NAS PAX activities. The landscape within the study area consists of coastal lowlands surrounding the Chesapeake Bay used for agriculture from the time of Maryland's original settlement. The general area has largely maintained its rural character with small towns threaded along state routes running through the woodlands and farms along the bay. The long peninsulas and width of Chesapeake Bay have resulted in limited transportation options through the region. The topography has also allowed the eastern and western shores to remain fairly isolated with the nearest crossing (Highway 301) located approximately 45 miles north of NAS PAX.

A description of each participating jurisdiction in the JLUS Study is provided by Sub-Area.

Middle Eastern Shore Sub-Area

Caroline County

Caroline County is located in the central portion of Maryland's eastern border approximately 60 miles northeast of NAS PAX. Caroline County covers 321 square miles or 206,719 acres. The county is located on the Delmarva Peninsula and is part of the Upper Eastern Shore Region, which is comprised of Caroline, Cecil, Kent, Queen Anne's, and Talbot counties. The county is bordered by Queen Anne's, Talbot, and Dorchester Counties in Maryland and Kent and Sussex Counties in the State of Delaware. The Choptank River and Tuckahoe Creek separate Caroline County from Talbot County to the southwest and Tuckahoe Creek separates Caroline County from Queen Anne's County to the northwest. Caroline County is relatively flat, which has helped to foster crop farming in the area. Large sand and gravel mineral deposits exist in the middle and southern portions of the county.

Caroline County was formed in 1773 from portions of Dorchester and Queen Anne's counties. The county's historical roots date back to Maryland's origins as an English colony. The county maintains its rural character with open rolling lowlands. Although suburban development has occurred, the county remains firmly committed to agriculture, with agricultural preservation as one of its highest priorities. Caroline County maintains numerous natural resource areas including forests, rivers, streams, and wetlands.

Sources: Caroline County 2006 Land Preservation, Parks, and Recreation Plan; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; Town of Denton History, 2013; US Census 2010

Dorchester County

Dorchester County is the largest county in Maryland, covering nearly 629,120 acres with over 1,700 miles of shoreline and nearly surrounded by the Chesapeake Bay and its tributaries. The county is located south of Caroline and Talbot counties and is bordered by the state of Delaware to the east and Wicomico and Somerset counties to the south. The county's western shore is approximately five miles east of NAS PAX. The county includes numerous islands on the Bay and the Blackwater National Wildlife Refuge and the Taylors Island Wildlife Management Area.

The county was colonized as part of the land claims made by Lord Baltimore in 1669. Dorchester County operates under a home rule form of government with a County Council consisting of five members, one from each of the districts throughout the county.

Forty-eight percent or 170,338 acres are zoned agricultural which dominates most of the northeast portion of the county. Approximately four percent of Dorchester County's total land area is developed. The remaining area comprises resource lands including forests, agricultural lands, and wetlands. Tidal wetlands account for roughly 25 percent of the county's land area. Dorchester County's wetlands account for approximately 39 percent of the entire state wetlands. The county's comprehensive plan outlines goals and policies to preserve the area's natural rural character. The northern area of the county is designated as the area for future residential growth. The plan seeks to encourage development which fits appropriately into the landscape, avoiding strip development and "big box" stores. The southern areas are planned to

retain their agricultural and maritime uses and to limit future growth between five to ten percent of the total area growth.

Sources: Dorchester County Comprehensive Plan, 1994; Dorchester County homepage; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

City of Cambridge

The City of Cambridge serves as the county seat of Dorchester County and is the county's largest incorporated municipality. It is located along US Highway 50 in the northern portion of the county. Cambridge was founded in 1684 as a tobacco farming plantation and has maintained important agricultural and maritime industries, including fishing and oyster harvesting. The city has taken measures to preserve its historical character with tourism supporting growth in retail and services, replacing manufacturing which been steadily declining since the 1980s. The City's Comprehensive Plan outlines measures to preserve open space by limiting infrastructure growth outside the city boundary. Cambridge's jurisdiction includes an additional 6,590 acres of water.

Cambridge is currently the center of population and economic growth for Dorchester County and anticipated to serve as the center for growth in future years. Cambridge's downtown district is surrounded by residential uses bordered by open space uses.

Source: City of Cambridge Comprehensive Plan, 2011; City of Cambridge Homepage, accessed October 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census Bureau 2010

Talbot County

Talbot County is located on the eastern shore of Chesapeake Bay midway down the Delmarva Peninsula. The City of Easton is the county seat located approximately 35 miles northeast of NAS PAX. The county is bordered to the north by Queen Anne's County, the east by Caroline County, the south by Dorchester County, and the west by the Chesapeake Bay. The county mostly comprises rural residential, agricultural, and open space land uses, with development centered around Easton and other smaller jurisdictions such as Trappe to the south, and St. Michaels to the west. Talbot County is one of the oldest centers of European settlement in the New World with a long history linked to the water. With over 600 miles of tidal shoreline, the most of any county in the United States, it retains a maritime character. Talbot County contains 171,000 acres of agricultural use of the 178,560 acres within its jurisdiction. The Talbot County Council adopted an Agriculture Visioning Plan to preserve agricultural land and to support agriculturally based industries. The plan addresses the sustainable requirements of Talbot County's agricultural base, including large grain farms, poultry and mid-size farm operations, small value-added farms and resource-based agriculture. US Route 50 runs north-south through the center of the county. Talbot County is similar to other communities along the Chesapeake Bay with rolling lowlands and numerous harbors and inlets.

Sources: Maryland Department of Business and Economic Development, Brief Economic Facts Talbot County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; Talbot County Comprehensive Plan, 2005; Talbot County Homepage, US Census 2010

Lower Eastern Shore Sub-Area

Somerset County

Somerset County is located at the southern edge of Maryland, bordering Dorchester and Wicomico counties to the north, Worcester County to the east, the State of Virginia to the south, and St. Mary's County across the Chesapeake Bay to the west. The county was established in 1666 by Quakers who migrated from Virginia. The topography is generally flat, with favorable agricultural soils punctuated by areas of poorly drained wetlands and a high water table. Numerous Wildlife Management Areas and state parks are located throughout Somerset County. Much of the county is subject to Critical Area and other environmental regulations due to its considerable tidal and non-tidal wetland resources. The county's character varies from fishing communities and summer homes, to marshland and wilderness. Principal land uses in the county are agriculture and forestry, both of which contribute to Somerset's rural character and open space opportunities. The county covers approximately 209,390 land acres, 68 percent of which are zoned for agricultural use. Agricultural lands are located in the central northern, middle, and southern portions of the county. Only three percent of Somerset County's land area is developed with the remaining 97 percent either agricultural, forest, wetland, or open space.

The prevalence of agricultural and forested lands, and vast areas of tidal wetland, has preserved the rural character of the county and provided opportunities for greenways. The Somerset County Land Preservation

and Recreation Plan designates six greenway corridors. These consist of four riparian greenways and two trails systems. All of these greenways link natural and historic elements between rivers and larger bodies of water to inland trails. Several are multi-county efforts aimed at encouraging regional tourism. The county's limited residential and non-residential uses are clustered within seven primary growth nodes located along US Route 13 and State Route 413.

Sources: Somerset County Land Preservation, Parks, and Recreation Plan, 2012; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census Bureau 2010

City of Crisfield

The City of Crisfield is located at the southernmost tip of Somerset County at the terminus of State Route 413. The city is approximately 35 miles southeast of NAS PAX and is bordered to the north by the Janes Island State Park. Crisfield was founded in 1666 as a coastal fishing village and popular docking station for colonials. Large oyster beds discovered in 1854 led to the development of a strong seafood industry supported by the Eastern Shore Railroad from Salisbury. The city was formally incorporated in 1872. Somerset County has established an Enterprise Zone in Crisfield which provides tax credits for capital improvements to create local jobs.

Land use in the city consists of commercial districts along State Route 413 and the central business district along Main Street, residential neighborhoods, and water-dependent / water related uses in the marina and downtown maritime areas. Much of the shoreline is devoted to commercial and industrial uses directly related to or in support of the fishing industry; including the Little Boat Harbor; however, this development pattern has begun to change as multi-family condominiums are replacing traditional maritime activities. The natural environment is a defining feature of Crisfield. The Chesapeake Bay, the Little Annemessex River, and associated tidal marshes are predominant natural features. With the exception of several high points of elevation, the city lies within the 100-year floodplain and flooding is a regular occurrence. The remaining marshlands and low-lying areas are vital buffers to dissipate storm surges and store floodwaters. Much of the marina and downtown maritime areas are built on fill. Chesapeake Bay Critical Area regulations cover a large area of the city.

Sources: City of Crisfield Comprehensive Plan, 2010; City of Crisfield Homepage; Maryland Department of Business and Economic Development, Brief Economic Facts Somerset County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Wicomico County

Wicomico County, Maryland, is located at the southern end of the Delmarva Peninsula. The county is bordered to the north by the State of Delaware, to the east by Worcester County, the south by Somerset County, and the west by Dorchester County and the Chesapeake Bay. Wicomico County has a long history deeply rooted in the Eastern Shore culture of today. Created from neighboring Somerset and Worcester counties in 1867. Wicomico's County Seat, Salisbury, dates back to 1732. The area is rich in colonial and post-revolutionary American history.

Wicomico County is characterized primarily by undeveloped forest, agricultural, and wetland areas. It also has a unique blend of urban and rural environments. Because of its strategic location in the center of the Delmarva Peninsula and at the intersection of two major highways, US Routes 13 and 50, it will likely maintain its current status as a regional center of economic activity.

Wicomico County's unique blend of urban and rural environments sets it apart from other counties on the Eastern Shore. Salisbury, located at the intersection of US Routes 13 and 50, serves as the center of population and economic activity. Beyond the urban core, farm fields, forests, wetlands, rivers and streams dominate the landscape. Wicomico County encompasses 241,428 acres, with major portions of the land comprising forest, crop land, wetland, and water features. Approximately 46 percent of the county land is forested and approximately 38 percent is agricultural use. Developed portions of the county constitute only ten percent or about 24,000 acres of the total area. While there is relatively little publicly owned land in the county, much of the land is protected by Critical Area and tidal wetland regulations.

Sources: Maryland Department of Business and Economic Development, Brief Economic Facts Wicomico County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010; Wicomico County Homepage; Wicomico County Zoning Map, 2009

Southern Maryland Sub-Area

Calvert County

Calvert County was founded in 1658 and is located at the northern end of the JLUS study area on the western shore of the Chesapeake Bay. Calvert County is Maryland's smallest county with only 140,000 acres. The county is a peninsula surrounded by the Chesapeake Bay on its eastern side and the Patuxent River on the west. Much of the bay side of the county is characterized by steep wooded cliffs while the Patuxent River side contains a mixture of rolling hills and flat lands, primarily in agricultural use. Approximately 65 percent of the county's land area is comprised of farmland, woodland, parkland, and open space. The county has recently increased funding for farmland preservation efforts and has received nationwide recognition for its strategy to manage build out. The county has protected over 20,000 acres of prime farmland through local efforts and participation in the Maryland Agricultural Land Preservation Foundation. Though the county still retains a rural character, services and trade are gradually replacing traditional agriculture and seafood activities.

Unincorporated Prince Frederick is the designated seat of Calvert County. The major town centers include Solomons, Dunkirk, Prince Frederick, Huntingtown, St. Leonard, Owings, and Lusby, and the towns of Chesapeake Beach and North Beach, each having their own adopted Master Plans and Zoning Ordinances. Calvert County's vision is to maintain the county landscape dominated by forests and fields while promoting its seven town centers as attractive, convenient, and interesting places to live, work and shop. Land use goals are focused on continuing growth in town centers where services are more readily available and expand the use of its transferable development right (TDR) program to further protect the underdeveloped areas of the county from unwanted sprawl.

Transportation plays a greater role in the development of residential land than commercial land in Calvert County. MD 2 and 4 are used as major north-south arterials, encouraging community development along their respective routes. The exception to this development trend occurs in Chesapeake Beach and North Beach, which are incorporated municipalities on the western shore of Chesapeake Bay. Located in the northern portion of the county, Chesapeake Beach and the adjacent North Beach are accessible via State Routes 260 and 261. The County's zoning policy encourages employment development based on established town centers. These commercial districts, located in each of the major towns within Calvert County, serve to provide livability, business growth, and retail opportunities.

Sources: Calvert County Zoning Map, 2013; Calvert County Zoning Ordinance, 2012; Maryland Department of Business and Economic Development, Brief Economic Facts Calvert County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Charles County

Charles County is located approximately 25 miles northwest of NAS PAX and is bordered by Prince George's County, St. Mary's County, Calvert County, and the Potomac River, to the north, south, east, and west, respectively. The county's rolling countryside is dotted with historic landmarks. The original Charles County was created in 1650 and included portions of St. Mary's, Calvert, and Prince George's counties. Its present boundaries were established in 1658 by an Order in Council as part of the Maryland colony. The area historically served as a center for agriculture, but has recently experienced development pressure and more than doubled in population since 1970 due to the expanding Washington, DC metropolitan area.

From the region's first Native American inhabitants at least 12,000 years ago, to the establishment of the Naval Proving Ground at Indian Head in the late 19th century, the county's history reflects the diversity and continuity of life in southern Maryland. Charles County has been characterized by a number of compact settlements spread over a rural landscape. Approximately 64 percent of the county is forested; however suburbanization of rural areas has emerged as a challenge to the rural setting and natural environment over past several decades. Two guiding principles of the county's land use plan are the preservation of rural character and protection of natural resources. Recent development within Charles County has occurred in the north-west quadrant: along the MD 228 and MD 229 corridors; east of this corridor in the St. Charles area; in the Hughesville area; and the Town of La Plata. The predominant land uses in the county are forested and agricultural uses followed by residential.

The northern part of the county is the "development district" where commercial, residential and business growth is focused in Waldorf, White Plains, and the planned community of St. Charles, allowing the remainder of the county to retain its pastoral character. La Plata is home

to the county government, and Waldorf, an unincorporated area comprising the northern part of the county, and St. Charles, a master-planned, unincorporated city adjacent to Waldorf, are the county's fast-growing suburban communities. Approximately 400 farms, more than 10,000 acres of public parkland, and forests and marshes comprise major land uses.

Sources: Charles County Comprehensive Plan, 2012; Charles County Zoning Ordinance, 2010; Maryland State Archives Homepage; Maryland Department of Business and Economic Development, Brief Economic Facts Charles County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

St. Mary's County

St. Mary's County, in Southern Maryland, is on the peninsula formed by the confluence of the Potomac and Patuxent Rivers and the Chesapeake Bay, 55 miles southeast of Washington, DC, and 80 miles south of Baltimore. First settled in 1634, St. Mary's County is bordered by the Patuxent River to the north, the Chesapeake Bay to the east, the Potomac River to the south, and Charles County to the west. NAS PAX is located at the northeast corner of the county. Settlers in search of economic opportunity and religious freedom founded the county in 1634, and in 1649 the first law establishing the freedom to practice religion in the colonies was passed. This law later became the basis for Article One of the US Constitution. From the county's inception through WWII, farming and fishing uses dominated; however, the establishment of NAS PAX in 1942 changed the course of development in the county.

The area comprises rolling lowlands with agriculture, forested areas and open space situated on a peninsula surrounded by the Patuxent River on the eastern side and the Potomac River on the west. St. Mary's County has 400 miles of shoreline and covers approximately 231,280 acres. Eighty-three percent, or 191,963 acres, are zoned for agriculture use and located throughout the county. The county has approximately 1,500 acres of public parkland and approximately 3,000 acres of state parkland. State Routes 5 and 235 pass through the county and connect most of the towns and localities throughout the county. Existing zoning patterns around NAS PAX include a mix of low, medium, and high-density residential uses, rural preservation, commercial, mixed-use, and industrial uses. The zoning around NAS PAX is a pattern of dense development, which includes commercial and industrial uses in the Lexington Park area along State Route 235 and Great Mills Road surrounded by young residential densities intermixed with rural preservation moving away from the station.

Sources: St. Mary's County Comprehensive Plan, 2010; St. Mary's County Comprehensive Zoning Ordinance, 2013; Maryland Department of Business and Economic Development, Brief Economic Facts St. Mary's County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Town of Leonardtown

Leonardtown is located in central St. Mary's County, Maryland. Established in 1708, Leonardtown is the only incorporated municipality in St. Mary's County and serves as the county seat. The area has experienced fluctuations in population levels with economic changes and has taken several steps to redevelop its downtown and waterfront as a means of attracting a growing tourism industry and capitalizing on popular outdoor recreation activities. Leonardtown is located approximately 10 miles due west of NAS PAX and has benefitted from the influx of military-related jobs which have moved to the area in recent years, including DynCorp International, Northrop Grumman, and Engility, whom are all major employers in the area.

Sources: Town of Leonardtown Comprehensive Plan, 2010; Town of Leonardtown Homepage; Maryland Department of Business and Economic Development, Brief Economic Facts St. Mary's County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Virginia Northern Neck Sub-Area

Northumberland County

Northumberland County was established in 1648 as part of the English colonies in the Americas, situated on the Northern Neck peninsula in northern Virginia where the Potomac River flows into the Chesapeake Bay. The county is bounded by the Potomac River to the north, the Chesapeake Bay to the east, Lancaster County to the south, and Richmond and Westmoreland counties to the west. Northumberland County, Virginia, called the "Mother Country of the Northern Neck," was originally known as Chickacoan, a Native American district on the Northern Neck lying between the Rappahannock and Potomac Rivers.

For hundreds of years Northumberland remained a county largely isolated from the rest of the state due to the lack of a road network. In 1926 the bridge crossing from Essex County to the Northern Neck provided access to the west, which initiated growth in the area.

Northumberland County's 183,040 acres consists mainly of flat to gently rolling countryside bounded by 438 miles of shoreline on inlets, creeks, the Potomac River and the Chesapeake Bay. The county's history is reflected in the county seat at Heathsville, a well preserved village referred to as "a veritable museum of 18th, 19th, and 20th century architecture." In addition to historic culture, the county offers boating and fishing opportunities, Virginia Birding and Wildlife Trail sites, beaches, golf, and unspoiled scenery.

Agriculture and forestry comprise the predominant land uses. The county has more miles of buildable shoreline than any other county in Virginia. Commercial development is concentrated within several villages, and industrial development, a combination of marine and other industrial uses, occurs mostly along waterfronts, with a major concentration in the vicinity of Reedville.

Sources: Northumberland County Homepage, accessed October 2013; Virginia Employment Commission, 2013; US Census 2010

Westmoreland County

Located approximately 25 miles southwest of NAS PAX, Westmoreland County is bordered by the Potomac River to the north, Northumberland County to the east, Richmond County and the Rappahannock River to the south, and King George County to the west. The county was originally created from a division of Northumberland County in 1653. The county is approximately 229-square-miles. The county originally consisted of widespread farming, which still characterizes much of the landscape today. In recent years, the county has attracted new growth from expansion from the Washington, D.C. area which continues to bring new residents to the county. There are two incorporated towns in the county: the county seat of Montross and the resort town of Colonial Beach. As part of Virginia's Tidewater region, the county comprises forested upland, rolling farmland, wetlands and cliffs, 250 miles of shoreline, and 5,450 acres of nature preserves.

Sources: US Census 2010; Virginia Employment Commission, 2013; Westmoreland County Comprehensive Plan, 2010

Study Area Growth Trends

The following provides a profile of the study area's trends concerning population change, economic development, housing stock, and transportation infrastructure establishing the regional context for growth potential in the region.

The population data is based on information obtained from the US Census Bureau and shows the growth or decline within the study area. Table 2-1 provides a comparison of the changes in population in the region between 2000 and 2010, noting the percentage change over the decade.

Population levels have remained fairly stable throughout the study area over the past ten years; however, each jurisdiction within the study area in the state of Maryland, with the exception of Dorchester County, Somerset County, and the City of Crisfield, experienced growth at a rate higher than the state. St. Mary's County and the Town of Leonardtown experienced the highest population growth rate in the study area. The two counties in Virginia remained relatively stable with minimal population growth.

The Maryland State Data Center and the Virginia Employment Commission prepare thirty year population growth estimates for their respective states and all counties within their jurisdictions. These projections indicate a continued rate of growth for the counties in the study area. As local population growth continues, these counties will have to balance growth with preservation. In most study area counties, growth policies outlined by comprehensive plans delineate district or municipal boundaries which are enforced through zoning ordinances at the county or city level. Zoning ordinances establish infrastructure expansion limitations by establishing allowable land uses for different zones. Many jurisdictions have incorporated open space, rural, agricultural, watershed, or park zones outside of developed areas to focus growth and redevelopment into the development districts. These planning controls are discussed in greater detail in Chapter 4.

Table 2-1. Population Change 2000-2010; Growth through 2030

Jurisdiction	2000	2010	Percent Increase	2020	2030
State of Maryland	5,296,486	5,773,552	9%	6,216,150	6,611,900
Calvert County	74,563	88,737	19%	95,600	100,200
Caroline County	29,772	33,066	11%	36,650	41,150
Charles County	120,546	146,551	22%	174,350	202,150
Dorchester County	30,674	32,618	6%	35,000	37,950
City of Cambridge	10,911	12,326	13%	Not Available	Not Available
Somerset County	24,747	26,470	7%	27,900	29,050
City of Crisfield	2,723	2,726	0%	Not Available	Not Available
St Mary's County	86,211	105,151	22%	125,150	148,750
Town of Leonardtown	1,896	2,930	55%	Not Available	Not Available
Talbot County	33,812	37,782	12%	40,850	42,900
Wicomico County	84,644	98,733	17%	109,200	119,200
State of Virginia	7,078,515	8,001,024	13%	89,17,395	9,825,019
Northumberland County	12,259	12,330	1%	15,996	17,699
Westmoreland County	16,718	17,454	4%	18,501	19,399

Source: US Census Bureau, 2000-2010; Maryland State Data Center, 2012; Virginia Employment Commission, 2013

Calvert County

Calvert County experienced a steady increase in population from 2000 to 2010. The nearly 20 percent raise can be attributed in part to the increase in suburban development within the county. The rise in housing development has brought with it an expansion of the workforce. The county contains only two classified municipalities: Chesapeake Beach and North Beach. The majority of the population within Calvert County resides in unincorporated areas and town centers.

Caroline County

Caroline County's population increased slightly between 2000 and 2010 and expects to see similar growth over the next 20 years. Much of this growth is anticipated in unincorporated land throughout the county. The population increase coincides with a consistent increase in average yearly wages over the decade. As of the 2010 census, Caroline County was the fifth least populous county in Maryland. Its largest town is Denton.

Charles County

Charles County's close proximity to the Washington-Baltimore area, open spaces, rural areas, waterfront, and villages continue to attract residents. Between 2000 and 2010 Charles County's population increased by 22 percent, making both Charles and St. Mary's counties the fastest growing counties in Maryland. The county's population is expected to continue to grow as employment opportunities expand in the region as a result of proximity to the Washington metropolitan region and several military installations.

Dorchester County

Dorchester County experienced a slight decline in population leading up to the year 2000 and has since experienced a slight growth in population, which is expected to increase over the next 20 years. Most of this growth is anticipated in the North Dorchester and Cambridge areas. Cambridge's 2010 population increase mirrors an increase in jobs in Cambridge and Dorchester County. Cambridge is the fourth most populous city in Maryland's Eastern Shore, after Salisbury, Elkton and Easton.

Talbot County

Talbot County's population increased marginally during the first decade of the 21st century. The total increase in population was approximately twice the number of the increase in occupied housing units over that duration. As of the 2010 census, Talbot County was the sixth least populous county in Maryland. Nearly half of the county lives in its most populous city, Easton.

Somerset County

Somerset County's population decline has been occurring over the past several decades as a result of limited employment opportunities outside of the City of Crisfield. Crisfield's 2010 population was 2,726 and continues to decline. This decline has been evident since the turn of the 20th Century and the collapse of fisheries in conjunction with the decline of the Chesapeake Bay ecosystem.

St. Mary's County

Population growth has been steady throughout St. Mary's County for several decades. The county's population increase of 22 percent between the years 2000 and 2010 is largely attributable to exurban migration from the Washington and Baltimore Metropolitan regions, primarily as a result of job creation at NAS PAX. Growth is expected to continue as additional technology and engineering jobs are added to support NAS PAX and other Navy installations throughout the region.

Wicomico County

In 2010, the population of Wicomico County was 98,733. Wicomico County contains the largest population on Maryland's Eastern Shore and is one of the most rapidly growing counties on the Delmarva Peninsula. The county continues to plan for a moderate population growth, encouraging the retention of existing residents and workforce in-migration.

Northumberland County

Although still very much rural, Northumberland County's qualities have attracted people to the area, resulting in building along the county shoreline. The period of declining population has begun to reverse with a one percent population increase between 2000 and 2010.

Westmoreland County

Westmoreland County's gradual population increase over the past decade has occurred from attracting residents from other counties in the Washington Metropolitan area. The increase in population over the next 20 years is expected to favor individuals above retirement age as the county continues attract retirees and those seeking second homes.

Economic Development

The Chesapeake Bay area is host to a diverse economy incorporating traditional regional drivers with shifting economic trends. According to the North American Industry Classification System (NAICS), which classifies economic activity into major industries and provides employment estimates, the major industries by employment in the study area include manufacturing, retail trade, healthcare and social assistance, and accommodation and food services. Manufacturing has been an important source of employment in the area over the past century and adapted to meet new regulatory requirements and new industries. The emerging tourism industry supports a diverse array of employment in accommodation, food services, and retail trade as the agricultural lowlands and wildlife refuges have drawn many visitors to the Chesapeake Bay area. This reflects the reinvestment local jurisdictions are making to protect their open spaces and revitalize downtown areas while continuing manufacturing productivity with military and other industry-supported research and production. These trends are evident by the establishment of major employers throughout the study area, including military contractors such as Boeing, Lockheed Martin, and Northrup Grumman and traditional seafood and agricultural producers such as Amick Farms, Sysco Eastern Maryland, and Southern Connection Seafood. Medical services and healthcare have been rapidly increasing with numerous hospitals and medical services centers established throughout the study area.

Calvert County

Though Calvert County consisted mostly of agricultural farms and manufacturing, it is quickly becoming one of the wealthiest counties in the nation. According to NAICS establishment data, the largest industries within the county are construction, trade, transportation and utilities, and

professional and business services. The emphasis on supporting infrastructure through employment numbers represents the amount of growth currently occurring throughout Calvert County. Among its largest employers are Calvert Memorial Hospital, Constellation Energy / Calvert Cliffs Nuclear Power Plant, Walmart, and Giant Food.

While most of the residents in Calvert County commute outside of the county for work, the median household income is among the highest in the country. Data from the US Census Bureau showed that Calvert County residents make approximately 12 percent more than the average Maryland resident and 44 percent more than the average American. Based on the 2000 and 2010 US Census, Calvert County was recorded as the 32nd and 16th richest county in the nation, respectively.

Caroline County

Caroline County's economy is evolving from a rural and agricultural economy to a diversified economy supported by services, distribution, and industrial uses. Manufacturing is the largest industry sector, with several major employers including Solo Cup Operating Corporation, Maryland Plastics, and the Tri Gas & Oil Company. Healthcare has been a rapidly growing industry with employment nearly doubling from 1999 to 2011. Major healthcare employers include the Caroline Nursing Home and Choptank Community Health System. Interstate-95, Caroline County's major north-south traffic artery, provides easy access to growing areas of the county.

Major economic development initiatives in Caroline County include the improvement of regional infrastructure and services to create economies of scale, expanding tourism opportunities, and creating new industry opportunities with a focus on providing opportunities for young people. The county has identified various economic development and growth goals that promote industry while balancing the protection of the county's environmental and cultural heritage. The County has set aside land in appropriate locations for new commercial, industrial, and institutional uses to encourage economic development while minimizing the impacts on neighboring property owners; supporting historical tourism efforts; and developing detailed surface mining performance and site mitigation standards. Municipal growth objectives are focused on attracting new employers, encouraging growth of local shops in downtown areas, and creating a greater demand for the service industry.

Charles County

With its location in the center of two major metropolitan regions, Baltimore and Washington D.C., Charles County's economy is influenced by its proximity to military installations in the region. Charles County is home to Naval Support Facility Indian Head, the county's largest employer including 3,100 personnel with more than 1,300 scientists, engineers, and technicians. Employment parks are located throughout the county along key transportation corridors and designed to accommodate defense related companies with anti-terrorism / force protection compliance measures. Headquartered in La Plata, the College of Southern Maryland supports employers' workforce training needs. Willis Group, also located in La Plata, consists of multiple subsidiaries related to the petroleum industry. One of these subsidiaries, Southern Maryland Oil Motor Fuels, is the largest independent marketer of Shell Oil in the country. Regional firms headquartered in the county are complemented by a growing number of tech-related employers: Naval Support Facility Indian Head, Facchina Global Services, SAIC, Energetics Technology Center, OutsourceIT, and Zekiah Technologies. Four main business and industrial parks have been programmed to accommodate the county's growing technology and research and development based economy.

In addition to its government and military focused assets, the county recognizes the economic importance of water-related tourism and continues to seek additional water access sites and facilities along the Potomac River and its tributaries.

Dorchester County

Over the past several decades, Dorchester County has experienced a pronounced shift from a manufacturing economy to a retail and service based economy. Traditional and innovative manufacturing, services including IT, tourism, and agriculture/ aquaculture are the current primary employment sectors. Among the largest employers in the county are Amick Farms, Hyatt Regency Chesapeake Resort, and the Shore Health System. Future economic development in the count is anticipated to take advantage of the area's natural resources, including maritime industries, tourism, agriculture, and forestry. Given Dorchester's maritime identity, the county is a prime tourist destination for boaters and paddlers who enjoy exploring its many waterways and marshes. The county continues to diversify its industry mix through the provision of improved infrastructure such as the new 113-acre Dorchester Regional Technology

Park serving the county and region. Located across from the Cambridge-Dorchester Regional Airport, the park is in one of the county's two State Enterprise Zones. Hurlock Industrial Park located in the north of the county and Chesapeake Industrial Park in Cambridge are also within Enterprise Zones.

Talbot County

From its beginning as an English colony, agriculture and seafood products have been Talbot County's chief industries. The original economy was based on tobacco farming, and then replaced by tomatoes, fruit, and dairy products, corn, soybeans, and poultry. Equally important have been the maritime industry, including shipbuilding, seafood harvesting and processing, and today, water-related tourism such as sailing and sport fishing. Several vibrant small towns have supported both the farming and maritime industries as centers for trade, craftsmen, and manufacturing. Today the county's primary industry is still agriculture, although health care is an emerging industry. The University of Maryland Shore Regional Health is the largest employer in the Mid-Shore Region with 2,000 employees, 1,700 of which reside in Talbot County. Retirees and tourists have also created a new economy in the area.

Current initiatives focus on promoting environmental studies to attract environmental technology companies, expanding its diverse manufacturing base, and attracting developing science and technology businesses. The county is host to seven industrial parks with space available for emerging companies. Emerging cyber, biometric and defense contractors are attracted to Talbot County for the availability of secure sites, high speed redundant fiber and access to over 90 critical federal labs and facilities within a two to three hour commute.

Wicomico County

With its strategic location at the crossroads of Maryland's Lower Eastern Shore, Wicomico County serves as a hub for commerce, industry, healthcare, education, and transportation. Wicomico County's policy for economic development has been the promotion of agriculture, industry, and trade and services. Although employment in the agriculture sector declined, farm income has shown a resurgence in recent years.

Major employers in the county include Peninsula Regional Medical Center, Salisbury University, and Perdue Farms, headquartered in Salisbury. Other major employers in Wicomico County include: Salisbury University, Verizon, Peninsula Regional Medical Center, The Knowland Group, and Pepsi Bottling of Delmarva. Other industries in Wicomico County include electronic component manufacturing, pharmaceuticals, shipbuilding, and agriculture.

St. Mary's County

St. Mary's County includes numerous bays and state parks making it a frequent tourist destination greatly contributing to the local economies. Military, manufacturing, healthcare, and retail/accommodation (associated with tourism) are major industries. Home to NAS PAX and over 200 high-tech defense contractors, St. Mary's County has emerged as a world-class center for maritime aviation, research, development, testing, and evaluation. The county is home to the highest percentage of high-tech employment in the region and the fastest growing county in Maryland. With the presence of BAE Systems, Wyle, CACI, Smartronix, Inc., Triton Metals, Sailing Specialties, Inc., Ship Point Machine Company, Inc., and other companies that produce innovative products for military, transportation, law enforcement, communications, and custom plastics, manufacturing is a small but growing component of the county.

The hospitality industry has also experienced growth as a result of NAS PAX's presence and the growing need for technology consultants and experts. Growth in housing, shopping, restaurants, hotels, recreation, arts, and entertainment attracts new residents and supports the county's many historical sites. Current economic objectives and funding are oriented toward growth in education, transportation, and other infrastructure investments that support the Navy's expansion.

Somerset County

Somerset County's economy is historically based on the processing and distribution of seafood, poultry, produce, and other food products. The county seat of Princess Anne is home of the University of Maryland Eastern Shore, one of the largest employers in the county and offers a doctoral program in marine, estuarine, and environmental sciences. The county has Enterprise Zones in Crisfield and Princess Anne and participates in the One Maryland Program, which offers tax credits for capital investments that create jobs. Plans for a hotel conference center are moving forward along with the future development of an industrial park in the city of Crisfield. The Economic Development Commission is

working to assist in the commercial development of the Crisfield waterfront and to attract aerospace industry. The major employers in Somerset County include the University of Maryland Eastern Shore campus, McCready Memorial Hospital, the Somerset County Development Center, and Sysco Eastern Maryland.

Northumberland County

Manufacturing is historically, and continues to be, the major industry in Northumberland County. The county is reliant on its abundance of natural resources and access to local waterways to maintain a positive fishing community. Manufacturing of seafood products provides the highest number of employment opportunities; however, more than 45 percent of the county's residents commute outside the county for employment. The county has many natural, recreational, and cultural assets to improve the job market and reverse or reduce the out-migration of workers.

The county's economic objectives include improvement of waterfront access and the use of shorelines to promote the growth of recreational based opportunities and tourism and to promote and attract jobs in occupations active during the winter and spring to increase year-round employment. New water-oriented enterprises that support tourism, sports fishing, commercial fisheries, and other water related activities are encouraged at sites with deep water and appropriate access.

Westmoreland County

Westmoreland County's economy is historically dominated by occupations related to the use of natural resources. More recently, sales and service occupations have become the predominant contributor to the county economy; however, employment opportunities are severely limited due to many retirees and second home owners. The largest employers include the Westmoreland County School Board, Carry On Trailer Corporation, the County of Westmoreland, and Town of Colonial Beach School District. Westmoreland's economic development objectives include attracting more employers, jobs for young people, and higher-paying jobs by encouraging technology training programs within the existing educational facilities and support of the Northern Neck Tourism Commission to develop a more robust tourism industry.

Housing Value and Trends

Housing trends are an important indicator of economic vitality because they demonstrate population growth or decline relative to new residential construction and represent market decisions relative to home ownership versus rental properties. Housing trends indicate potential future development and the types of residential and commercial uses. Table 2-2 illustrates the housing market trend and median monthly gross rents. Tables 2-3 and 2-4 show the NAS PAX base allowance for housing (BAH) rates and median home values within the JLUS study area, respectively.

Table 2-2. Median Monthly Gross Rent 2000 – 2010

Jurisdiction	2000	2010	Delta	% Change
State of Maryland	$689	$1,139	$450	65%
Calvert County	$837	$1,321	$484	58%
Caroline County	$482	$893	$411	85%
Charles County	$858	$1,370	$512	60%
Dorchester County	$456	$753	$297	65%
City of Cambridge	$441	$713	$272	62%
Somerset County	$429	$686	$257	60%
City of Crisfield	$359	$525	$166	46%
St Mary's County	$719	$1,222	$503	70%
Town of Leonardtown	$516	$1,321	$805	156%
Talbot County	$552	$925	$373	68%
Wicomico County	$567	$969	$402	71%
State of Virginia	$650	$1,024	$374	58%
Northumberland County	$478	$743	$265	55%
Westmoreland County	$537	$601	$64	12%

Sources: American Community Survey, 2007-2011; US Census 2000

Between 2000 and 2011, the median rent increased by a range of 12 percent to 156 percent in the study area jurisdictions. During this ten-year span, every jurisdiction except for Westmoreland County expected an increase greater than 50 percent of the year 2000 value for rent; at the same time, 11 of the 13 jurisdictions in the JLUS study area experienced rent cost increases at a faster rate than the average state rate in which they reside. While trends throughout the entire study area provide a regional understanding of housing costs, it is important to focus on the Western Shore and Northern Neck sub-areas, as they are most accessible to NAS PAX and more likely to impact affordability of off-station housing for military personnel.

There are 805 units for military family housing at NAS PAX in four communities existing on station and an additional three located near the installation. Average wait times in 2013 ranged between zero and three months. There are 336 spaces available for unaccompanied personnel on station. These facilities alleviate the pressure on off-station housing. For military personnel seeking off-station accommodation, a BAH is given to supplement housing costs. The BAH is a stipend given to military personnel who choose to live out in the community or cannot be accommodated in on-station housing and is designed to augment the costs of living associated with private sector arrangements, including home or apartment rent, utilities, and renter's insurance. The BAH rates for personnel at NAS PAX are provided in Table 2-3.

While BAH rates for military personnel vary by rank and dependent status, affordability may only be a concern for grade E-1 to E-5 in certain communities on the Western Shore and Northern Neck Sub-Areas, including Calvert and Charles counties and the Town of Leonardtown.

Sources: Installation Overview – NAS Patuxent River, Maryland; 2013

Housing value trends illustrate the changes in land and home values relative to market fluctuations. These fluctuations can be indicative of development activity and the location or migration patterns of populations. Table 2-4 shows the median housing value trends in the study area from 2000 to 2010.

Table 2-3. BAH Rates at NAS PAX, 2013

Grade	Without Dependents	With Dependents
E-1	$1,149	$1,524
E-2	$1,149	$1,524
E-3	$1,149	$1,524
E-4	$1,149	$1,524
E-5	$1,365	$1,575
E-6	$1,476	$1,842
E-7	$1,527	$1,893
E-8	$1,629	$1,950
E-9	$1,710	$2,088
W-1	$1,503	$1,845
W-2	$1,626	$1,917
W-3	$1,719	$1,986
W-4	$1,854	$2,127
W-5	$1,908	$2,295
O-1E	$1,575	$1,905
O-2E	$1,692	$1,977
O-3E	$1,842	$2,154
O-1	$1,470	$1,605
O-2	$1,557	$1,836
O-3	$1,746	$1,983
O-4	$1,899	$2,358
O-5	$1,971	$2,628
O-6	$1,989	$2,652
O-7	$2,025	$2,679

Source: PatuxentRiverHousing.com, 2013

Table 2-4. Median Housing Values 2000 – 2010 NAS PAX JLUS Study Area

Jurisdiction	2000	2010	Delta	Percent Change
State of Maryland	$146,000	$319,800	$173,800	119%
Calvert County	$169,200	$384,500	$215,300	127%
Caroline County	$101,700	$232,600	$130,900	129%
Charles County	$153,000	$341,200	$188,200	123%
Dorchester County	$92,300	$202,000	$109,700	119%
City of Cambridge	$79,300	$188,200	$108,900	137%
Somerset County	$81,100	$162,300	$81,200	100%
City of Crisfield	$81,700	$125,400	$43,700	53%
St Mary's County	$150,000	$324,500	$174,500	116%
Town of Leonardtown	$150,600	$376,300	$225,700	150%
Talbot County	$149,200	$352,200	$203,000	136%
Wicomico County	$94,500	$195,400	$100,900	107%
State of Virginia	$125,400	$254,600	$129,200	103%
Northumberland County	$129,100	$246,000	$116,900	91%
Westmoreland County	$95,300	$190,000	$94,700	99%

Sources: American Community Survey 2007-2011; US Census 2000

Median housing values have more than doubled in most cases, which translate to higher rents and mortgages and increased monthly living expenses for area residents. These sudden increases can strain affordability of the housing market close to NAS PAX and lead to increased commuting distances by military personnel who are priced out of the local housing market. Growth of the housing market can also be determined by the number of building permits filed with counties in the study area. Records since the year 2000 indicate growth during the housing supply in the early 2000's followed by a sharp decline in new housing construction consistent with the national economic downturn.

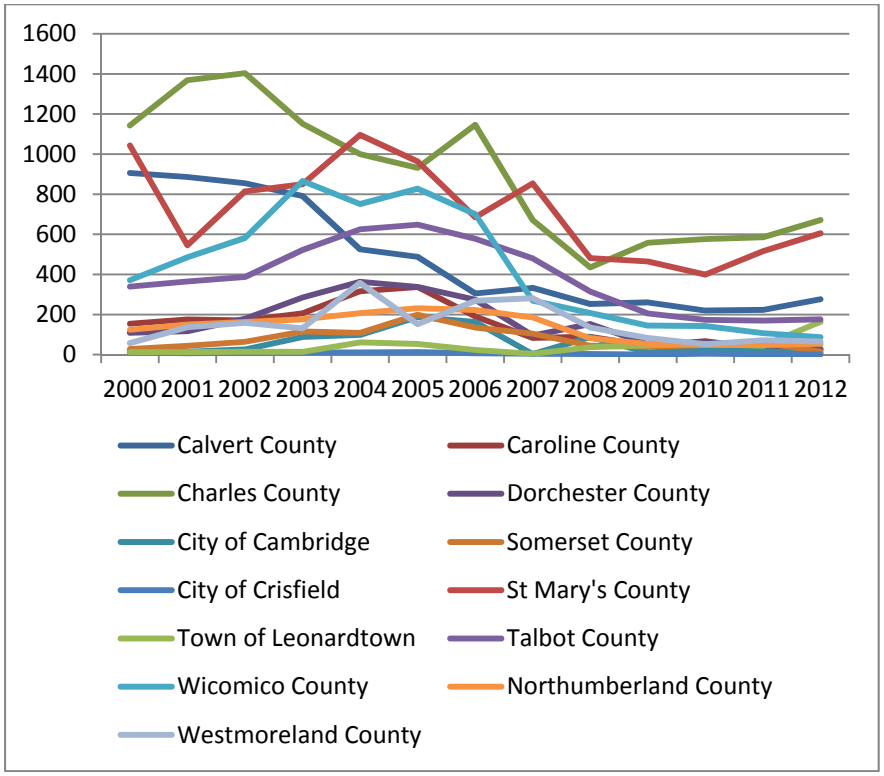
Figure 2-1 shows the supply of newly constructed single family housing units between 2000 and 2012 in the JLUS study area. This growth illustrates the conversion of agricultural land for residential uses. Many counties within the study area utilize growth boundaries to manage development in urban districts around existing community centers and transportation corridors. These growth limiting policies may increase land costs and reduce affordability throughout the study area.

Housing starts indicate the availability of multi-family housing (two or more units, such as apartments and condominiums). Figure 2-2 shows a similar downturn in new construction since the start of the national recession beginning in 2007.

These trend lines indicate building permits for new construction of single-family residential were consistent with the national economy and recent recession beginning in 2007. In the last few years, the area has experienced a small, but steady, increase in the number of new permits for single family construction. There has also been a limited resurgence in multi-family dwellings construction, particularly in St. Mary's and Wicomico counties.

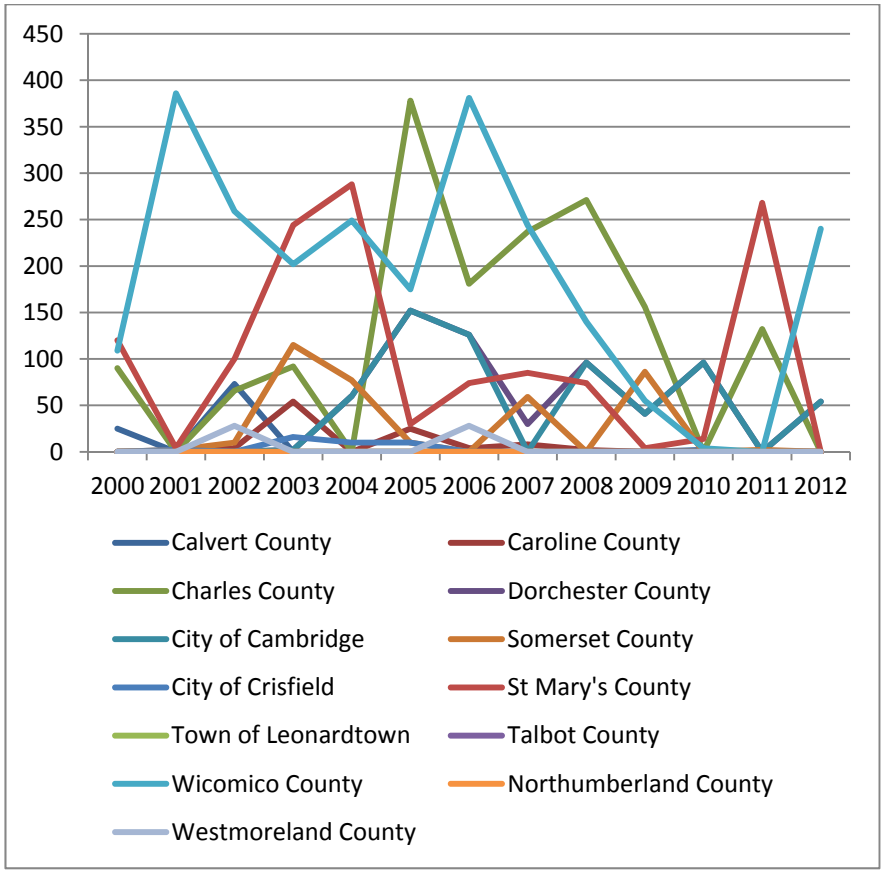
The availability of affordable housing is an important factor for considering military compatibility since some personnel stationed at NAS PAX may need to live off-station. It is important for the communities within the JLUS study area to provide housing stock that meets the needs of civilian residents and military personnel stationed at NAS PAX.

Figure 2-1. Single-Family Building Permits in the NAS PAX Study Area, 2000 – 2012



Source: US Census, 2000 – 2012

Figure 2-2. Multi-Family Building Permits in the NAS PAX JLUS Study Area, 2000 – 2012



Source: US Census, 2000 – 2012

Regional Development Overview

Land uses throughout the JLUS study area are defined by open space and agriculture with concentrated residential and urban population centers along major transportation corridors. The cities of Cambridge, Crisfield, and Salisbury, all located on Maryland's Eastern Shore and Leonardtown, located just west of NAS PAX are among the largest in the study area.

The area surrounding NAS PAX is a mix of agriculture, rural residential, and recreation use / open space uses. Urban development is in the major metropolitan areas of Washington, DC northwest of NAS PAX and Annapolis, MD north of NAS PAX. While these metropolitan areas may not be directly impacted by operations at NAS PAX, continued outward expansion of these urban areas into the counties surrounding the station may create future compatibility concerns.

NAS PAX is bounded to the north by the Patuxent River. Land north of the river in Calvert County is primarily rural with agricultural and residential uses. The eastern boundary of NAS PAX is the Chesapeake Bay. Land across the bay from NAS PAX is characterized by the coastal marshes and lowlands sparsely inhabited and encompassed in the Blackwater National Wildlife Refuge, Fishing Bay Wildlife Management Area, and Deal Island State Wildlife Management Area. The area south of NAS PAX includes the rural countryside of St. Mary's County which continues to the Potomac River. The area is largely rural, with open space, agriculture, and limited residential uses. The western border of NAS PAX is the most developed including the communities of Lexington Park, Great Mills, California, Hollywood, and Leonardtown. These areas include multiple defense-related industries and are local population and economic centers for personnel associated with NAS PAX. These areas along the numerous state routes crossing the area are likely to experience the most development as the local population continues to grow.

Transportation

Roadways

The JLUS study area is located east of Interstate 95 (I-95), the major north-south arterial along the eastern seaboard. The Chesapeake Bay poses a geographic barrier bisecting the study area. Maryland Route 301 (MD 301) passes north-south through Charles County and crosses the Chesapeake Bay north of Annapolis, Maryland, connecting the communities in the eastern sub-areas to the western sub-areas. Several State Routes serve the study area, including Maryland Highway 235 (MD 235) which passes through Charles and St. Mary's counties and connects NAS PAX to Maryland Routes 5 and 301 and I-95 to the west. Maryland's Eastern Shore is served by US Routes 13 and 50 which run north-south through Maryland and Virginia.

NAS PAX Main Station is accessible by MD 235, also known as Three Notch Road, beginning as Branch Avenue in Washington, DC, turning into State Highway 5 (MD 5) at the Maryland border, and then to MD 235 outside of Mechanicsville, MD. These highways are the primary roadways within St. Mary's County and are primary thoroughfares for commuters arriving to and departing from NAS PAX. Maryland Highway 4 (MD 4), also known as Patuxent Beach Road/St. Andrews Church Road, runs from Leonardtown and California across the Patuxent River into neighboring Calvert County. This roadway is another heavily traveled thoroughfare in the county. MD 235 is the main collector of secondary roads in the area bringing the majority of traffic to the station. The station's controlled access points are located off MD 235. Other primary roads that feed into MD 235 and are part of the network bringing commuters to and from NAS PAX Main Station include MD 237, Chancellors Run Road; MD 245, Hollywood Road; and MD 246, Great Mills Road. Secondary roads include Pegg Road, Willows Road, and Hermanville Road. Webster Field is accessible from MD 5, Villa Road, or Beachville Road.

Airports

There are several public and private airports located within the study area, some of which are used by NAS PAX for military training operations. Of the 29 local civilian airports located within the vicinity of the Atlantic Test Range (ATR) Inner Range, the majority are privately-owned and operated. Several of the public airports within the ATR Inner Range are also included in the JLUS study area.

Source: Range Air Installations Compatible Use Zones (RAICUZ) Study for the Inner Range of the Atlantic Test Range, 2009

Ronald Reagan Washington National Airport

The Ronald Reagan Washington National Airport is located in Arlington, VA, approximately 50 miles northwest of NAS PAX. This public airport is a major air transportation hub for the Washington, D.C. metropolitan area. The airport had over 300,000 total operations from February 2013 to February 2014 characterized as a take-off and landing. NAS PAX does not access Ronald Reagan National Airport; however, there are some military operations there and air traffic control is coordinated.

Source: AirportIQ5010.com Ronald Reagan Washington National Airport Page, 2013

St. Mary's County Regional Airport

Established in 1969, the St. Mary's County Regional Airport is a county-owned and operated public general aviation facility located four miles northeast of Leonardtown in St. Mary's County. The airport consists of one asphalt runway 4,175 feet in length. Operations at the airport average 111 flights per day or approximately 40,500 for the 12 month period ending March 24, 2014. The majority of these flights (58 percent) were local general aviation with less than 1 percent consisting of military operations. Eighty-seven percent of aircraft based at the airport are single engine light aircraft.

Source: http://www.airnav.com/airport/2W6; http://www.stmarysmd.com/dpw/Airportinfo.asp

Salisbury-Ocean City Wicomico Regional Airport

Salisbury-Ocean City Wicomico Regional Airport is a regional, publically owned airport located two miles southeast of Salisbury, in Wicomico County, approximately 50 miles east of NAS PAX. The airport is owned and managed by the Metropolitan Washington Airports Authority. The airport has two runways which are 5,000 feet long and support mostly private aircraft operations. Current data for CY 2013 shows a total of approximately 45,000 annual flight operations at the airport, of which approximately 14,750 were military. NAS PAX has a Memorandum of Understanding (MOU) with Salisbury Airport for interfaciltiy coordination and control procedures and utilizes this airport for ILS Instrument approaches, low approaches, touch-and-go's pattern work, and navigation system testing. The majority of Navy activity involves C-12 and helicopter operations. Other military aircraft that utilize the airport include T-34, T-6, MU-18, U-6, and V-22 aircraft.

Source: AirportIQ5010.com Salisbury-Ocean City Wicomico Page, 2013

Cambridge-Dorchester Airport

Cambridge-Dorchester Airport is a county-owned, public-use airport located southeast of Cambridge in Dorchester County, MD. The airport has been in operation since 1936 and has approximately 63 flight operations daily. NAS PAX utilizes Cambridge-Dorchester Airport as a divert field on rare occasions and V-22 operations in R4006.

Source: Airnav.com Cambridge-Dorchester Page, 2014

Crisfield Municipal Airport

Crisfield Municipal Airport is a public airport owned and operated by the City of Crisfield located northeast of the city, in Somerset County, MD. Operations at the airport average 38 flights per week or approximately 1,960 for the 12 month period ending on June 10, 2014. NAS PAX occasionally access Crisfield Airport as a divert field for V-22 operations and for T-34 touch and go operations.

Source: Airnav.com Crisfield Page, 2014; AirportIQ5010.com 2014

Easton Airport

Located in Talbot County, MD, the Easton Airport is located north of the Town of Easton. The airport accommodates an estimated 140 daily operations, 4 percent of which is military operations. The majorities of Navy activity involves C-12 and helicopter operations, but also includes touch and go operations, and instrument and low approaches for T-34, U-1, and U-6 aircraft. Easton is a general aviation municipal airport with 2 runways.

Source: Airnav.com Easton Page, 2014; eastonairport.com, 2013

Maryland Airport

Maryland Airport is a general aviation airport located east of Indian Head in Charles County with one active runway. A second runway is under construction to accommodate larger aircraft such as corporate jets and air cargo. The current runway has approximately 17,000 total operations annually, which amounts to roughly 47 flight operations per day, and while 6 percent of them are attributable to military operations, none of which are associated with NAS PAX. Most flights at this airport are for private, non-commercial aircraft.

Source: Airnav.com Maryland Airport page 2014;

Ocean City Municipal Airport

Ocean City Airport is located southwest of Ocean City, in Worcester County, MD. The public use, general aviation airport is owned and operated by the Town of Ocean City, MD. For the 12-month period ending on May 24, 2014, the airport has approximately 103 flight operations per day, and is home to a flight training school. A skydiving business also operates from the airport and sight-seeing flights are conducted by three separate businesses. NAS PAX utilizes the Ocean City Airport an average of three times per week for T-34, C-12, V-22 and H-60 training flights, low approaches, and touch-and-go's.

Source: oceancitymd.gov, 2013; airnav.com Ocean City page, 2014

Ridgely Airpark

Ridgely Airpark is a private airport open to public use in Caroline County, MD. Its single runway is primarily used for agriculture, air taxi, local general aviation, gliders, private instruction, and recreation.
NAS PAX T-34s occasionally (once per week) use Ridgely Airpark for touch-and-go's. Total annual operations for the year ending in July 2014 is approximately 11,900 or about 33 operations daily.

Source: AirportIQ5010.com; Airnav.com Ridgely page 2014

Inside Chapter 3 . . .

NAS Patuxent River Profile 3-1
Economic Impact 3-1
Base History 3-4
Installation Setting 3-5
Military Mission 3-8
Military Footprint 3-14

NAS Patuxent River Profile

This chapter provides an overview of the Naval Air Station Patuxent River Complex (NAS PAX) including the operational areas and current operations at NAS PAX within the Joint Land Use Study (JLUS) study area. The mission operations performed within NAS PAX's Main Station, Webster Outlying Field (WOLF) and operational areas extending beyond the property boundaries across the Chesapeake Bay [within the Atlantic Test Range's (ATR) Inner Test Range] are described to provide valuable insight into the importance of NAS PAX as a national strategic asset and its relationship with communities in the region. The purpose of providing this information is to enable stakeholders to make informed decisions about the future development and economic growth of communities proximate to NAS PAX that could potentially impact the viability and future role of the installation.

Economic Impact

Although NAS PAX is located in St. Mary's County, Maryland, the impact of the installation, resulting from both mission activities and economic value, extends throughout the United States (US). A 2010 study conducted by the Maryland Department of Business and Economic Development cites an economic impact of over $8 billion on the state's economy from NAS PAX, representing eight percent of the economic impact of all military facilities in Maryland for the year 2008 (Mission Maryland: Measuring Economic Impact of Maryland's Military Installations). The most direct regional impact extends to communities in Southern Maryland, Maryland's Eastern Shore, and Virginia's Northern Neck. The benefits and impacts of NAS PAX operations extend beyond the installation borders and across the Chesapeake Bay as a

result of its ATR Inner Test Range, supersonic operating areas, Unmanned Aerial System (UAS) routes, helicopter operating areas, and Military Training Routes (MTR) that comprise the overall military influence areas (MIA)'s associated with NAS PAX operations.

The Department of Defense (DOD) plays a significant role in the regional and local economy. Although the focus of this JLUS is NAS PAX, it is worth noting that NAS PAX is one of several Navy installations that comprise the Naval District Washington (NDW) region depicted on Figure 3-1.

The most recent data measuring the economic impact of NAS PAX illustrates the economic significance of the installation. NAS PAX's total workforce has grown steadily over the past two decades from less than 10,000 personnel in 1995 to 19,200 in 2012. An additional 4,500 dependents and 4,500 retired military also benefit from NAS PAX's facilities and services.

This economic activity contributes to the economy in four different ways:

1. Direct – the civilian and military employees working on the base;
2. Indirect – the contractors who work with the base, either inside the gate or outside;
3. Induced – the restaurants and other retail and service businesses who are patronized by the employees spending their salaries; and
4. Total – direct, indirect, and induced added together.

As presented in Tables 3-1 and 3-2 NAS PAX generated a total of $8.6 billion in economic activity in Maryland and created or supported 41,185 jobs providing an estimated $2.4 billion in employee compensation in the year 2008.

Locally, NAS PAX is considered to be a major contributor to recent population and economic growth in St. Mary's and Calvert counties. The majority of NAS PAX employees (71 percent) reside in St. Mary's County. NAS PAX personnel also commute to the installation from Calvert County (13 percent), Charles County (five percent), other counties within Maryland (three percent), and other states (eight percent). The most recent economic profile of NAS PAX direct and indirect economic contributions includes data on the most proximate counties to the installation: St. Mary's, Charles, and Calvert counties. An economic model estimated the economic activity associated with both NAS PAX and Naval Support Facility (NSF) Indian Head, located nearby in Charles County. Economic activity is measured by output (value of goods and services produced in an area); employment; compensation; and local taxes paid by the employees.

Table 3-1. NAS PAX Spending Impact

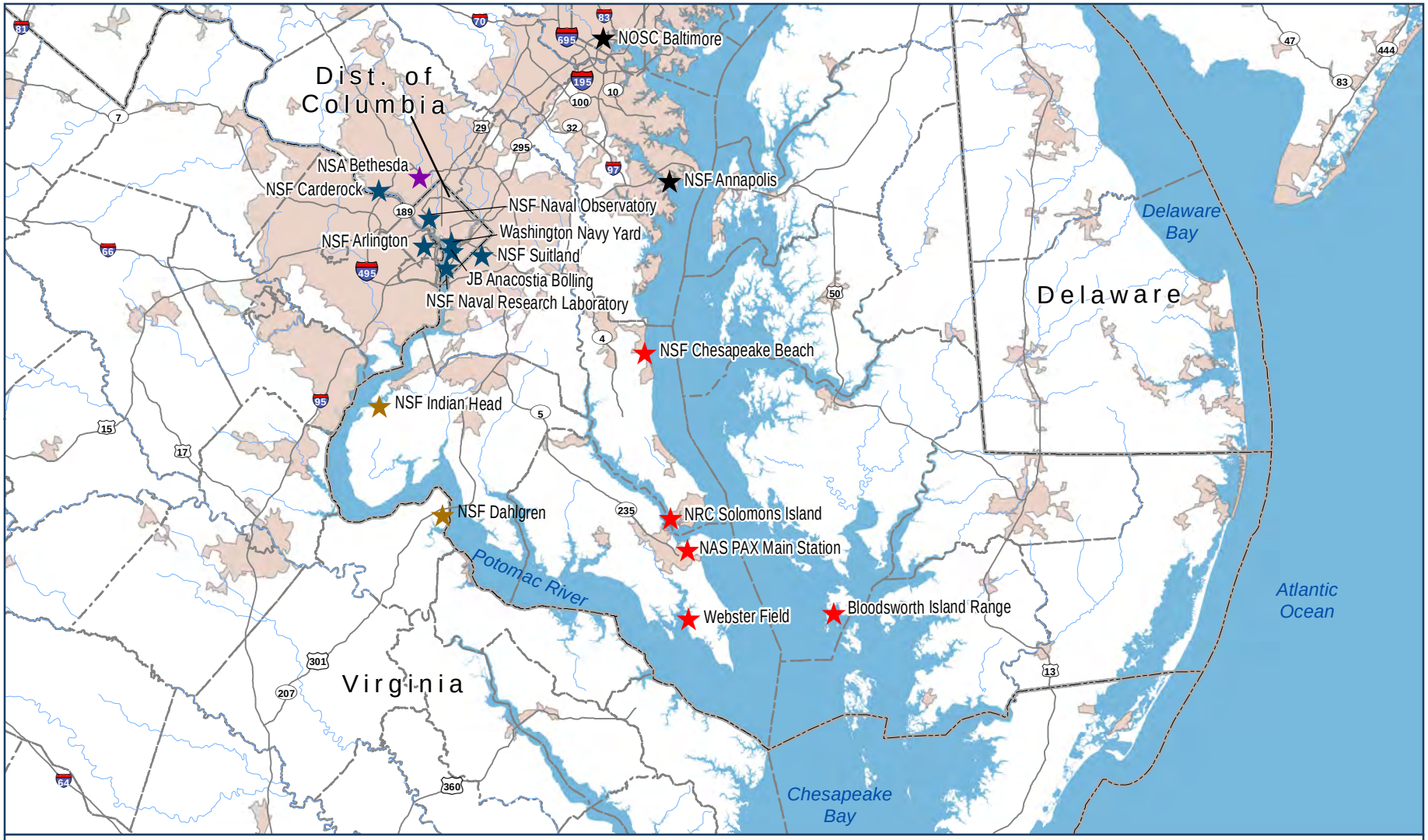
Facility Spending	Total	In-State
Payroll (Mil. $)	$883.4	$830.4
Employment (# of Jobs)	10,965	10,307
Purchases (Mil. $)	$1,731.8	$1,731.8
Visitor Spending (Mil. $)	Not Applicable	$29.4

Source: State of Maryland Department of Business and Economic Development and the Department of Labor, Licensing and Regulations 2008

Table 3-2. NAS PAX Economic Impact

Economic Impacts	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output (Mil. $)	$2,591.5	$2,443.5	$1,542.5	$6,577.5
Employment (# of Jobs)	10,965	17,829	12,392	41,185
Employee Compensation (Mil. $)	$883.4	$1,078.2	$465.5	$2,427.1

Source: State of Maryland Department of Business and Economic Development and the Department of Labor, Licensing and Regulations 2008



Legend

Naval District

- NSA PAX Complex
- NSA Washington
- NSA Annapolis
- NSA South Potomac
- NSA Bethesda
- City/Community
- County Boundary
- State/District Boundary
- Water Body
- Highway
- River

0 10 20 Miles

Matrix DESIGN GROUP

Sources: ESRI, 2010; USGS, 2010

NAS_PAX_Fig3-1_NavalDist_20141211_CJM.pdf

Figure 3-1
Naval District Washington Military Installations

The station impact on the individual counties varies widely. Economic growth has resulted from the relocation and consolidation of major research and development missions from Warminster, Pennsylvania, and Trenton, New Jersey with Naval Air Warfare Center Aircraft Division's (NAWCAD) existing Test and Evaluation (T&E) facilities at NAS PAX. The Naval Air Systems Command (NAVAIR) headquarters, which includes naval aircraft and weapons systems acquisition and program management functions, relocated from Arlington, Virginia, to NAS PAX. Table 3-3 shows the workforce distribution at NAS PAX between the period 1995 and 2012 indicating installation employment and growth as a result of mission acquisitions.

Table 3-3. NAS PAX Workforce Distribution

1995			2000			2012		
Military	Civilian	Contractor	Military	Civilian	Contractor	Military	Civilian	Contractor
2,588	4,199	3,141	2,810	7,237	3,613	2,160	9,382	7,455
Total Workforce		**9,928**	**Total Workforce**		**13,660**	**Total Workforce**		**18,997**

Source: Economic Briefing 2013 (with 2008 data); NAS PAX River AICUZ 2009

St. Mary's County is the largest recipient of federal spending in the region. NAS PAX is the largest employer and primary driver of the economy in St. Mary's County. This economic growth can be attributed to the increase in technical jobs and substantial growth in high-tech defense contractor positions specializing in aviation and avionics research, development, and testing.

Calvert County mostly realizes induced impacts from NAS PAX, e.g. retail and service stores where employees spend their salaries. Approximately 500 jobs were created via induced impacts; however, approximately 1,150 Calvert County residents work as civilian or military employees at NAS PAX earning an average of $68,600,000 in salaries. Calvert County residents employed as contractors at NAS PAX total slightly less than 1,000 with an additional 2,200 employed as civilians.

NAS PAX combined with neighboring NSF Indian Head support approximately 4,500 jobs in Charles County, which represents nearly 10 percent of all jobs in the county. Salaries represent nearly 18 percent of total countywide salaries, while local taxes paid totaled $46,582,000, which is over five percent of all local taxes received by the county. Charles County businesses also provided $1.5 million in goods and services to NAS PAX.

Base History

Naval Air Station Patuxent River

NAS PAX was initially established to centralize widely dispersed air testing facilities established during the pre-World War II years. In 1937, the Navy's Bureau of Aeronautics sought to consolidate aviation test programs, previously being conducted at several stations, including nearby Dahlgren and Norfolk, VA; the Washington Navy Yard and NAS Anacostia in Washington, D.C.; and the Naval Aircraft Factory in Philadelphia, PA. The site of Pearson, MD was selected for the Naval Air Station due to its remote location on the coastline, with ample space for weapons testing. The onset of American involvement in World War II spurred development of the new air station, which was granted official approval for construction in 1942. The station was formally commissioned "U.S. Naval Air Station, Patuxent River, Maryland" on April 1, 1943.

During WWII, hundreds of combat experienced pilots arrived at NAS PAX to test airplanes. Formalized classroom instruction began in 1948 with the establishment of a Test Pilot Training Division that provided training of pilots and the ability to examine enemy aircraft. The development of radar tracking techniques and technology was also developed at NAS PAX. Radar fire control, radar tracking, airfield lighting, and instrument landing techniques were developed and refined at NAS PAX.

Since the end of the Cold War era, research and testing facilities for both rotary (helicopter) and fixed-wing (conventional) aircraft have been consolidated, integrated, and relocated to NAS PAX from decommissioned bases as a result of the Navy's Base Realignment and Closure (BRAC) measures. In 1991, the Navy began consolidating its technical capabilities to improve its products and services, resulting in the creation of four large warfare centers. One of these, the Naval Air Warfare Center (NAWC), located in Washington, D.C., has integrated sites and capabilities to improve services to the fleet and sponsors. The NAWC streamlined its resources into two divisions: the Aircraft Division located at NAS PAX and the Weapons Division at China Lake, CA. The standup of

the NAWCAD at NAS PAX took place January 1, 1992; thus beginning its role as the Navy's full spectrum research, development, test and evaluation, and engineering (RDAT&E) and fleet support center for air platforms.

NAS PAX has evolved into the center of excellence for naval aviation. With the consolidation, integration, and collocation that have occurred, NAS PAX now hosts NAVAIR and NAWCAD as major tenants, which provide the full spectrum of acquisition management, research and development capabilities, air and ground test and evaluation, aircraft logistics, and maintenance management. This distinctive synergy supports land-based and maritime aircraft engineering, T&E, integration, and life cycle support for ship/shore electronics.

Webster Field

Along with the purchase of the Main Station, the US government acquired 852.3 acres of land for the creation of an Outlying Landing Field (OLF) for NAS PAX in 1943. The OLF was originally named the Naval Air Station, Beachville, Maryland, and its mission was to serve as a dispersal field in the event of possible air invasion, as an area for routine runway check flights, and as a temporary emergency landing field. However, due to heavy air traffic at NAS PAX during World War II, the Beachville Air Station was used for dive bombing, rocket bombing, aerial gunnery target practice, and glider control experiments. The OLF was later renamed Webster Field in honor of Captain Noah Webster, a pioneer in naval aeronautical engineering. At the conclusion of World War II, air activity slackened until 1947, when the field was reactivated for use by the Naval Air Reserve Training Unit out of NAS Anacostia to address dangerous conditions due to the high number of air operations at NAS PAX's Main Station.

In 1967, Webster Field was formally commissioned as the Naval Electronic Systems Test and Evaluation Facility, and the land transferred from NAS PAX to the Naval Electronic Systems Command with the understanding that Naval Air Test Center (NATC)/NAS would still have use of the airspace at Webster Field for training fleet squadrons, the Test Pilot School (TPS), NATC test requirements, small propeller and vertical and short takeoff-and-landing (VSTOL) aircraft, and for any special test projects within the capabilities of the airfield. The transfer also included a caveat that no future construction will degrade or interfere with the capabilities to operate aircraft from existing runways.

Bloodsworth Island Range

The Bloodsworth Island Range (BIR) was used by the Navy as a shore bombardment and bombing range from 1942 until 1995. During this time, air-to-ground training and testing in weapons delivery (bombing and strafing), Naval Gunfire Support training, and Special Warfare training were conducted. Training activities consisted of firing or dropping live munitions containing explosives and practice/training munitions containing spotting/marking charges, propellants or other energetics. Testing activities included the use of inert munitions that contained pyrotechnics and/or propellants, but no explosives.

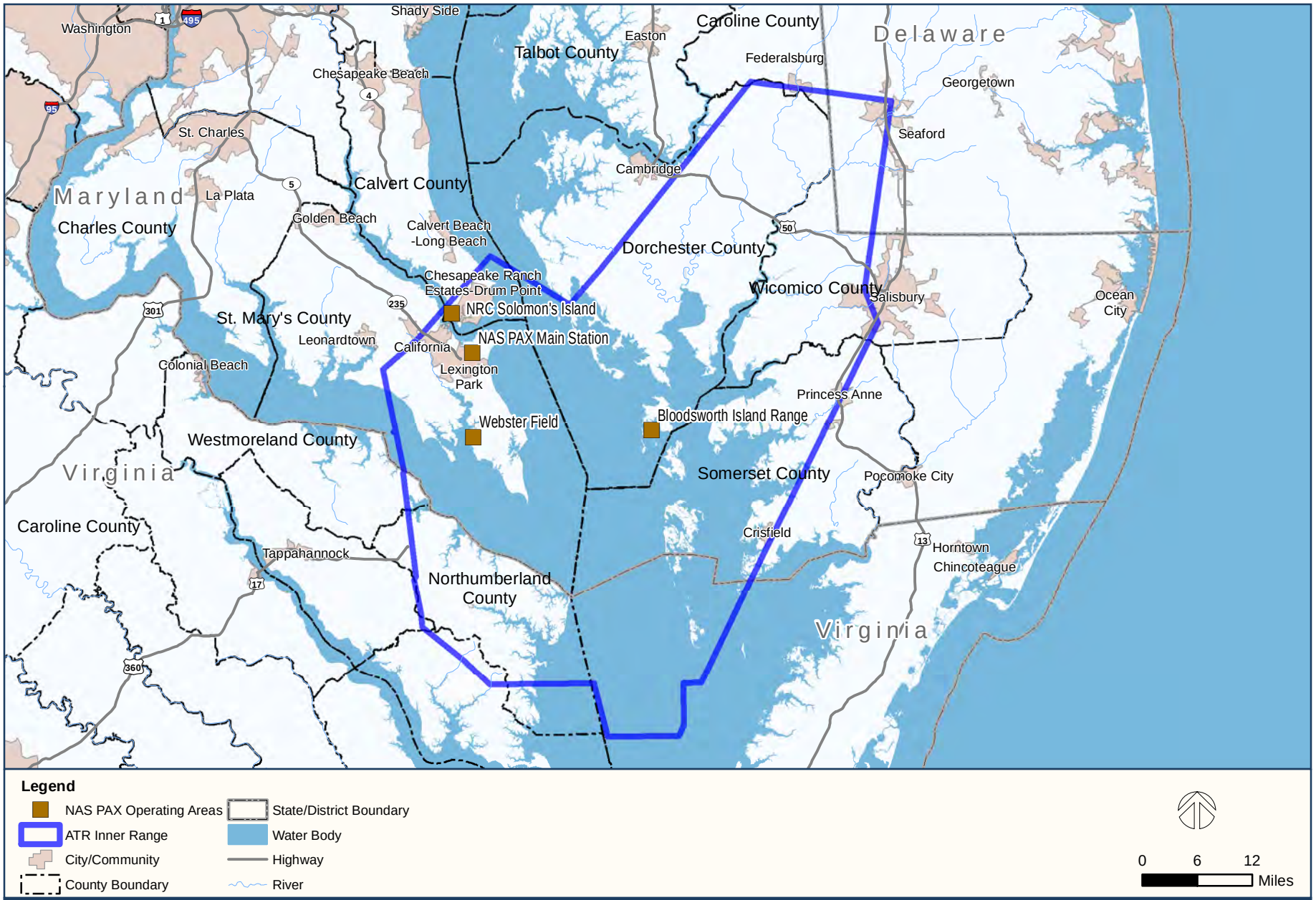
Ordnance has been fired or dropped upon only Bloodsworth and Pone Islands. The last range impact operations to occur on Bloodsworth and Pone islands were in 1995. Land ownership and management of the BIR was then transferred to NAS PAX from Naval Amphibious Base Little Creek, Norfolk, Virginia, in March of 2001. Since 1942, the Atlantic Test Range's Range Operations Division has controlled the airspace over BIR and, as of 2001, manages the range. The BIR is currently an important Navy asset in support of NAVAIR RDAT&E and TPS non-impact operations. Access to the island is restricted due to the presence of unexploded ordnance.

Installation Setting

The overall Patuxent River Complex and operating areas are illustrated on Figure 3-2 including the NAS PAX Main Station, Webster Field, Naval Recreation Center Solomon's, and the ATR Inner Test Range which includes the BIR.

NAS PAX Main Station

NAS PAX Main Station is located adjacent to the Lexington Park area of , St. Mary's County, Maryland and stretches across 25 miles of shoreline at the mouth of the Patuxent River, overlooking the Chesapeake Bay, 65 miles southeast of Washington, D.C., and 90 miles south of Baltimore, MD. NAS PAX Main Station occupies approximately 6,500 acres. The NAS PAX airfield contains three runways and various support facilities such as a multitude of hangars to accommodate the wide variety of aircraft. The landing area consists of two primary runways and one utility runway.



Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-2
NAS PAX Complex Operating Areas

NAS_PAX_Fig3-2_Operating_Areas_20141211_CJM.pdf

- Runway 06/24 is oriented in southeast to northeast alignment and measures 200 feet wide and 11,809 feet in length. Runway 06/24 is a Class B runway.
- Runway 14/32 is oriented in northwest to southeast alignment and measures 200 feet wide and 9,742 feet in length. Runway 14/32 is a Class B runway.
- Runway 02/20 is aligned generally north to south and measures 75 feet wide and 5,007 feet in length. The Clear Zone (CZ) for Runway 20 measures 1000 feet by 3000 feet. Runway 02/20 is a Class A runway.

Runways 32 and 24 have simulated deck markings and that are frequently utilized for field carrier land practice. Seven helicopter landing pads are also located at the airfield. Airfield lighting includes runway, approach, carrier deck, taxiway, rotating beacon, and obstruction lighting.

The NAS PAX Master Plan outlines the land uses for all types of operations on the base. Existing conditions ensure that each base activity occurs on compatible land and with supportive facilities. Of the nine existing conditions, the four largest areas combine to make up over 91 percent of the base's total area. Predominant land uses at NAS PAX include airfield operations, RDAT&E, sailor and family support, and open space.

Airfield operations take up the majority of the center of the installation, with runway 6-24 stretching to the northern shore. Land allocated for sailor and family support is generally located in the western portion of the installation and technology / operations are located on the east side of the installation. Most of the open space at NAS PAX is located in the southern or northern areas of the installation bordered by the airfield.

The hierarchy of land uses at NAS PAX allows the base to prioritize areas based on use. Air operations and RDAT&E land uses are the highest priority due to their influence on the overall core mission of NAS PAX.

Webster Field

Webster Field occupies approximately 900 acres of land 10 miles to the south of the Main Station in the community of St. Inigoes Shores. Webster Field is characterized by a mix of forest, open field, wetlands, open waters, agriculture areas, and wildlife areas. Activities include helicopter, glider, UAS, and limited fixed-wing operations.

Webster Field is equipped with two primary runways primarily to accommodate testing of UAS and a helicopter landing pad used by US Coast Guard Station St. Inigoes. Both Runways 08/26 and 15/33 are 5,000 feet long by 150 feet wide. Recently, parcels located east of Runway 26 have been acquired by NAS PAX which gives the Navy land use control within this area to help prevent encroachment and other potentially incompatible land uses proximate to Webster Field. A grass Helicopter Operating Area 1,600 feet in length and 75 feet wide is located adjacent to 15/33. All taxiways are composed of asphalt and are 75 feet wide except the ramp taxiway that is 150 feet wide. A grass helicopter area 1000 feet wide and 1000 feet long is located north of the control tower at the intersection of the 15/31 parallel taxiways and the ramp access taxiway.

There is one hangar facility at Webster Field. There are no lighting, flight planning, maintenance, or service facilities at Webster Field and ramp space is extremely limited. Land use around Webster Field is rural and characterized by a mix of agricultural, low- and medium-density residential and forested lands.

Atlantic Test Range

The Atlantic Test Range (ATR) consists of two main operating areas – the Offshore Warning Area and the ATR Inner Test Range. Not included as part of this JLUS, the offshore range areas are collectively referred to as the Atlantic Warning Areas. The ATR is located east of the Delmarva Peninsula over the Atlantic Ocean and consists of three Warning Areas (W-386, W-378, and W-72) covering 30,000 square miles that provide use of airspace from surface to an unlimited altitude. Fleet Area Control & Surveillance Facility, Virginia Capes (FACSFAC VACAPES) maintains primary control over the Atlantic Warning Areas and the NAVAIR Range Department at NAS PAX maintains a partnership with FACSFAC VACAPES for use of the offshore areas. The WFF launch site provides supersonic target services for fleet training and T&E of weapons systems.

Atlantic Test Range - Inner Test Range

The ATR Inner Test Range is an instrumented Navy range operating area. The ATR Inner Test Range is located to the west of Delmarva and overlies an area of approximately 2,360 square miles of land, airspace, and surface water in the middle portion of the Chesapeake Bay. Approximately 1,200 square miles (50 percent of the range) overlies land, a fraction of which is military controlled. The privately controlled land includes the populated areas within all or portions of 11 counties in Southern Maryland, Maryland's Eastern Shore, Delaware, and the Northern Neck of Virginia. The remainder of the range overlies the surface waters of the Chesapeake Bay, including the main shipping channel from the Atlantic Ocean and Hampton Roads to the Port of Baltimore.

The NAVAIR Range Department is a tenant of NAS PAX that schedules and provides all the operational support for the range. This support includes RDAT&E of aircraft, and training for aircrew and integrated avionics and mission systems.

Bloodsworth Island Range

The Bloodsworth Island Range (BIR) is situated in the middle of the Chesapeake Bay approximately 20 miles southeast of NAS PAX Main Station; 24 miles south of Cambridge, MD; 27 miles southwest of Salisbury, MD; and approximately 75 miles southeast of Washington, D.C. Bloodsworth Island is the northernmost of a chain of marsh islands terminating with Tangier Island. The BIR consists of four main islands: Bloodsworth, Pone, Adam, and Northeast, totaling approximately 6,013 acres. The largest island is Bloodsworth occupying 5,361 acres of land. The BIR also includes the surrounding restricted waters of its surface danger zone where access is prohibited. This area extends across a 0.5 nautical mile (nm) radius circle on the west side of Bloodsworth and Pone islands.

Military Mission

The overall NAS PAX mission is to develop, deliver and sustain Navy and Marine Corps aircraft weapons and systems and serve as the Navy's principal research and development, test, evaluation, engineering and fleet support activity for naval aircraft and their support systems.
NAS PAX serves as the Navy's Center for Aviation Excellence providing services in support of NAVAIR, NAWCAD, and other activities and units as designated by appropriate authority.

The mission of Webster Field is to provide auxiliary airfield support of NAS PAX and NAWCAD missions and systems and material support to NAVAIR. Functions and tasks important to the mission include the testing and evaluation of electronic systems, providing in-service engineering support, developing prototype equipment modifications, and integrating electronic support systems for new ships. Additionally, both the US Coast Guard and Maryland Army National Guard have facilities at Webster Field.

The mission of the NAVAIR Range Department is to support Navy aircraft related RDAT&E and training activities conducted by the tenant commands at NAS PAX, principally NAWCAD. Operations include a full spectrum of acquisition management, research and development capabilities, air and ground test and evaluation, aircraft logistics and maintenance management that supports land based and maritime aircraft and engineering, testing and evaluation, integration, and life cycle support for ship/shore electronics. The air combat systems development functions conducted at NAS PAX require sea level altitude, a varied climate and a location near the sea to produce the test conditions essential for naval aircraft.

The overall complex comprises 935 separate buildings, including 13 hangars, with a total of over 8.76 million square feet of facilities; five runways; 780 square miles of restricted airspace; and 5,000 square miles of controlled airspace.

Radar Tracking and Dynamic Measurements of Flight Performance

NAS PAX is equipped with the Advanced Dynamic Aircraft Measurement System (ADAMS), the Navy's only outdoor radar measurement test range that performs radar measurements of targets in flight. These measurements are key to providing the DOD with decision quality information to ensure major weapon systems acquisition are meeting defined requirements and providing measurements to support system developments. This system provides a wide range of radar measurement capabilities that allows for real time data collection and response as the test is being conducted.

ADAMS is comprised of eight individual radars integrated into an overall radar measurement system that covers an extensive radio frequency spectrum. ADAMS operates at a high Pulse Repetition Frequency (PRF), which is the number of radar pulses per second transmitted. This high PRF (tens of thousands of pulses per second) is achieved due to ADAMS' reliance on separate tracking radar to provide range cueing information.

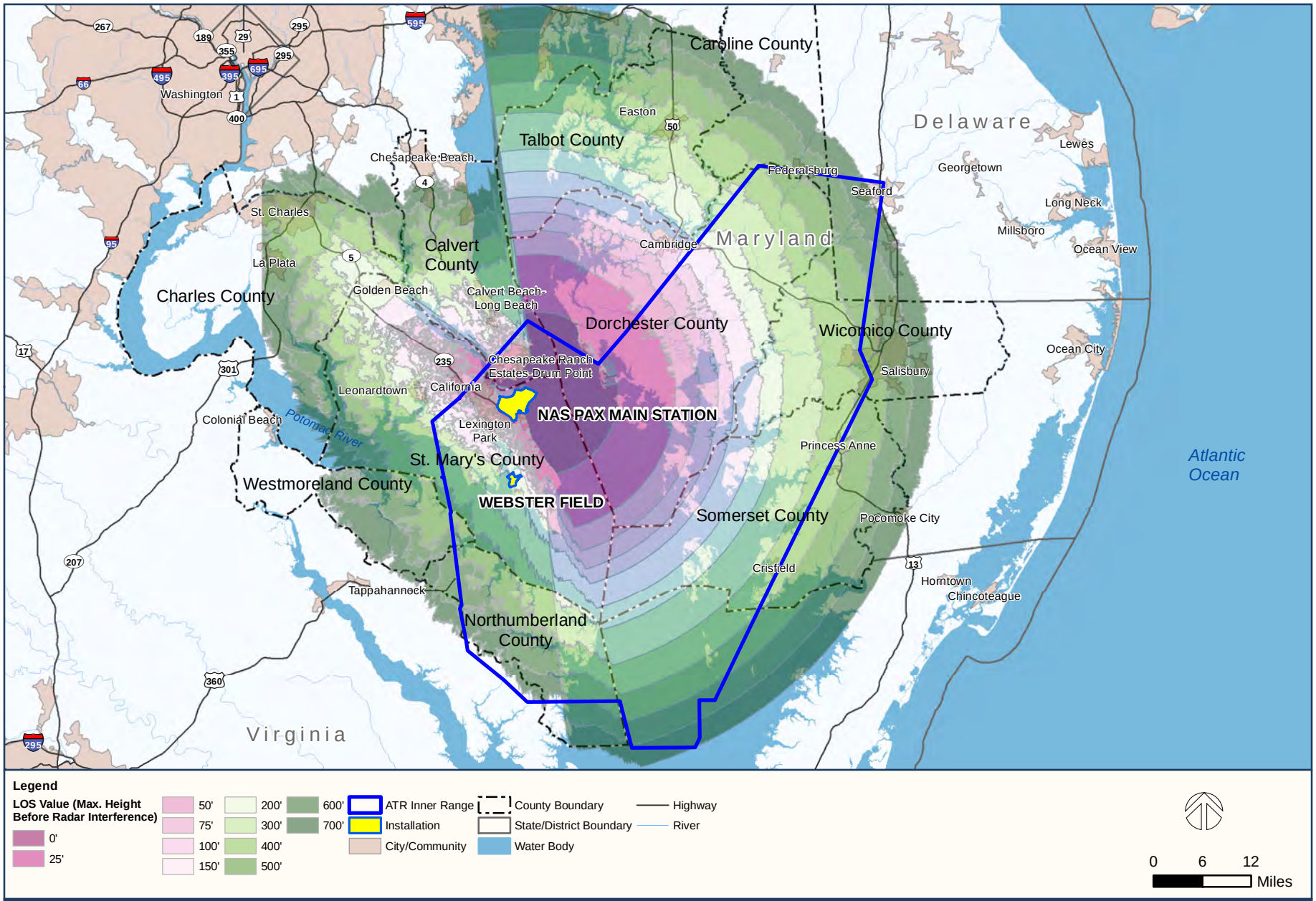
Real time data monitoring requires real time data processing of received radar pulses, requiring a clutter-free Doppler measurement environment. This open air laboratory is highly susceptible to clutter sources which exist in the Doppler spectrum such as vertical structures and rotating wind turbine blades. The line of sight points that must remain clear across the instrumentation viewshed vary by height with the areas closest to the center of the range requiring the greatest level of clearance. Height limitations required to maintain a clear viewshed vary from zero feet at the center of the viewshed to 700 feet at its outermost edges. The overall instrumentation viewshed is depicted on Figure 3-3.

ADAMS relies strictly on a subset of the 2,400 square miles within the Inner Test Range. This system relies on unobstructed ground and airspace within its viewshed in order for ADAMS to operate fully and accurately. Obstructions such as wind turbines with moving blades would render the system unable to complete its mission when located within the main beam of the radar. Obstructions located within the side lobes of the radar would significantly degrade ADAMS performance.

When conducting a flight event an aircraft navigates to a specified starting point that is chosen based on the type of data collection required for that particular test. The aircraft altitude relative to the flight profile measurement ADAMS radars must collect is displayed to an aircraft controller. The aircraft controller processes the information collected and relays real time flight corrections needed to the pilot in order to maintain the desired profile and obtain the desired data sets to the pilot. While this is occurring, the ADAMS high precision tracking radar are following the aircraft and continuously pointing directly at the aircraft to obtain results for comparison to the original flight plan. The real time review is critical to ensuring the radars are functioning as expected and that the target under test is also performing as expected. This real time processing must keep pace with the high pulses sent out by the ADAMS radar system thus requiring a clutter-free Doppler measurement environment.

Objects in motion will induce a Doppler (frequency) shift that allows radars employing MTI to separate moving targets from stationary clutter. While many tracking radar are simply concerned with the basic energy coming from the skin of the aircraft, sophisticated instrumentation radars, such as ADAMS, are also concerned with characterizing not only basic aircraft velocity but also the moving components on the aircraft itself, which induce additional Doppler effects and interfere with data collection and system efficacy.

Moving components being tracked may include characteristic and data associated with the spinning blades of a jet engine know as jet engine modulation (JEM), propeller modulation for prop driven aircraft, or rotor blade modulation in the case of helicopters.



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig3-3_RadarViewshed_20141211_CJM.pdf

Figure 3-3
ADAMS Radar Viewshed

Aircraft Types and Operations

Various types of military testing and training takes place at NAS PAX and include both fixed-wing and rotary-wing (helicopter) aircraft and associated operations. As a test and training facility, NAS PAX supports over 35 independent aircraft types and models ranging from modern fighter aircraft to World War II vintage aircraft, to UAS. As a RDAT&E facility, NAS PAX is constantly receiving new requirements for aircraft testing and integration. The current fixed-wing inventory at NAS PAX (including Webster Field) consists of 105 aircraft of 19 different types, the rotary-wing inventory consists of 42 aircraft of 8 different types, and the UASs inventory consists of 24 aircraft comprising five different types.

A flight operation is any takeoff or landing at an airfield. The takeoff and landing may be part of a training maneuver (or pattern) associated with the air station runway or may be associated with a departure or arrival of an aircraft to or from defense-related airspace.

Table 3-4 identifies the current aircraft inventory at NAS PAX.

Table 3-4. Current Aircraft Inventory at NAS PAX

Fixed-Wing Aircraft:

- C-12 Sea King Air
- T-2C Buckeye
- T-6 Texan II
- T-38 Talon
- T-45C Goshawk
- NU-1B Otter
- U-6A Beaver
- P-3C Orion
- (K)C-130R/J Hercules
- C-2A Greyhound
- E-2C/D Hawkeye
- F/A -18 Hornet / Super Hornet
- F-35 Lightning II
- P-8A
- EA-6B Prowler
- EA-18G Growler
- X-26 A High Performance Glider
- UC-12 M Huron
- E-6 B Mercury

Rotary-Wing Aircraft:

- OH-58C Kiowa
- MV-22B Osprey
- UH-1Y Iroquois (Super Huey)
- AH-1W/Z Cobra/Super Cobra
- H-60A/F/L/R/S / Blackhawk/Seahawk
- VH-3A Sea King
- TH-57C Sea Ranger
- UH-72 Lakota

Rotary-Wing Aircraft:

- MQ-8A/B Navy Fire Scout
- RQ-7B Shadow
- MQ-4C Triton
- X-47 Pegasus
- RQ-4 Global Hawk

Source: Naval District Washington, Naval Air Station Air Operations Department, Patuxent River, Maryland

Several basic flight operations are listed below:

Departure. An aircraft taking off to a local training area, a non-local training area, or as part of a training maneuver (i.e., touch-and-go).

Straight-In/Full-Stop Arrival. An aircraft lines up six to 10 nautical miles from the field on the runway centerline. The aircraft descends gradually, comes to a full stop, and then taxis off the runway.

Overhead Arrival. An expeditious arrival using visual flight rules. An aircraft approaches the runway 500 feet above the altitude of the landing pattern. Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the landing pattern. Once established in a pattern, the aircraft lowers landing gear and flaps and performs an 180-degree descending turn to land on the runway.

Ground Controlled Approach (GCA) Box. A radar or "talk down" approach directed from the ground by Air Traffic Control (ATC) personnel. ATC personnel provide aviators with verbal course and glide slope information, allowing them to make an instrument approach during inclement weather.

Touch-and-Go (T&G) Operation. An aircraft lands and takes off on a runway without coming to a full stop. After touching down, the pilot immediately goes to full power – the landing is counted as one operation and the takeoff is counted as another.

Field Carrier Landing Practice (FCLP). An aircraft practices simulated carrier landings. FCLPs are required training for all pilots before landing on a carrier. The number of FCLPs performed is determined by the length of time that has elapsed since the pilot's last landing on a carrier.

Low Approach. An instrument approach to a runway where the pilot does not make contact with the runway.

Electro-Optic Test (EOT) Target Pattern. The EOT target is used for testing electronic and electro-optic systems and devices on aircraft. The EOT is located at Webster Field only and is situated alongside Runway 08/26.

Range Operations

NAVAIR's Range Department controls and manages airspace, aircraft operations, and the target areas within the ATR Inner Test Range. The open-air range and ground test facilities provide RDAT&E application for fleet and war fighter pre-deployment and readiness exercises. Range instrumentation includes acquisition, surveillance and tracking radar, special purpose electronic combat emitters, videographic and photographic instrumentation, laser tracking systems, optical tracking systems, infrared signature measurements, and dynamic cross section measurements. The Range Department is also responsible for the provision and management of flight test control and range safety functions and provides frequency coordination services throughout the Mid-Atlantic region.

The ATR Inner Test Range supports a variety of aircraft, operations, and ordnance and operations that must be closely coordinated.

The following RDAT&E flight test activities are conducted within the ATR Inner Test Range:

- **Aircraft Flying Qualities and Performance.** Includes flight tests to evaluate and measure rate of climb/descent, acceleration, turn performance, range, and other similar aircraft maneuvers to demonstrate the ability of the test aircraft to meet mission and specification requirements.
- **Propulsion Systems.** Includes in-flight measurement of thrust, stall margin acceleration and deceleration performance, fuel consumption, air-start capability, and other specifics related to mission and specifications requirements.
- **Human Factors (Aircrew Systems).** Includes flight tests to evaluate aircrew survival systems, cockpit lighting, night vision systems, cockpit visibility, and other human-machine interface factors.
- **Missions Systems.** Includes flight tests to evaluate radar systems, directed energy systems (laser designators, microwave communications, and other low energy systems), navigation systems, mapping systems, and other electronic systems.
- **Electronic Warfare.** Includes flight test of systems designed to detect, classify, and provide counter-measures against various enemy threats such as missile, radar, and gun control systems
- **Flight Crew Proficiency.** Includes flight tests to maintain pilot and aircrew proficiency for navigation, target recognition, tracking, and other aviation related skills.
- **Weapons Compatibility/Separation.** Weapons separation testing is conducted in the ATR Inner Test Range and consists of operations to evaluate the store separation characteristics and to establish safe release envelopes for all expendable stores. These tests include the intentional release of stores such as missiles, bombs, fuel tanks, dispenser pods, flares, chaff, trailing antennas, and tow systems, or any other store that is capable of being released during normal operations or jettisoned for emergencies. Only inert stores are used for these tests.

- **Carrier/Shipboard Suitability.** The Navy conducts field and ship-based testing to determine the performance and compatibility of manned and unmanned conventional and V/STOL aircraft and aircraft systems. This is done in the ship board operating environment for all classes of aircraft carriers, amphibious ships, and from advanced airfields. Tests focus on the major aircraft design considerations that are driven by the requirement to operate on a ship and the unique adverse operating environment such as ship motion, air wake, confined operating area, corrosive hazards, acoustic and electromagnetic hazards, ground crew safety, and other challenges of naval aviation.

Tenant Commands: NAS PAX Main Station

Conducting over 150,000 air operations annually, NAS PAX hosts more than 50 tenants including three services, federal agencies, and private industry. Although NAVAIR and NAWCAD are the primary tenants at NAS PAX, the facilities are also used by foreign governments, academic institutions, and private industry for similar projects.

NAVAIR serves the Navy and the nation by developing, acquiring, and supporting aircraft and related systems that can be operated and sustained at sea. The NAVAIR mission is to provide full life-cycle support of naval aviation aircraft, weapons, and systems operated by the fleet. NAVAIR is a competency aligned organization and provides support to Naval Aviation Program Executive Officers and their assigned Program Management Air activities responsible for meeting the cost, schedule, and performance requirements of assigned programs. NAVAIR is also the principle provider for the Naval Aviation Enterprise.

The NAVAIR includes NAWCAD and NAWCWD. The NAWCAD is one of two product centers within NAVAIR. The NAWCAD provides a variety of services to the DOD, other federal agencies, and non-federal customers. The NAWCAD facilities at NAS PAX support RDAT&E and fleet support of Navy and Marine Corps air vehicle systems and trainers and serves as the steward of the ranges, test facilities, laboratories, and aircraft necessary to support NAS PAX's acquisition requirements.

Tenant Commands: Webster Field

In addition to components of NAVAIR and NAWCAD, Webster Field is home to the Small Unmanned Aircraft Systems program and Ship and Shore-Based Electronics Systems Competency (S&SBES). The S&SBES has four divisions (Air Traffic Control Systems Division, Identification Systems Division, Integrated Communications and Information Systems Division, and Special Communications Requirements Division) that provide fleet support for a variety of DOD critical systems.

Webster Field's UAS program supports the testing and evaluation of the Vertical Takeoff Unmanned Air Vehicle (VTUAV), Marine Corp Tactical Unmanned Aircraft System, Small Tactical Unmanned Aircraft System, and VTUAV Endurance Upgrade (MQ-8C) programs.

The **Fifth Coast Guard District** is located on the edge of Webster Field. Coast Guard Station St. Inigoes is one of five stations under the authority of Coast Guard Sector Baltimore, which is responsible for all operations in the Potomac River, middle and upper Chesapeake Bay and the Chesapeake and Delaware Canal. Dedicated in 1976 and designated a multi-mission facility, the current active duty and reserve enlisted members of the station carry out their duties, including search and rescue, enforcement of laws and treaties, marine environmental protection and recreational boating safety. In addition to its primary responsibilities, the station provides support to NAS PAX and its tenant test and evaluation facilities and presidential security operations, as well as liquid natural gas tanker protection.

The **Maryland Army National Guard,** Shadow Tactical Unmanned Aerial Vehicle platoon of Charlie Company, 629th Military Intelligence Battalion, maintains their training facility at Webster Field. Webster Field is the regional training site for Army National Guard for this program.

Military Footprint

Mission and testing activities conducted by NAS PAX generate a number of impacts that can affect the health, safety, and overall quality of life in the surrounding community. Examples of these mission impacts include noise and vibration from overhead flights or the risk of an aircraft accident. Conversely, the military mission is susceptible to hazards created by certain nearby civilian activities and land use development that may obstruct air space or locate noise sensitive uses in high noise zones. Understanding the overlapping spatial patterns of these impacts within military operational areas is essential for promoting compatible and informed land use decisions.

Several elements or mission profiles comprise the mission footprint that extends outside the NAS PAX and Webster Field property boundaries. The following outlines the different elements or mission profiles that comprise the NAS PAX military footprint:

- Runway Class Airspace
- Restricted Airspace
- Military Training Routes
- Helicopter Operating Areas
- UAS Operating Areas
- Supersonic Operating Areas
- Imaginary Surfaces
- Part 77 Obstruction Evaluation Area
- Aircraft Safety Zones
- Aircraft Noise Contours
- ATR Inner Range
- Radar Instrumentation View Shed
- High Risk of Adverse Impact Zone (HRAIZ)
- Explosive Safety Quantity Distance Arcs (ESQD)
- Bird / Wildlife Air Strike Hazard (BASH)

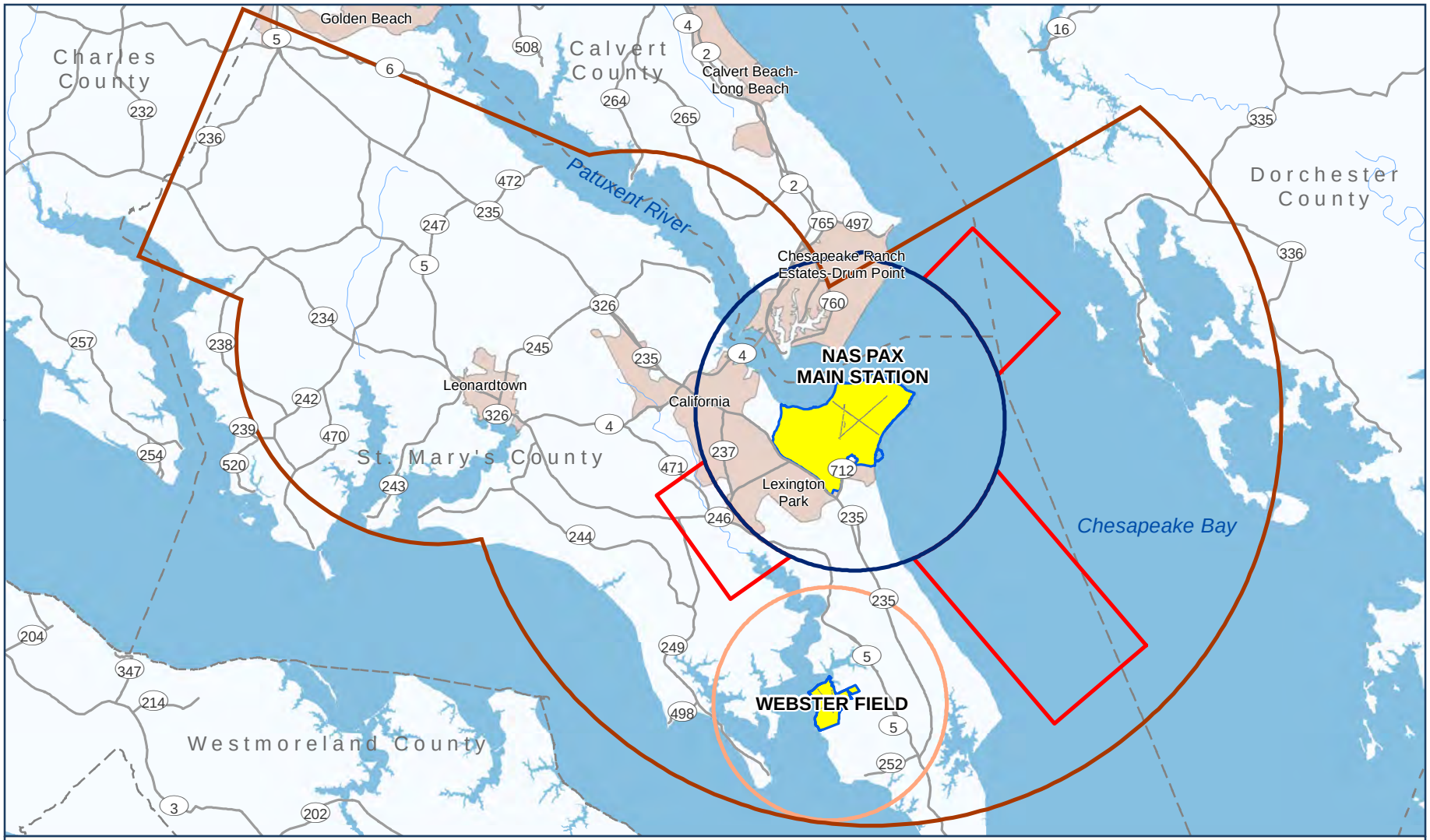
Runway Class Airspace

NAS PAX Main Station

NAS PAX Class D Airspace encompasses an area within a 4.5-mile radius of the center of the airfield that extends upward to 2,500 feet mean sea level (MSL). Use of Class D airspace requires the use of two-way communication with Air Traffic Control, which must be established prior to entering Class D airspace. No transponder is required. Visual Flight Rules (VFR) flights in Class D airspace must have three miles of visibility, and fly an altitude at least 500 feet below, 1,000 feet above, and 2,000 feet laterally from clouds. There are two areas of controlled Class E airspace surrounding the airfield. One set of Class E airspace radiates in three rectangles from the Class D airspace from an elevation of floor to a ceiling of Flight Level 180 or generally 18,000 feet MSL. Outside of the Class D airspace and the Class E airspace rectangles is a larger area of Class E airspace that encompasses Webster Field and extends from an elevation of 700 feet above ground level (AGL) to Flight Level 180. The Class D airspace reverts to the Class E airspace when the ATC is closed or during other special conditions. The airspace surrounding the Main Station airfield is depicted on Figure 3-4.

Webster Field

Webster Field is located within Class G / E airspace that is controlled by surrounding towered and non-towered airports depending on their operational status. The Webster Field airspace encompasses an area within a 4-mile radius of the center of the airfield. The Class G airspace extends from floor to 2,500 feet AGL. When Webster Field is open or closed and NAS PAX Approach is open, this airspace is controlled by NAS PAX Approach. When both Webster Field and NAS PAX Approach are closed, the Class G airspace is under the control of Washington Center. The Class E airspace extends from 2,500 AGL to Flight Level 180. When Webster Field is open or closed and NAS PAX Approach is open, this airspace is controlled by NAS PAX Approach. When both Webster Field and NAS PAX Approach are closed, the Class G airspace is under the control of Washington Center. Both VFR and instrument flight rules (IFR) flight is permitted in Class E airspace and communication with air traffic control is not required for VFR flights. The airspace above Webster Field is also designated as Restricted Airspace (R) which when activated, restricts designated airspace to military use.



Legend

- Class D Airspace
- **Class G Airspace**
  - Floor to 700 feet AGL
  - Floor to 2,500 feet AGL
- **Class E Airspace**
  - 700 feet AGL to Flight Level 180
  - Floor to Flight Level 180
  - 2,500 feet AGL to Flight Level 180
- Installation
- City/Community
- County Boundary
- Runway
- Water Body
- Highway

Control of airspace varies between NAS PAX Approach and Washington Control depending on operational status of Webster Field and NAS PAX Approach

0 2 4 Miles

Matrix DESIGN GROUP

Sources: ESRI, 2010; FAA, 2014

Figure 3-4
NAS PAX Airspace Classifications

NAS_PAX_Fig3-4_Airspace_20141217_CJM.pdf

The parameters of Restricted Airspace are described below. Both R-4005 and R-4006 overlie Webster Field. The Class G / E airspace for Webster Field are depicted on Figure 3-4.

Restricted Airspace

Special Use Airspace (SUA) is airspace where military activity or unusual flight conditions may occur. The designation of SUA serves to alert a nonparticipating aircraft (civilian or military) to the possible presence of these activities. There are six SUA types: Alert Areas, Prohibited Areas, Controlled Firing Areas, Military Operating Areas (MOAs), Restricted Areas, and Warning Areas. Only Restricted Areas are designated within the ATR Inner Test Range.

Restricted Airspace designate areas where ongoing or intermittent activities occur that create usual and often invisible hazards to aircraft. Restricted airspace is specifically designated in areas where flight or ground activities must be confined because of their nature, which may be considered hazardous to nonparticipating aircraft. Restricted airspace is bounded by a floor (minimum altitude a plane can fly) and a ceiling (maximum altitude a plane can fly). Restricted airspace is designated under 14 Code of Federal Regulations (CFR) Part 73 and is utilized for hazardous flight activity and aircraft testing including high speed maneuvering, abrupt altitude changes, and other dynamic, non-standard aircraft activity. Depending on the type of restricted airspace, a few key factors that need to be taken into consideration to determine if development below these areas is compatible include: land use type, height/vertical obstruction, frequency and noise. Following are examples of some of the type of activities that may occur in restricted airspace:

- Unmanned aircraft and drones
- Simultaneous manned and unmanned aircraft operations
- Experimental aircraft operations
- Multi-purpose aircraft flight characteristics testing and evaluation
- Simulated aircraft/helicopter emergency training
- Simultaneous disassociated aircraft types and models flight operations
- Simulated aircraft carrier landing practice
- Amphibious shipboard landing practice

Air-to-ground weapons can only be released within a Restricted Area that has a floor surface level. When restricted airspace is being used for military training, non-participating military, as well as all civilian aircraft, are prohibited from flying through it. When restricted airspace is not being used for military operations, civilian and commercial access through the airspace may be requested from airspace-controlling agency that controls that particular area.

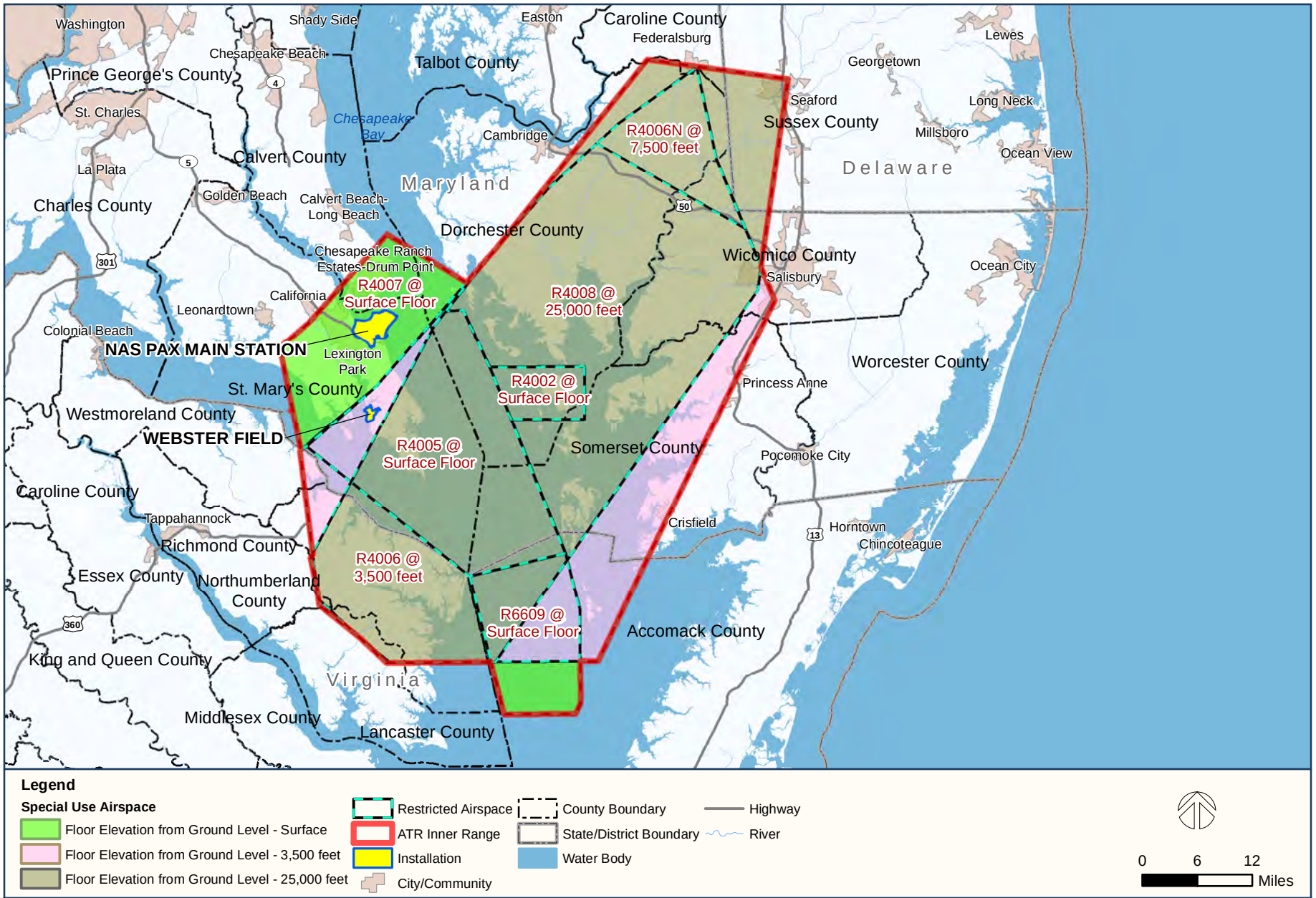
The ATR Inner Test Range Restricted Airspace consists of R-4002, R-4005, R-4006, R-4007, R-4008, and R-6609, the parameters of which are provided in Table 3-5 and illustrated on Figure 3-5.

Table 3-5. Restricted Airspace

Restricted Area	Minimum Altitude Feet	Maximum Altitude Feet	Area Covered Sq. Miles
R-4002	Surface	20,000	53
R-4005	Surface	25,000*	419
R-4006	3,500	7,500*	1,816
R-4006N	3,500	7,500*	113
R-4007	Surface	4,999*	216
R-4008	25,000	85,000	1,722
R-6609	Surface	20,000	165

**Up to but not including*
Source: NAS PAX RAICUZ, 2009.

Generally, a maximum of 10 aircraft may occupy the range airspace in R-4005, R-4006, and R-4008 during normal operating hours of 7:00 a.m. to 11:00 p.m. Aircraft may be distributed among the different altitudes, ranging from surface to 85,000 feet above sea level. Operational workarounds currently include scheduling delays for testing and flight



Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-5
Restricted Airspace

NAS_PAX_Fig3-5_Restricted_Airspace_20141211_CJM.pdf

pattern modifications. Airspace and surface targets are used for test and evaluation of aircraft and for warfighter training missions. In addition to radar and optical tracking systems, fixed and mobile assets provide the necessary capabilities for diverse testing and training scenarios.

Military Training Routes

Due to the unique nature of military training and testing requirements, Military Training Routes (MTRs) for special military use has been allocated for use by NAS PAX. The MTRs are flight corridors used to practice low-altitude, high speed, terrain-following training missions. Generally, MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots. Each segment of an MTR is allocated a floor altitude (at the earth's surface or any altitude above the surface) and a ceiling altitude with lateral boundaries.

Lateral boundaries are indicated in nautical miles to the left and right of the centerline. Aircraft may freely maneuver within the lateral and vertical confines of the MTR segment or block. Figure 3-6 shows the MTRs associated with NAS PAX. Parameters for each of these MTRs are listed in Table 3-6.

Table 3-6. Military Training Routes Associated with NAS PAX

MTR	Floor (feet AGL)	Ceiling (feet AGL)
VR-1711 AG	500	1,500
VR-1712 CG	500	1,500
VR-1713 AH	500	1,500
VR-1709AF	500	1,500
VR-1709CD	500	1,500
VR-1709DG	100	1,500
VR-1709GH	1,300	1,500
VR-1709HJ	400	1,500

Source: NAS PAX RAICUZ, 2009.

Helicopter Operating Areas

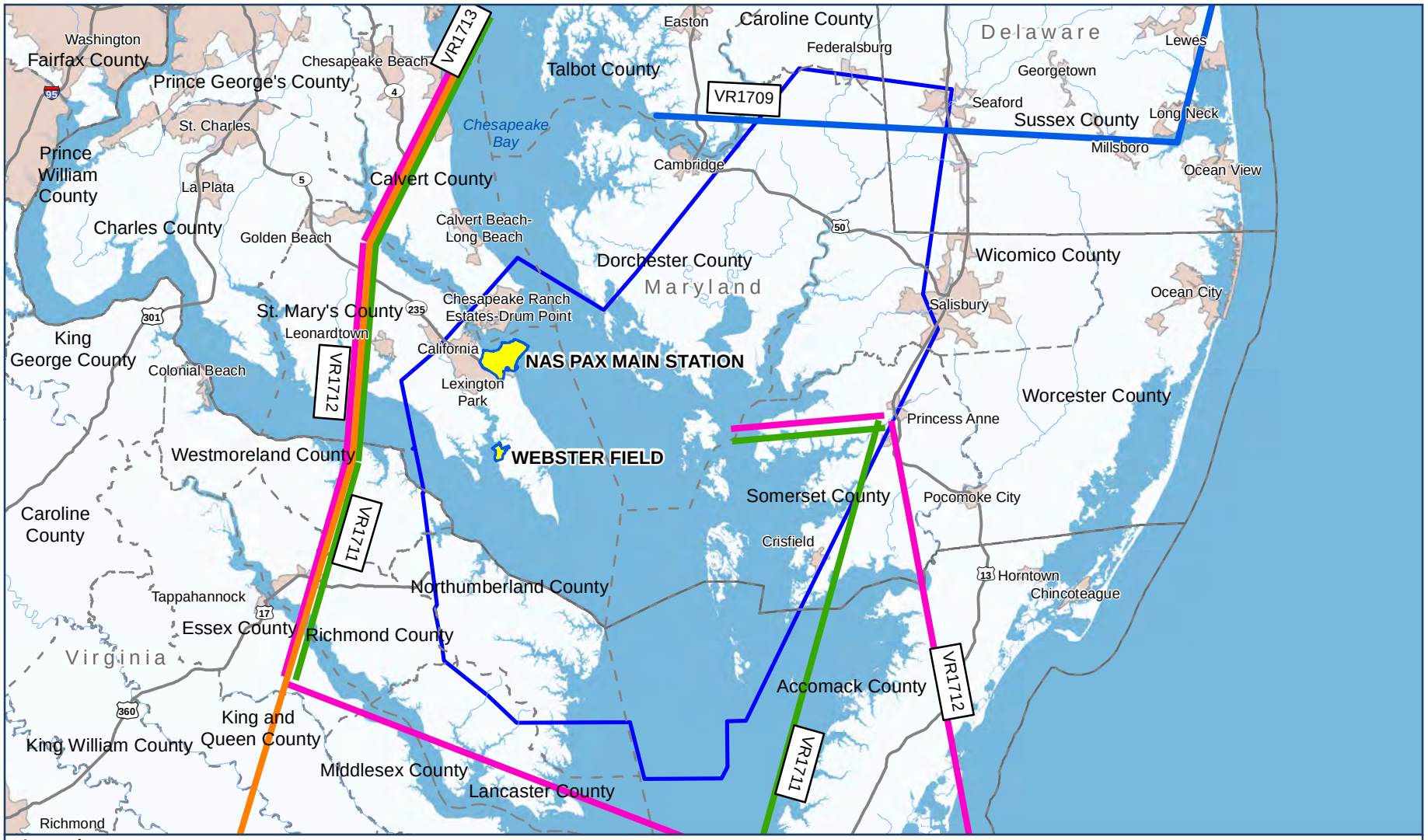
The East, South, and West Helicopter operating areas are located over portions of Maryland's Eastern Shore, Southern Maryland, and the Northern Neck of Virginia, respectively. These operational areas depicted on Figure 3-7 are primarily used for low-level helicopter and low performance fixed-wing aircraft operations. Ordnance release is not authorized within these areas.

Unmanned Aerial Systems Operating Area

As shown on Figure 3-8, NAS PAX's UAS Operating Area consists of a constricted area of the ATR Inner Test Range over the Northern Neck of Virginia. The northernmost point that extends over land is located along the shoreline just south of Coles Point in Westmoreland County. The UAS Operating Area limits extend south passing just east of Callao, VA at which point it turns to the southeast toward the Hughlett Point Natural Area. This area was originally established to easily segregate unmanned from manned flight operations. Low level UAS activities occur on a daily basis in this area.

Supersonic Flight Operating Areas

Supersonic flight operations are conducted in an area over the Atlantic Ocean within the Atlantic Warning Areas referred to as the supersonic test track. The test track runs from near Ocean City to Wallops Island and can be as close as three miles or up to 20 miles from shore. Although this supersonic test track is located within the Atlantic Warning Area illustrated in Figure 3-9 and located outside of the JLUS study area to the east, aircraft must traverse the Chesapeake Bay from its northernmost point near Lexington Park to its southernmost point lining up with Reedville in Northumberland County to reach the warning areas. Supersonic flight operations take place within the limits of R-4005 and R-4006. It extends at the 160 degree radial from the station's Very High Frequency Omni-Directional Radio Range Tactical Air Navigation Aid. The corridor does not overlay any land areas. Supersonic testing is typically conducted in a north to south pattern over the Chesapeake Bay to minimize impacts on the Northern Neck of Virginia communities.

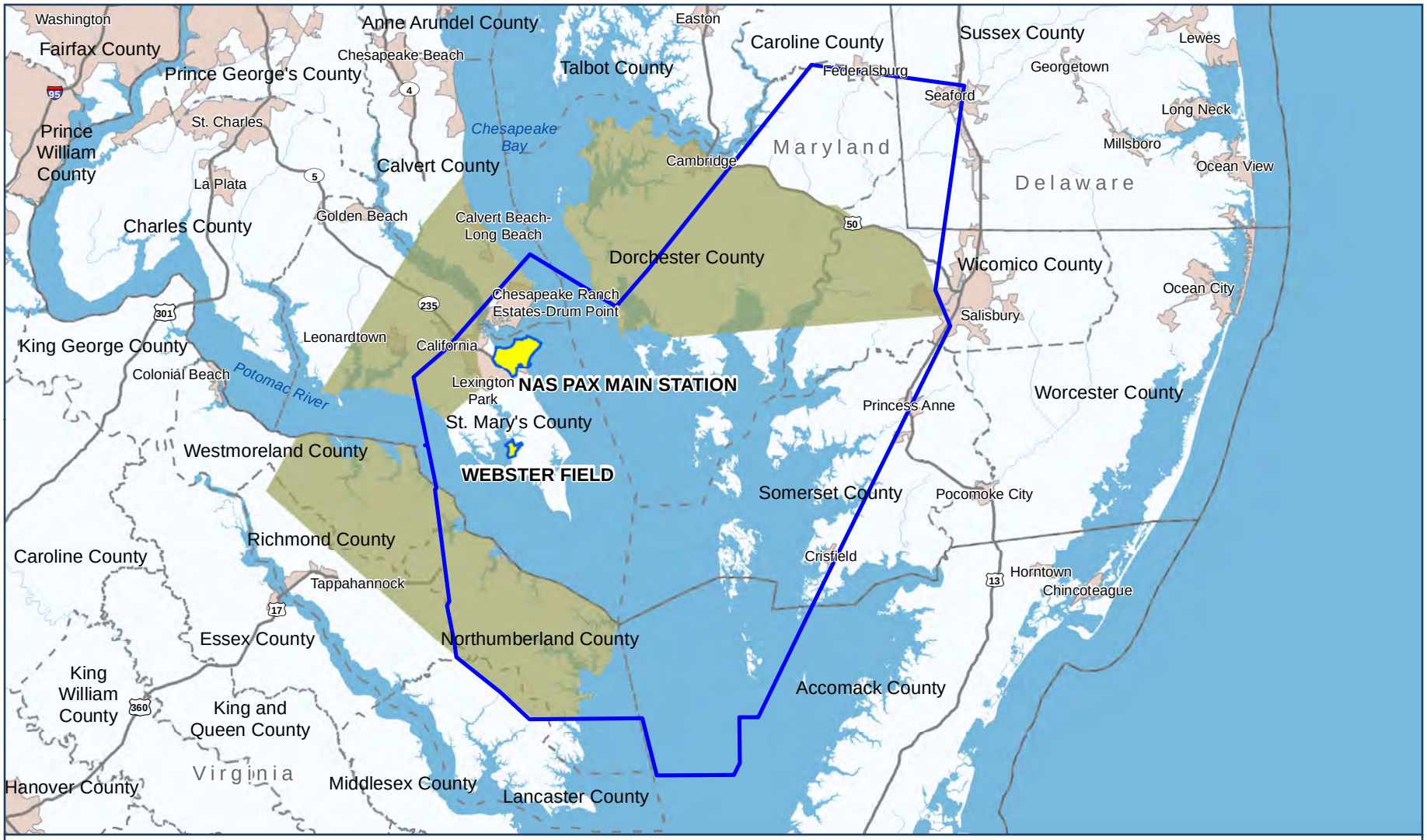


Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-6
Military Training Routes

NAS_PAX_Fig3-6_MilitaryTrainingRoutes_20141211_CJM.pdf

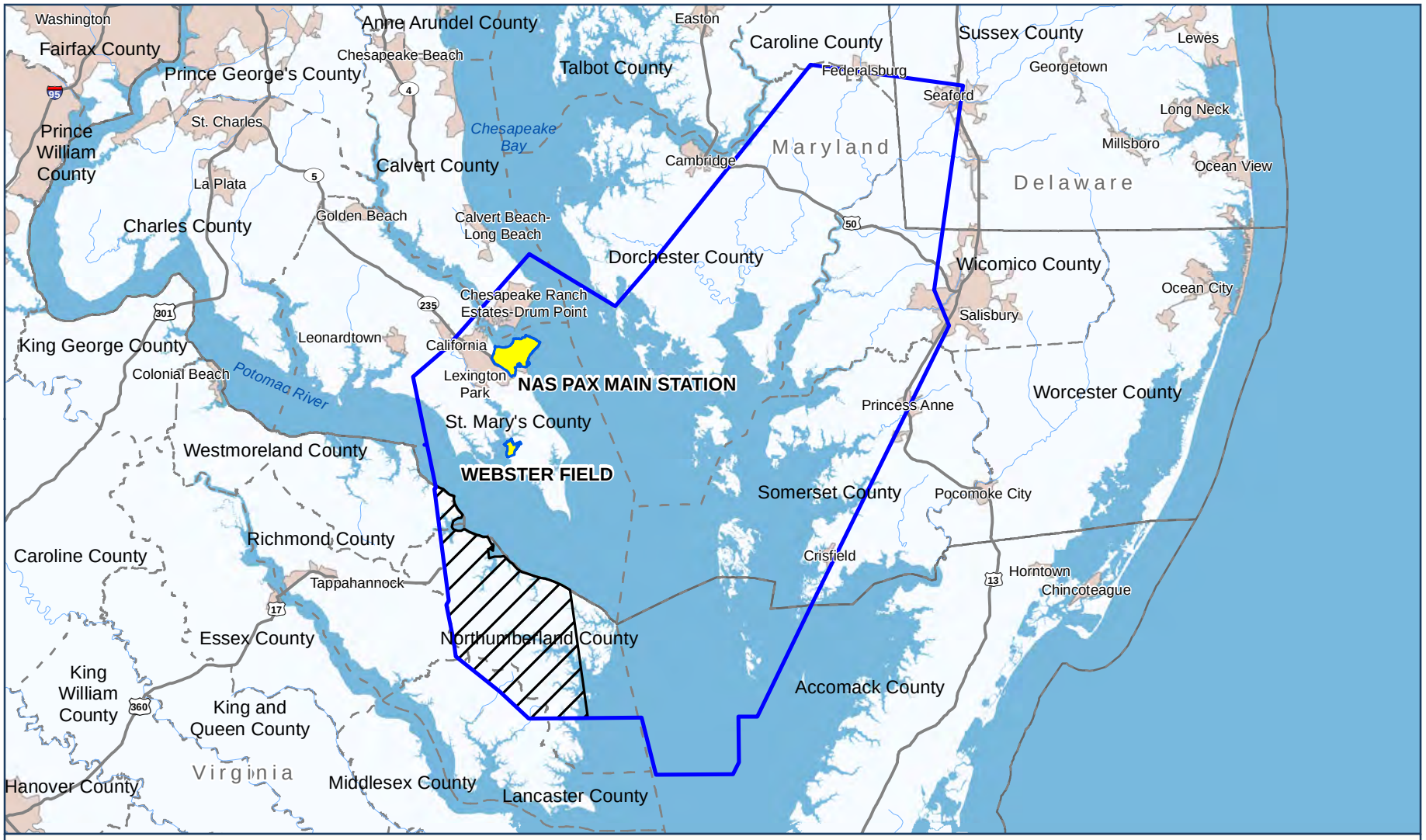


Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-7
Helicopter Operating Areas

NAS_PAX_Fig3-7_HelicopterOps_20141211_CJM.pdf

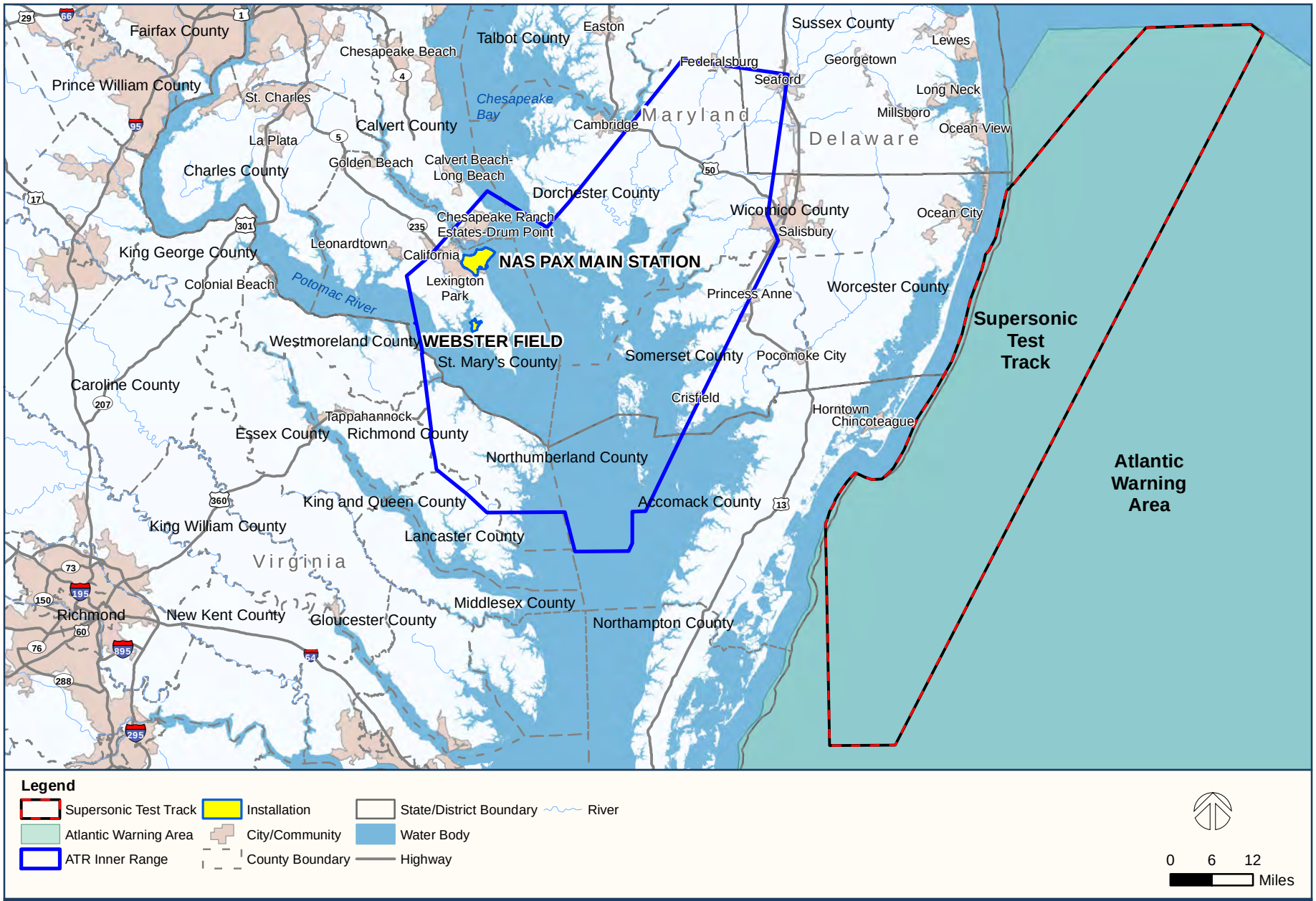


Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-8
Unmanned Aerial Vehicle Operating Areas

NAS_PAX_Fig3-8_UAV_20141211_CJM.pdf



Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-9
Atlantic Warning Area Test Track

NAS_PAX_Fig3-9_AtlanticWarningArea_20141211_CJM.pdf

The primary use of the Supersonic operating area is for supersonic test flights less than 30,000 feet associated with weapons separation events, which require tracking by optical and/or telemetry equipment. Inert ordnance releases are permitted only in approved target areas. Supersonic flights can occur outside of the corridor above 30,000 feet within the restricted airspace.

Imaginary Surfaces

The DOD has identified certain imaginary surfaces around military use runways to determine how structures and facilities are evaluated and identify if they pose a vertical obstruction relative to the airspace around a runway. The imaginary surfaces of an active runway are used to define the required airspace that must remain free of vertical obstructions in the vicinity of aviation operations to ensure safe flight approaches, departures, and patterns. The various imaginary surfaces build upon one another and are designed to guide the height of structures so there are no vertical obstructions to air navigation and operations, either natural or man-made. The extent or size of an imaginary surface depends on the type of runway.

Figure 3-10 illustrates a three-dimensional cross-section of the imaginary surfaces. This figure shows the slope of the potential heights of structures that should be followed to prevent the obstruction of navigable airspace.

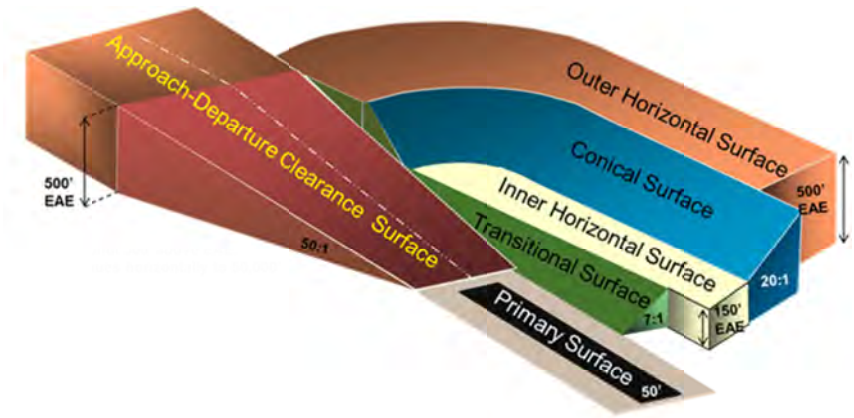


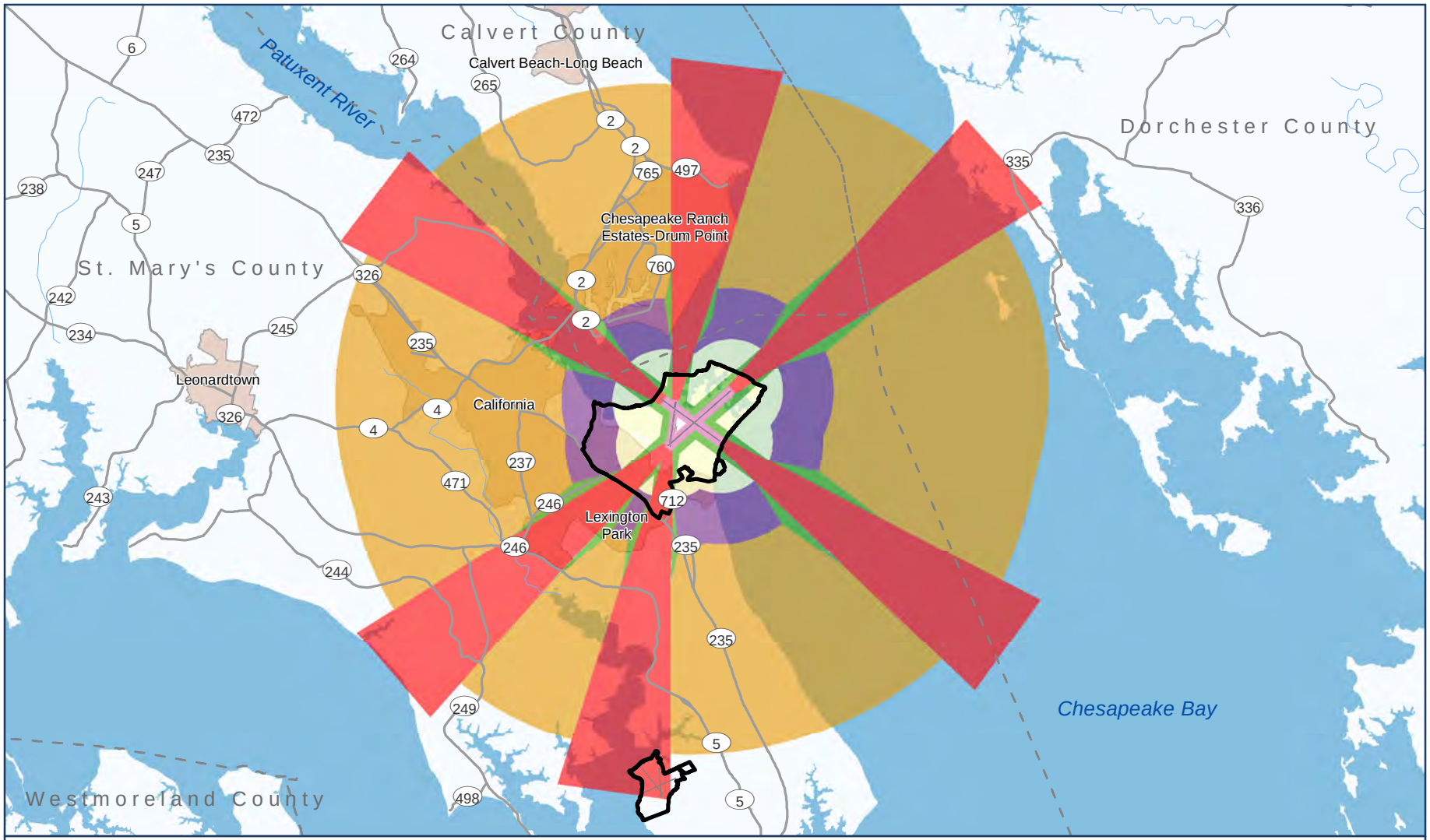
Figure 3-10. Imaginary Surfaces Cross Section

Imaginary surfaces are based on the type of runway. DOD fixed-wing runways are separated into two classes (Class A and Class B) for the purpose of defining imaginary surfaces and safety zones. Class A runways are used primarily by light aircraft and do not have the potential for intensive use by heavy or high performance aircraft. Class B runways are all other fixed-wing runways.

Imaginary Surfaces Class B Runway: NAS PAX Main Station

The imaginary surfaces relative to NAS PAX's Class B runways are described below and illustrated on Figure 3-11.

- The **Primary Surface** defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. It comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond each end of the runway. The width is 1,500 feet fixed on the runway centerline.



Legend

Imaginary Surfaces
- Approach / Departure
- Conical Surface
- Inner Horizontal Surface
- Primary Surface
- Transitional Surface
- Outer Horizontal
- Installation
- County Boundary
- City/Community
- Runway
- Water Body
- Highway

0 2 4 Miles

Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-11
NAS PAX Main Station Imaginary Surfaces

NAS_PAX_Fig3-11_MainStationImagSurface_20141211_CJM.pdf

- The **Clear Zone** defines the limits of the obstruction clearance requirements in the vicinity contiguous to the end of the primary surface. The CZ is located immediately adjacent to the end of the runway and extends 3,000 feet outward along the runway centerline. This is the area where an aircraft accident is most likely to occur.
- The **Approach-Departure Clearance Surface** is symmetrical about the runway centerline and begins as an inclined plane (glide angle) 200 feet beyond each end of the primary surface of the centerline elevation of the runway end, and extends for 50,000 feet from the runway. The slope of the approach-departure clearance surface is 50:1 along the extended runway (glide angle) centerline until it reaches an elevation of 500 feet above the established airfield elevation. It continues horizontally at this elevation to a point 50,000 feet from the start of the glide angle. The width of the surface is 2,000 feet at the runway end and flares uniformly to a width of 16,000 feet at 50,000 feet from the runway.
- **Horizontal Clearance Surfaces** include an inner surface at 150 feet above airfield elevation extending to 7,500 feet from the runway, and an outer surface at 500 feet above airfield elevation extending from 14,500 feet to 44,500 feet from the runway end.
- The **Conical and other Transitional Surfaces** is an inclined plane connecting the Horizontal Surfaces to the Approach / Departure Clearance Surfaces and the Primary Surface.

Imaginary Surfaces Class A Runway: Webster Field

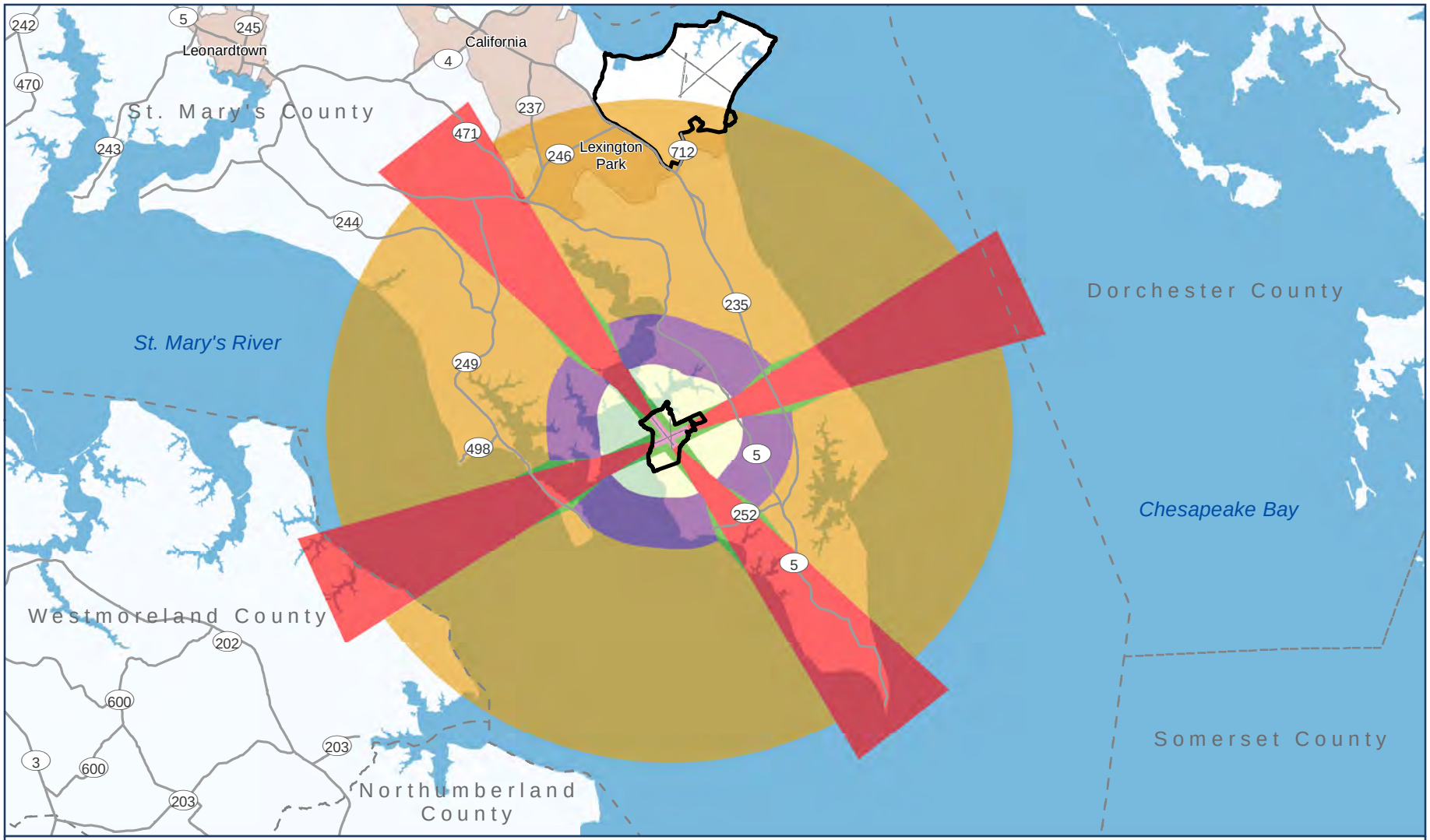
The imaginary surfaces associated with Webster Field's Class A runway are described below and illustrated on Figure 3-12. This figure shows the slope of the potential heights of structures that should be followed in order to prevent the obstruction of navigable airspace.

- **The Primary Surface** defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. It comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond each end of the runway. The width is 1,000 feet fixed on the runway centerline.
- The **Clear Zone** defines the limits of the obstruction clearance requirements in the vicinity contiguous to the end of the primary surface. The CZ is located immediately adjacent to the end of the runway and extends 3,000 feet outward along the runway centerline.
- The **Approach-Departure Clearance Surface** is symmetrical about the runway centerline and begins as an inclined plane (glide angle) 200 feet beyond each end of the primary surface of the centerline elevation of the runway end and extends for 50,000 feet from the runway. The slope of the approach-departure clearance surface is 40:1 along the extended runway (glide angle) centerline until it reaches an elevation of 500 feet above the established airfield elevation. It continues horizontally at this elevation to a point 50,000 feet from the start of the glide angle.
- **Horizontal Clearance Surfaces** include an inner surface at 150 feet above airfield elevation extending to 7,500 feet from the runway, and an outer surface at 500 feet above airfield elevation extending from 14,500 feet to 44,500 feet from the runway end.

Federal Aviation Act (Part 77) Obstruction Evlauation

The Federal Aviation Act [Title 14 Code of Federal Regulations (CFR) Part 77] was enacted in 1958 to provide methods for overseeing and regulating civilian and military use of airspace over the United States. The Act requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable air space. The intent is to serve the needs of both civilian aeronautics and national defense but it does not specifically address the needs of military agencies. The Federal Aviation Administration (FAA) was created as a result of the Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has "a public right of freedom of transit in air commerce through the navigable air space of the United States." The rule was formally announced in the 1963 Court of Claims ruling in Aaron v. United States and states that flights 500 feet or more AGL do not represent a compensable taking because flights 500 feet AGL enjoy a right of free passage without liability to the owners below.



Legend

Imaginary Surfaces
- Approach / Departure
- Clear Zone
- Inner Horizontal
- Primary Surface
- Transitional Surface
- Conical Surface
- Outer Horizontal
- Installation
- Runway
- County Boundary
- City/Community
- Water Body
- Highway

0 2 4 Miles

Matrix DESIGN GROUP

Sources:ESRI, 2010; NAS PAX, 2010

Figure 3-12
Webster Field Imaginary Surfaces

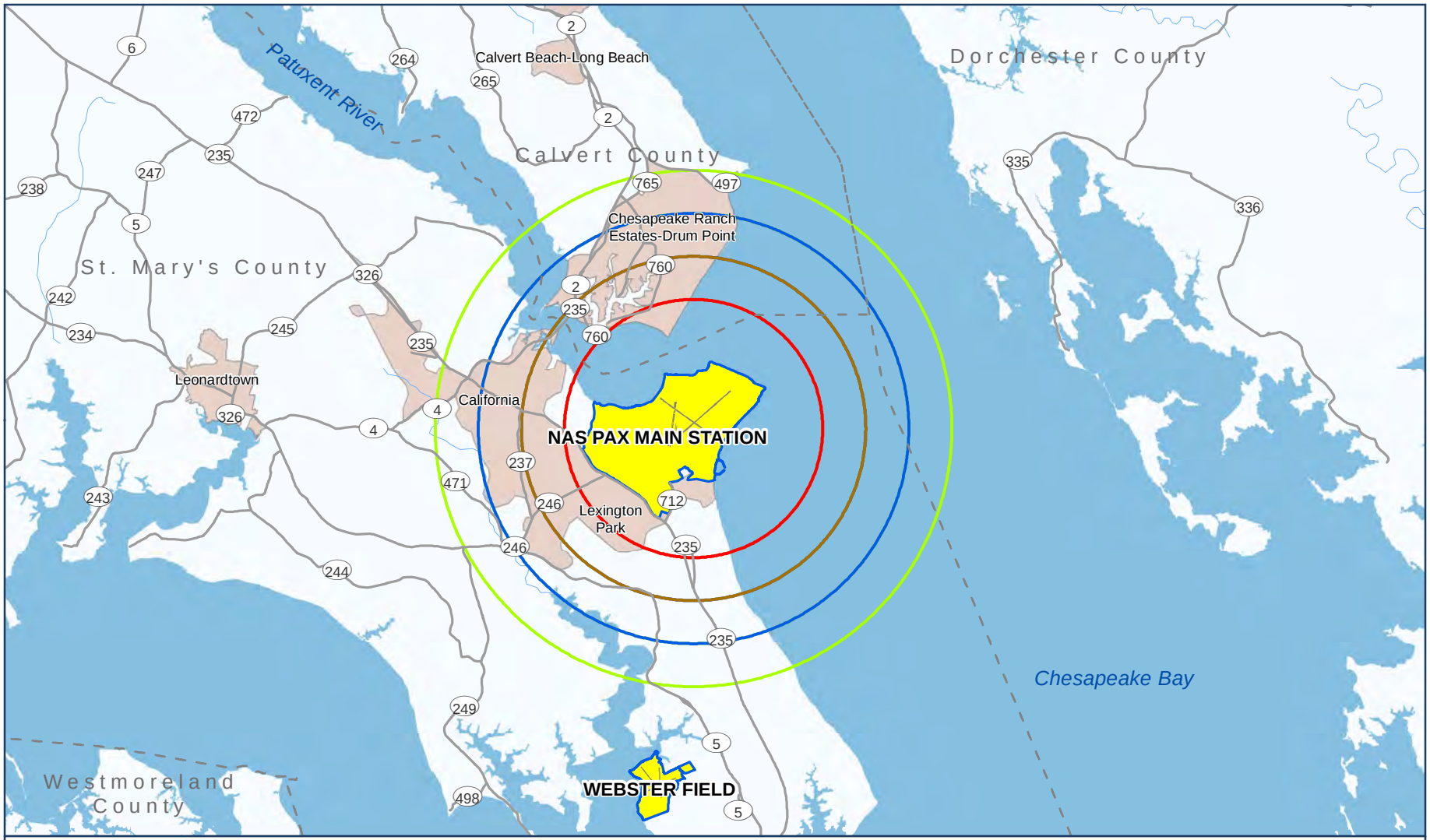
NAS_PAX_Fig3-12_WebsterImagSurface_20141211_CJM.pdf

Another important outcome of the Act is FAA Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation provides information to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility relative to the airfield in question. This regulation determines compatibility based on the height of proposed structures or natural features relative to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can easily assess the height restrictions near airfields. Additional information on Part 77 is located on the Federal Aviation Administration Internet site at http://www.faa.gov/.

Part 77.17 is meant to establish standards to determine obstructions within navigable airspace, typically within a certain distance from an airport or airfield. It defines an obstruction to air navigation as an object that is of greater height than any of the following heights or surfaces in the following manner:

- A height of 499 feet AGL at the site of the object.
- A height that is 200 feet AGL or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 499 feet; see Figure 3-6 for an illustration of this portion of the FAA Part 77 Vertical Obstruction Compliance.
- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.
- A height within an en-route obstacle clearance area, including turn and termination areas of a federal airway or approved off-airway route that would increase the minimum obstacle clearance altitude.
- The surface of a takeoff and landing area of a civilian airport or any imaginary surface established under 77.19, Department of Defense (DOD): 77.21, and heliports: 77.2. However, no part of the takeoff or landing area itself will be considered an obstruction.
- Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:
    - 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.
    - 15 feet for any other public roadway.
    - 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.
    - 23 feet for a railroad.

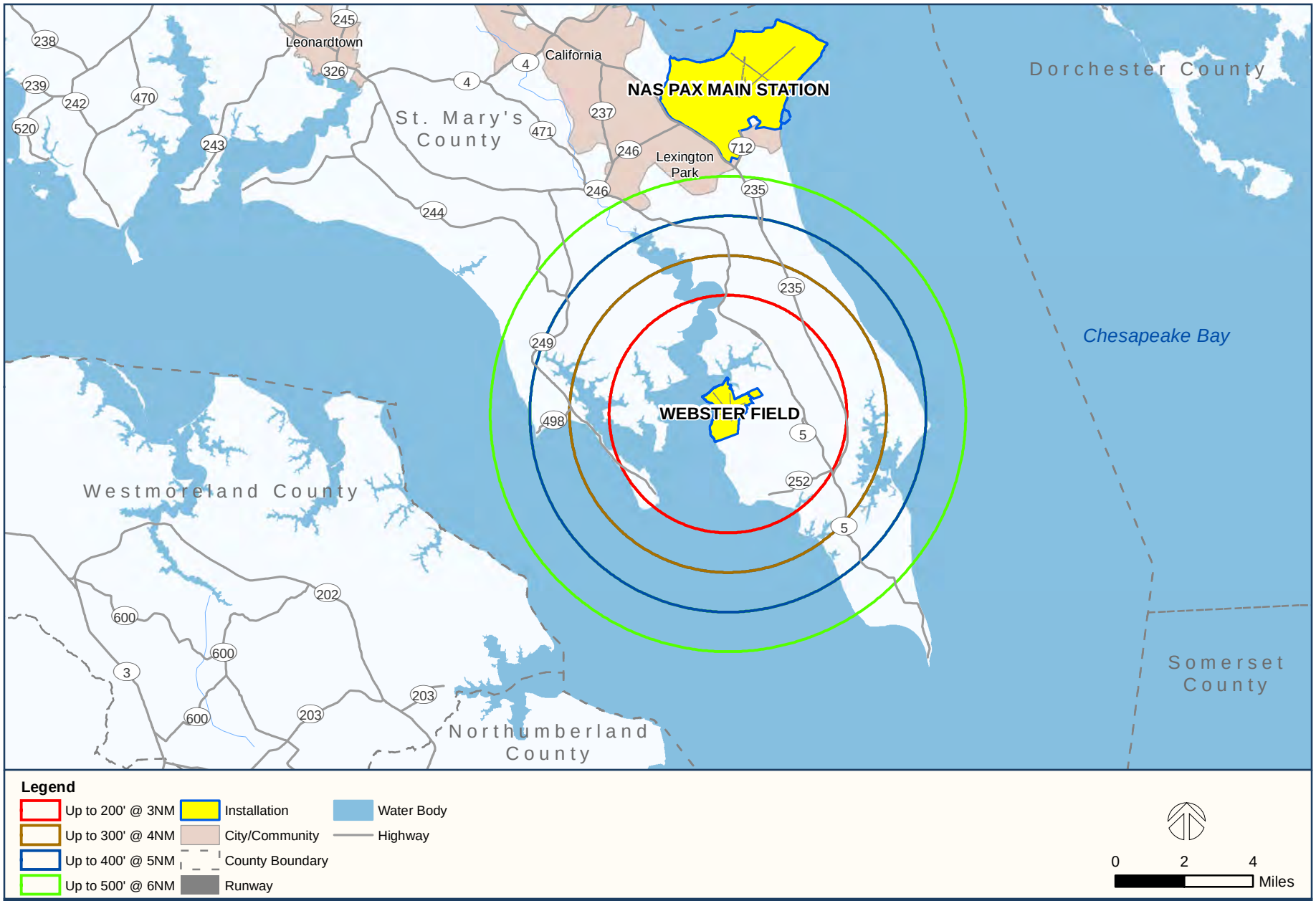
For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it. The FAA Part 77 Obstruction Evaluation areas for the NAS PAX Main Station and Webster Field are indicated on Figures 3-13 and 3-14, respectively.



Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-13
NAS PAX Main Station Part 77 Obstruction Evaluation Area

NAS_PAX_Fig3-13_MainStationFAA77_20141211_CJM.pdf



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig3-14_WebsterFAA77_20141211_CJM.pdf

Figure 3-14
NAS PAX Main Station Part 77 Obstruction Evaluation Area

Aircraft Safety Zones

The Air Installations Compatible Use Zones (AICUZ) program was created by the DOD to identify noise zones and safety zones that can be used by local communities as land planning tools. The AICUZ program recommends community land uses compatible with noise levels, accident potential, and flight clearance requirements associated with military airfield operations so that the information can be incorporated into local community planning programs. The goals of the AICUZ program are to protect the health, safety, and welfare of those living and working near military air fields and preserve the military aviation mission. These goals can be accomplished by encouraging local communities to manage land use and development near airfields in a manner that reduces danger to aircraft and reduces impacts, such as noise, to those living and working nearby.

Separate AICUZ studies were prepared each for NAS PAX Main Station and Webster Field. The latest AICUZ study for the NAS PAX Main Station was completed in 2009 and for Webster Field in 2006 for Webster Field. The AICUZ analyzes land development trends of surrounding communities, their existing land planning tools and compares them to the military mission requirements. From this analysis, the study proposes recommended strategies affected communities can implement to reduce, mitigate, or prevent incompatible land use associated with noise and safety impacts near the installation.

NAS PAX is developing a new AICUZ study that addresses mission changes including touch and go operations at Webster Field. The new AICUZ will supersede the previous 2006 AICUZ study for Webster Field and redefine operational areas per the mission changes.

Per Navy regulations, airfield safety zones are recommended to assist communities in developing land uses compatible with airfield operations and protect the health and safety of its citizens. Runways have associated safety zones to limit and guide development and provide for the safety of the public and pilots. Within these zones, there are recommended types, densities, intensities, and heights of land uses. While the likelihood of an aircraft mishap occurring is remote, the Navy identifies areas of accident potential to assist in land-use planning. The safety zones are referred to as Clear Zones (CZs) and Accident Potential Zones (APZs) I and II. The Navy has identified APZs and CZs at each end of the runways based on historical data for aircraft mishaps. The purpose of safety zones is to provide for the general safety of the public as it relates to the land uses under these zones. The DOD uses two classes of fixed-wing runways (Class A and Class B) for the purpose of defining CZs and APZs. A Class A runway is intended primarily for small light aircraft whereas a Class B runway can accommodate heavy aircraft and/or have the potential for development to heavy aircraft use. Following is a description of the NAS PAX and the Webster Field aircraft safety zones.

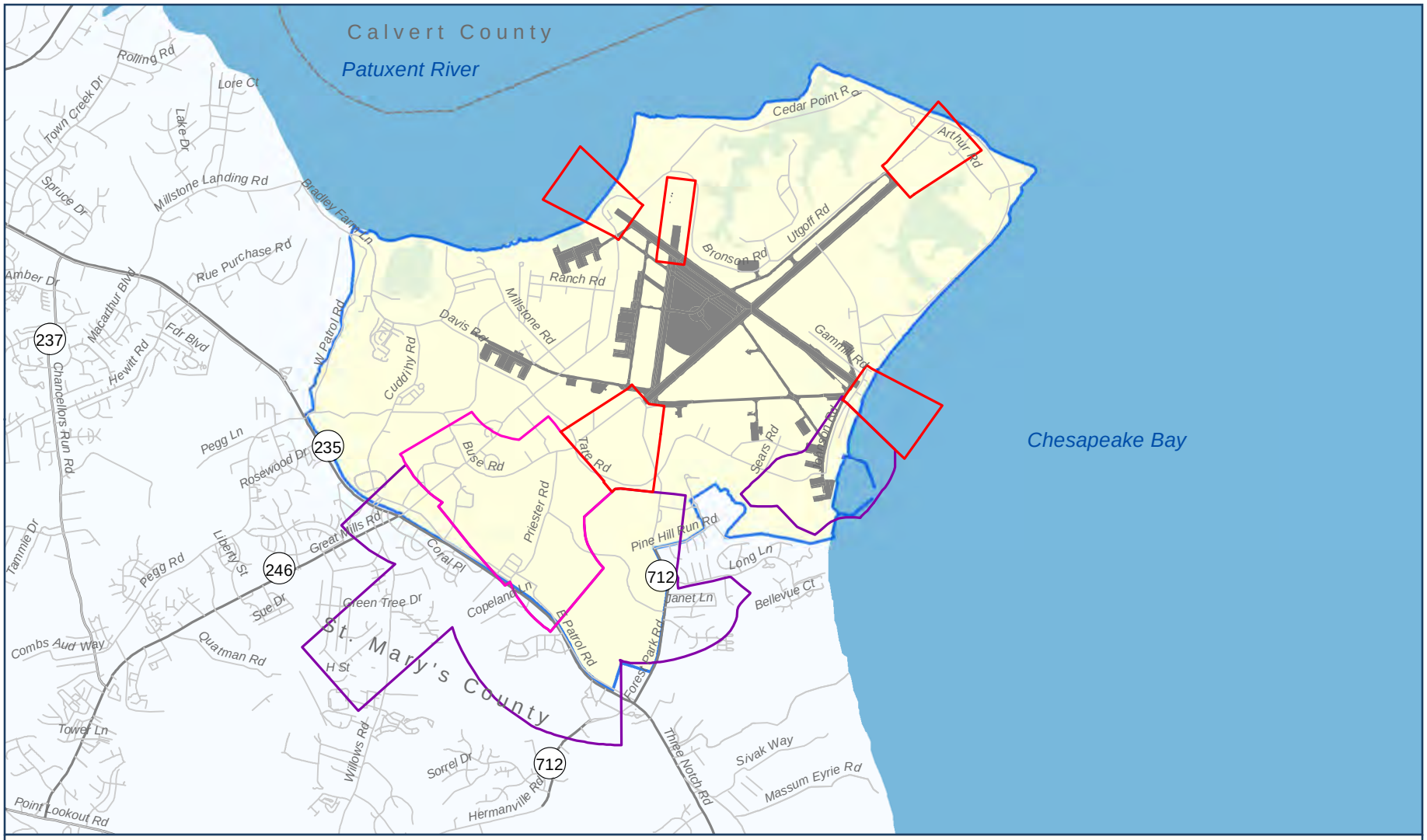
Aircraft Safety Zones: NAS PAX Main Station

The 2009 NAS PAX AICUZ report establishes aircraft safety zones for NAS PAX runways (Class B) based on historical data of aircraft collisions, geography, and runway information. Following is a brief description of these safety zones. The safety zones are illustrated on Figure 3-15.

The CZ begins at the end of each runway measuring 1,500 feet wide extending outward in a fan-shape to a length of 3,000 feet from the end of each runway. The fan-shape of this zone flares to a greater width of 2,284 feet at the end of the zone. The CZ associated with Runway 20 measures approximately 1,000 feet wide by 3,000 feet long. The CZ is the area where an accident involving an aircraft operation is most likely to occur; therefore, development is completely restricted in this area.

The **Accident Potential Zone I** (APZ I) is a rectangular area begins at the end of each CZ and extends to a length of 5,000 feet by 3,000 feet wide. This area typically experiences fewer accidents than the CZ but still has a measurable potential for aircraft accidents relate to the CZ. An APZ I is established under flight tracks that experience 5,000 or more annual operations (departures or approaches).

The **Accident Potential Zone II** (APZ II) is a rectangle that begins at the end of each APZ I at both ends of the runway extending to a length of 7,000 feet by 3,000 feet wide. APZ II is where development is the least restricted due to the reduced risk of accidents since it is further from the runway.



Legend

Safety Zones
- CZ
- APZ-I
- APZ-II

- Installation
- County Boundary
- Runway
- Water Body
- Highway
- Road

0 0.5 1 Mile

Matrix Design Group

Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-15
NAS PAX Main Station Safety Zones

NAS_PAX_Fig3-15_MainStationSafety_20141211_CJM.pdf

APZ extend from the end of the runway but apply to the predominant arrival and departure flight tracks used by the aircraft. If an airfield has more than one predominant flight track to or from the runway, APZs can extend in the direction of each flight track. Outside the CZ, APZ I, and APZ II, the risk of aircraft accidents is not significant enough to warrant special consideration in land-use planning. In addition to the CZ, there is a lateral Clear Zone (called the primary surface) that extends outward for 500 feet on each side, and for the length of, the runway.

The 2009 AICUZ identified approximately 23 acres of off-station land within APZ I and 1,002 acres of off-station land to be located within APZ II. The CZs remain entirely contained within the station's boundaries. Although portions of APZs I and II extend to the northwest and northeast of the Station, these areas overlay water areas only. The land areas within APZs I and II that extend off-installation onto private lands are located to the south and west of the installation, extending into the Lexington Park, Southampton, and Southgate Park neighborhoods of St. Mary's County.

Aircraft Safety Zones: Webster Field

All runways at Webster Field are Class A because of the types of aircraft using the runways. The CZ is the area that extends from the end of the active runway measuring 1,000 feet wide and 3,000 feet in length. CZs are designated for all active runways; however, APZs are only assigned to runways with at least 5,000 arrivals or departures. Due to the low number of fixed-wing operations that occur at Webster Field, there are only CZs associated with airfield. Webster Field's rotary wing APZs are contained within the fixed-wing primary surface and/or runway CZs. The designation of APZs are being considered and programmed for Webster Field by the Navy as allowed by the OPNAVINST 11010.36C.

Webster Field's CZs, illustrated on Figure 3-16, extend beyond the airfield perimeter. The CZs extending to the northwest and southwest only occur over water. Approximately 66 acres of land used for mixed forest, cropland, and low-density residential were affected by the CZs extending to the northeast and southeast of the airfield. For this reason, several parcels located within the eastern CZ of Runway 26 have been acquired by NAS PAX which gives the Navy land use control within the CZ and will help prevent encroachment and other potentially incompatible land uses proximate to Webster Field.

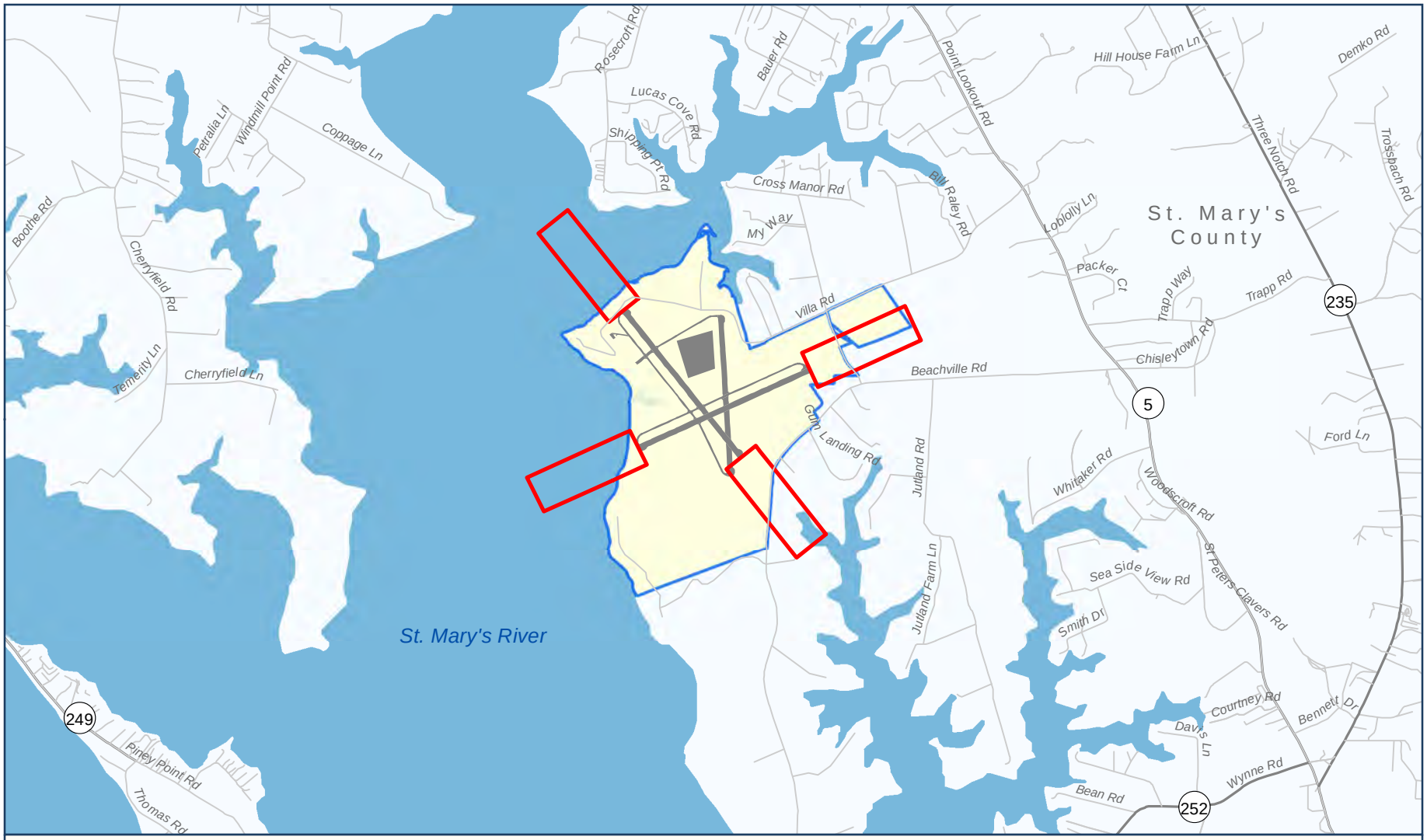
Aircraft Noise Contours

The AICUZ studies provide recommendations for compatible land uses associated with noise generated by aircraft that use the airfield. The noise baseline is based on noise modeling conducted by the DOD for a period of a year and then averaged for day and night noise levels. The DOD requires that noise levels for decibels (dB) of 60 and higher be plotted. The noise modeling uses aircraft information such as approach and departure operations and pre-flight and maintenance operations (runups) to develop noise contours associated with each aircraft.

The main sources of noise at airfields are flight operations or pre-flight and maintenance run-ups. Computer models are used to develop noise contours based on information about these operations including: type of operation (arrival, departure, and pattern); number of operations per day; time of operation; flight track; aircraft power settings, speeds, and altitudes; number and duration of maintenance run-ups; terrain; surface type; and environmental data (temperature and humidity).

The Navy considers how its operations impact the local community by calculating the day-night average sound level (DNL). The DNL averages the noise levels of all aircraft operations that occur with a 24-hour period. To assist the communities in land use decisions, the DOD uses decibel noise contours to illustrate the exposure to noise associated with aviation activities. For land-use planning purposes, noise zones are grouped into three categories.

1. **Noise Zone I.** Noise Zone I (less than 65 dB DNL) is generally considered an area of low or no noise impact. This zone is considered to have minimal noise exposure but may be a noise nuisance to certain types of land uses and activities.
2. **Noise Zone II.** Noise Zone II is an area where the DNL is between 65 dB and 75 dB. This zone is considered to be an area of moderate impact and is normally unacceptable for noise-sensitive land uses. Some land use controls are typically required within this zone.
3. **Noise Zone III.** Noise Zone III comprises areas that experience noise levels greater than 75 dB. This zone is considered an area of severe noise exposure and is deemed unacceptable for noise sensitive land uses, requiring the greatest degree of land-use control.



Sources:ESRI, 2010; NAS PAX, 2010

NAS_PAX_Fig3-16_WebsterSafety_20141211_CJM.pdf

Figure 3-16
Webster Field Clear Zones

Aircraft Noise Contours: NAS PAX Main Station

Noise contours associated with the NAS PAX Main Station were developed in 2009 based on existing and projected aircraft and are illustrated on Figure 3-17. These contours were determined to be largely the result of the straight-in arrivals of F/A-18C/D, F/A-18E/F and projected operations from the F-35 aircraft. The relatively high noise levels near the runways (greater than a DNL of 85 dB) result from departure operations by the major noise contributors, such as the F/A-18C/D, F/A-18E/F and F-35 operations.

The majority of the acreage encompassed by the Noise Zone I contour is located over Navy-owned property or water. A total of 2,366 acres of land off-station are affected by Noise Zone I, including the southern portion of Calvert County where the Chesapeake Range Estates are located and to the southwest and southeast of the installation into portions of the Lexington Park community of St. Mary's County.

All portions of Noise Zone II are either entirely contained within the installation boundary or occur over water. A small portion of Noise Zone II extends approximately to the southernmost portion of Chesapeake Range Estates in Calvert County. A total of 1,226 acres of land to the southwest and southeast of the installation into portions of the Lexington Park community of St. Mary's County are also affected by Noise Zone II. Fourteen acres of off-station land in the Lexington Park area near Three Notch Road experience noise levels greater than 75 dB.

Aircraft Noise Contours: Webster Field

The main noise source at Webster Field is aircraft operations, primarily by helicopter operations. Although Webster Field also serves as a detachment for UASs, the systems accessing Webster Field generate minimal levels of noise, thus Webster Fields noise contours are largely a result of rotary-wing operations centralized on the helicopter pad. As shown on Figure 3-18, portion of Noise Zone I extends outside the Webster Field boundaries over the St. Inigoes Shores residential area. Noise Zone II is entirely contained within Webster Field and noise levels greater than 75 dB have not been recorded for operations at Webster Field. Mission changes identified in the revised forthcoming AICUZ study will modify the noise contours associated with Webster Field. The future noise contours changes are currently unknown.

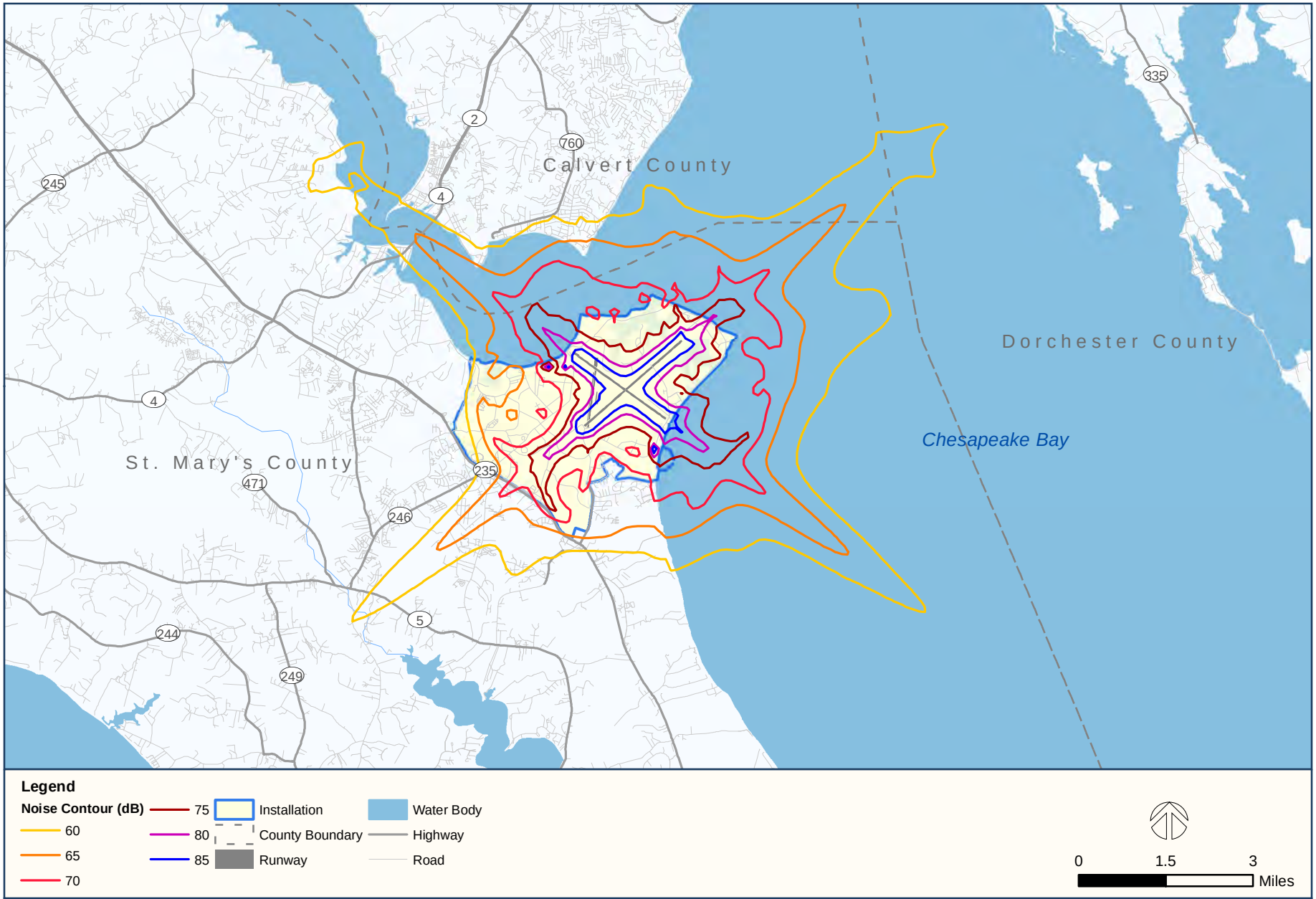
Atlantic Test Range Inner Test Range Targets

As illustrated on Figure 3-19, the ATR Inner Test Range consists of selected targets and airspace covering regions over the Chesapeake Bay, Maryland, Delaware, and Virginia. The ATR controls an aerial firing range and two exclusive-use surface target areas in the ATR Inner Test Range restricted areas. Webster Field is used as an auxiliary field for daylight testing and is the primary test area for UASs. The ATR provides real-time connectivity to:

- NASA Wallops Flight Facility
- Fleet Area Control and Surveillance Facility, Virginia Capes
- NAVAIR simulation and stimulation laboratories
- Other NAVAIR and DOD major test ranges

The ATR Inner Test Range contains three exclusive-use surface target areas: the Hooper Target, Hannibal Target, and Tangier Island Target (no longer in use). The surface target areas provide a safe, controlled location where air-to-surface firing and weapon separation testing can be conducted. An integrated network of cinetheodolites (an instrument located throughout the test range used for visual tracking of aircraft and for accurate multi-target tracking), laser and radar trackers, data acquisition, and scoring systems provide the capabilities for diverse testing and training scenarios within the range. Each of these target areas are surrounded by a prohibited area of 1,000 yards in radius which are delineated on navigation charts. Vessels are prohibited from entering these areas at all times unless authorized by NAS PAX.

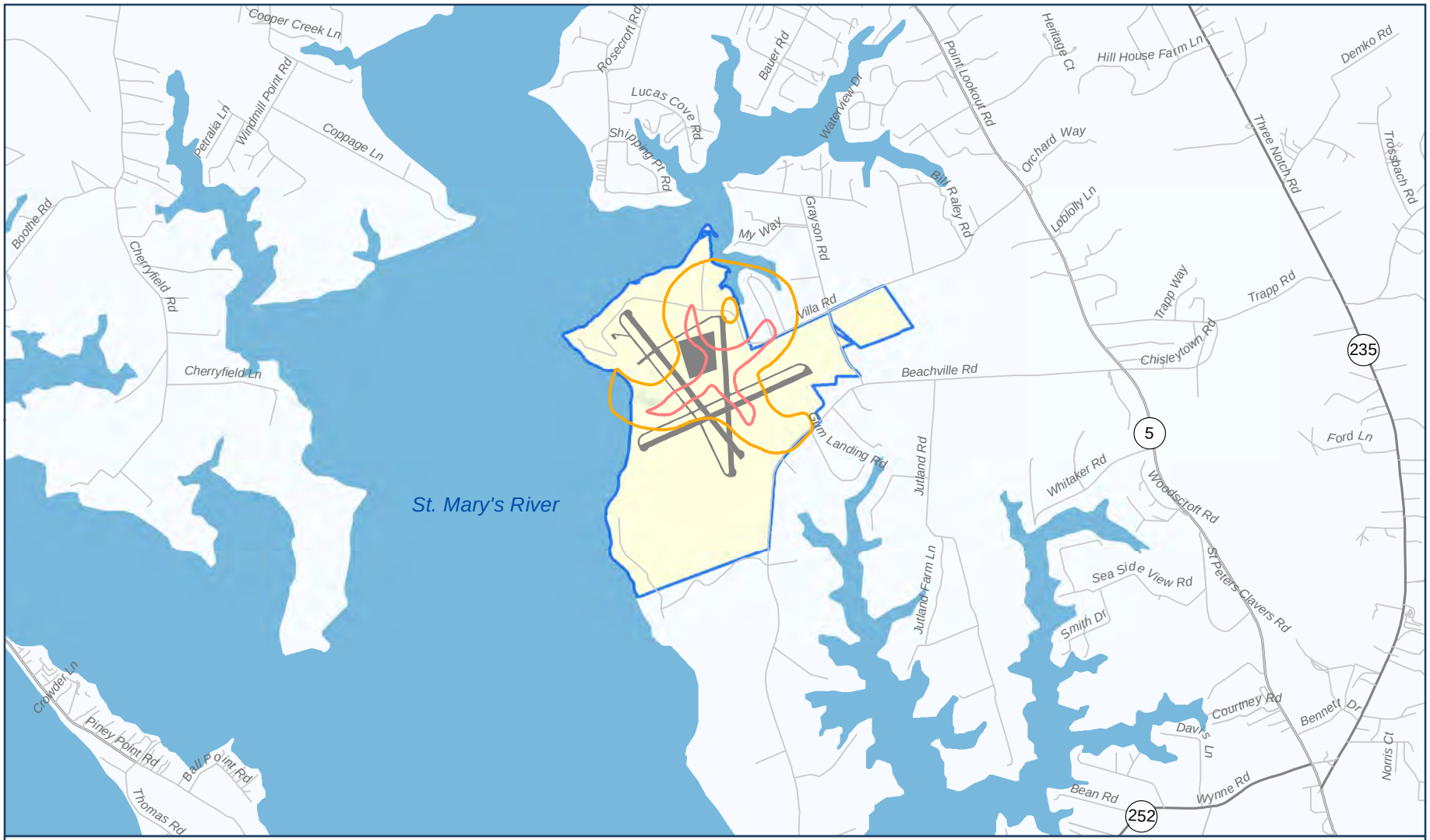
The Hooper and Hannibal targets and associated prohibited areas are surrounded by the aerial and surface firing range, which is open to navigation except during Navy exercise. The aerial and surface firing range overlies the main shipping channel. Due to the shallow depths near the targets, larger commercial vessels are unable to approach the targets; however smaller vessels such as fishing boats, tugboats, and recreational craft, are able to maneuver up to the limits of the prohibited areas and within most of the restricted area comprising the aerial and surface firing range.



Sources: ESRI, 2010; NAS Pax, 2010

Figure 3-17
NAS PAX Main Station Noise Contours

NAS_PAX_Fig3-17_MainStatNoise_20141211_CJM.pdf



Legend

Noise Contour (dB)
- 60 dB
- 65 dB

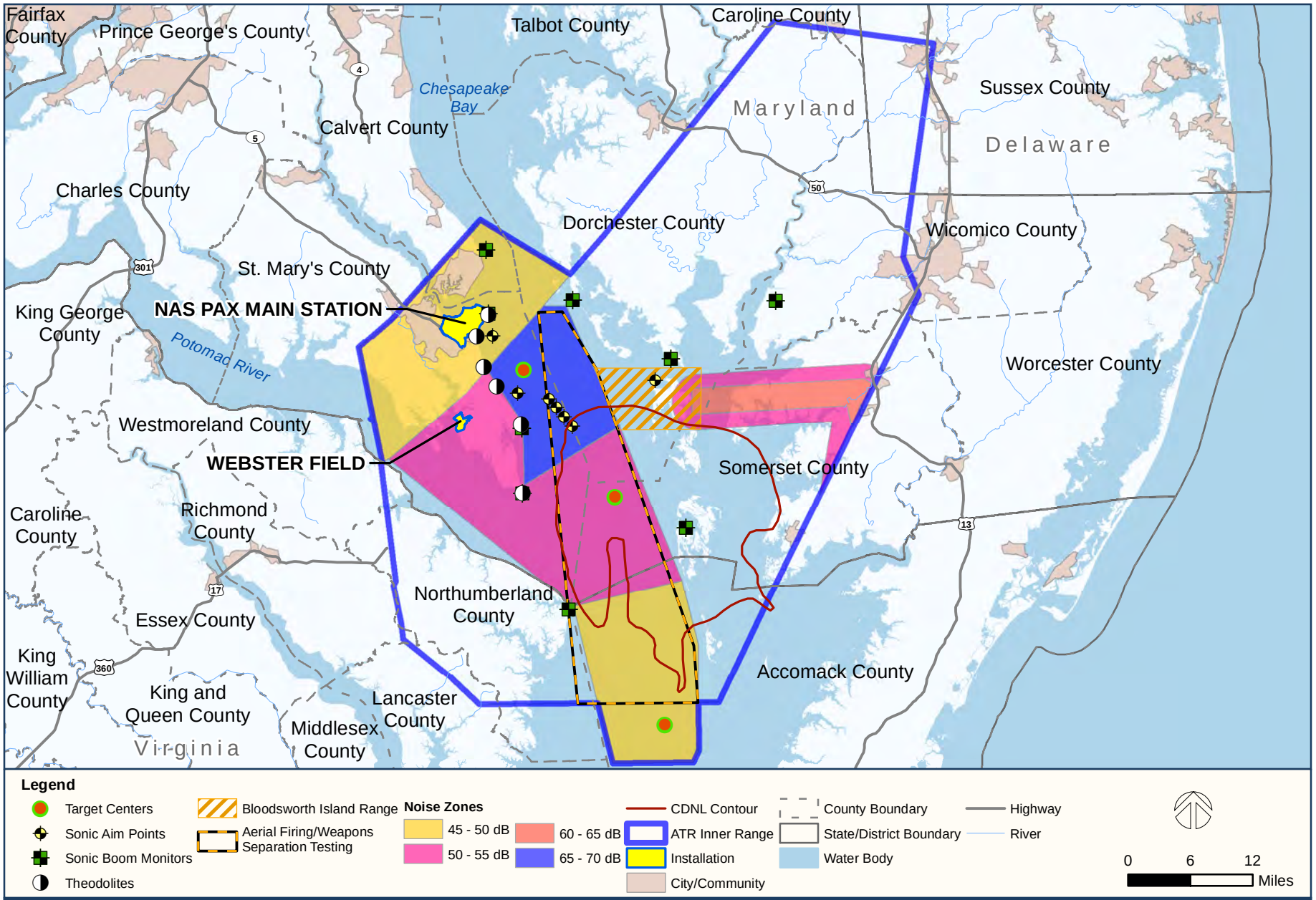
Installation
Runway
Water Body
Highway
Road

0 2,000 4,000 Feet

Sources:ESRI, 2010; NAS PAX, 2010

Figure 3-18
Webster Field Noise Contours

NAS_PAX_Fig3-18_WebsterNoise_20141211_CJM.pdf



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig3-19_ATRTargets_20141211_CJM.pdf

Figure 3-19
Atlantic Test Range Inner Range Targets

The **Hooper target**, used as a training device since 1949, is comprised of five highly visible and individual targets that are intended to serve as visual reference points for aircrew/aircraft mission systems in determining the location for weapons release. They are not intended to be struck by ordnance. It is located 6.5 miles (5.6 nm) north of Point No Point, Maryland. The target is used for reference purposes only. The actual targets associated with the Hooper target are expendable items such as rafts or barrels that are floated in the vicinity of Hooper target. Ordnance used includes inert bombs, rockets, torpedoes, mines, flares, chaff, and gun ammunition. The Hooper target is the most utilized water-based target within the ATR Inner Test Range and can be used for target scoring. The nearest land to Hooper target is approximately 3 miles (2.6 nm) to the west at The Elms Wildlife Management Area in St. Mary's County.

The **Hannibal target** is a cargo ship (the ex-American Mariner) that was scuttled in 1969. This target is intended as an impact target for both inert weapons drops and small arms fire. Scoring and precise data collections are not typically required for operations utilizing this target. The closest land to Hannibal target is South Marsh Island, approximately 4 miles (3.5 nm) to the northeast. South Marsh Island, comprising the South Marsh Wildlife Management Area, is uninhabited. The nearest inhabited land is Smith Island, located approximately 8 miles (7.2 nm) east-southeast of the Hannibal target.

The inactive **Tangier Island target** is surrounded by a restricted danger zone that may be closed to navigation during Navy exercises; however, the target and danger zone are not presently in use because of the poor condition of the target vessels.

Aim Points

An aim point is a precise point associated with a target and assigned for a specific weapon impact. There are no physical targets associated with these aim points.

Supersonic Aim Points: Four supersonic aim points are used during supersonic weapons separation tests within the aerial range. They are used by aircrew during supersonic weapons separation flights when attempting to conduct weapon impacts.

Bay Impact Point (BIP): The BIP is an aim point located in the center of a shallow water area and it is generally used when ordnance being tested requires recovery. This aim point is used when both accuracy and recoverability are important aspects of the test.

Shoals: The Shoals is the shallow water area north of the BIP that is used when recovery of the test article or ordnance under test is important but a designated aim point is not required. The Shoals have a hard sandy bottom which eases the task of ordnance recovery.

Bloodsworth Island Range

The BIR includes the restricted land and surrounding restricted waters of its surface danger zone. The surface danger zone covers approximately 26 square miles of surface water. A variety of targets including billboard-type signs, radar reflectors, simulated weapons platforms (e.g., full-size molded plastic tanks), discarded military and civilian vehicles (after removal of oil and gas), and other equipment are located on the BIR. These targets are used for the purposes of conducting range operations involving aviation-related RDAT&E within the SUA overlying the BIR. The RDAT&E aircraft operations include overflights of Bloodsworth Island; however, ordnance or other expendables are not released from the test aircraft. The targets on the BIR allow aircrews to learn how to sight and recognize ground-based threats. NAS PAX maintains existing targets including the replacement and/or relocation of targets on to meet specific RDAT&E requirements and conducts routine maintenance of the BIR's natural and cultural resources.

Aircraft Noise Contours: ATR Inner Test Range

Noise associated with airspace from such areas as Restricted Areas, MOAs, and MTRs are described differently than the noise metrics used to measure noise exposure in the vicinity of an air station or airfield. Military aircraft conduct training and maneuvers over land and water at low altitudes and high speeds often seeming to appear out of nowhere (producing a great amount of noise and then quickly disappearing). A modified noise metric to appropriately account for these factors utilizes the Sound Exposure Level (SEL) and adjusted DNL metrics that account for the "surprise" or "startle" effect of the onset rate of aircraft noise on humans. Onset-Rate Adjusted SEL is denoted SELr and the adjusted

DNL for the busiest month of the year is denoted as Onset-Rate Adjusted DNL (Ldnmr).

A unique characteristic of military aircraft is that they frequently operate in a sporadic fashion in designated low-altitude airspace. Because of the sporadic occurrences of aircraft events, the number of average daily operations is determined from the number of flying days in the calendar month with the highest number of operations in the airspace of interest. This metric is designated as Ldnmr, which is used as the primary metric for defining environmental noise occurring in the ATR Inner Test Range. Given the nature of the use of the ATR Inner Test Range, noise is measured for aircraft travelling at both subsonic and supersonic speeds.

The noise model used for predicting aircraft noise from aircraft operating in three types of airspace – MOAs, MTRs, and Range/Restricted Areas – is referred to as MR NMAP. This program is most appropriate for comparing "before-and-after" noise effects that would result from proposed changes or alternative actions when the calculations are made in a consistent manner. The model allows noise predictions for such proposed actions without the actual implementation or noise monitoring for those actions.

Subsonic Noise Contours

The modeled noise levels for the subsonic operations in the ATR Inner Test Range are based on MR NMAP model used to calculate and plot Ldnmr contours of 65 dB. Based on the resulting levels of planned aircraft activity, the area contained within the Ldnmr contour 65 dB is considered to be within Noise Zone II, an area where there is moderate noise impact. All other areas outside an Ldnmr contour of 65 dB are considered to be in Noise Zone I, which is subject to minimal or no noise impacts from operations within the ATR Inner Test Range.

Supersonic Noise and Sonic Booms

Aircraft flying at speeds exceeding Mach 1 create shock waves which are heard on the ground as a "sonic boom." Supersonic flight events can result in audible sonic booms. A sonic boom is an impulse sound, often occurring with no warning, similar to the sound of thunder or a double gunshot. Depending on the altitude of the aircraft and the air temperature, the path that the noise will travel on is downwards and away from the aircraft and can be altered enough so that it does not reach the ground.

The two metrics most used for quantifying sonic booms are Peak Overpressure and C-Weighted Day Night Average Sound Level (CDNL). The sonic boom Peak Overpressure is described in pounds per square foot and is used to describe the change in air pressure on the ground. The Peak Overpressure is also referred to as the amplitude of the sonic boom. Its value depends on the aircraft's size, weight, geometry, Mach number, and flight altitude. As a result, aircraft in maneuvering flight generate sonic booms of different amplitudes than aircraft in level flight. The second metric is the CDNL, which is similar to DNL, except for the frequency weighting. The human ear is not uniformly sensitive to all frequencies, thus the C-weighting scale, which is nearly flat throughout the range of audible frequencies, approximates the human ear's sensitivity to higher intensity sounds. C-weighting is generally used to quantify high-energy impulsive noise (e.g., sonic booms, detonation of high explosive materials).

These events are monitored to determine if the surrounding community is impacted. Events are tabulated according to altitude [above or at Flight Level (FL) 300 and below FL300], since these altitudes require different supersonic operational procedures. Supersonic Noise Contours represent supersonic operations within the ATR Inner Test Range. The most recent noise models for these events are based on an average of five sonic booms occurring per month within the range. The resulting levels are concentrated within the southeast area of the Restricted Areas, and farther southeast, in a stretch 50 to 100 nautical miles southeast of NAS PAX Main Station. The majority of sonic booms are concentrated over the Restricted Areas; however, long stretches of supersonic flights southeast of the air station (within MTRs VR 1711 and VR 1712) at 10,000 feet MSL and Mach numbers of 1.2 or 1.3 result in the 40 dB CDNL contour 50 to 100 nm southeast of the station.

Line of Sight High Risk of Adverse Impact Zone

The Line of Sight footprint is defined as the area in which electromagnetic waves or acoustic waves are transmitted or spread to various communication sites by simple unobstructed horizontal planes. This horizontal plane is at a certain height and allows for a clear, unobstructed pathway for the transmission of electromagnetic waves.

Depending on the structure's height and distance from the station, obstructions built within the radio frequency line of sight of RDAT&E systems and ATC radars may have a significant adverse impact to

RDAT&E activities and ATC services provided by NAS PAX. Sites that require clear line of sight in order to avoid adverse impacts to systems these systems may be designated by the DOD as a High Risk of Adverse Impact Zone (HRAIZ). The HRAIZ associated with NAS PAX and the ATR encompasses the ADAMS radar viewshed and extends to the Atlantic Warning Area as depicted on Figure 3-20.

Explosive Safety Quantity Distance Arcs

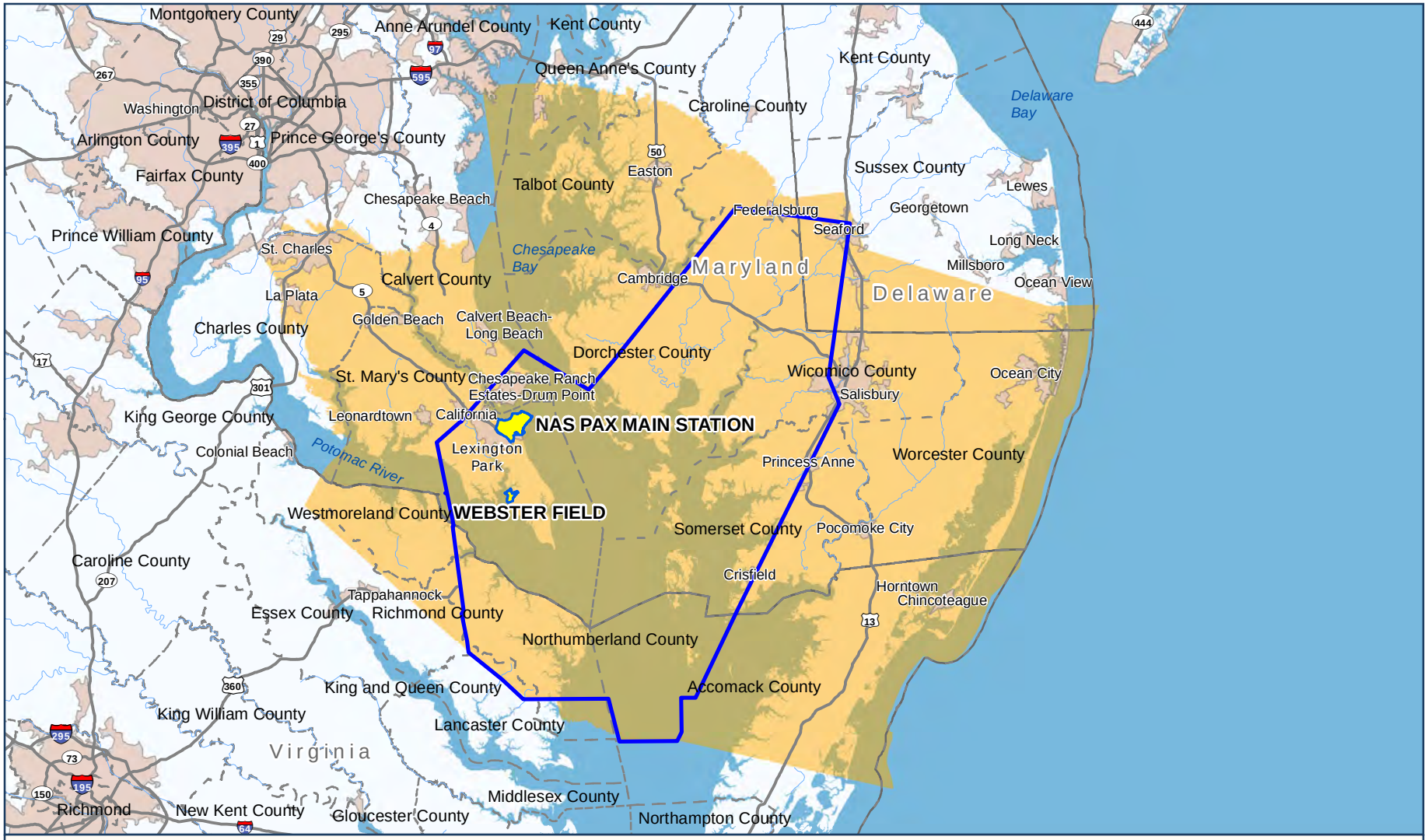
The explosive safety quantity distance (ESQD) arcs are the area where risk has been assessed based on the impacts of the types of explosives being stored. These arcs represent the setback distance from the ordnance storage or handling where inhabited facilities cannot be located. The setback distances are based on the quantity and type of explosives and represent the distance from the ordnance facility from which the potential for injury and damage is greatly reduced. The ESQD arcs do not extend off the NAS PAX property and do not pose an increased risk to adjacent or proximate land uses.

Bird /Wildlife Aircraft Strike Hazard

Birds and wildlife can present a significant hazard to military training and flight operations. Certain types of land uses attract birds and wildlife such as open water areas, standing water, and other natural areas. A bird/wildlife aircraft strike hazard (BASH) program has been adopted by NAS PAX to reduce the impact of birds on aircraft operations. Aircraft strikes are almost always fatal to the wildlife and sometimes fatal to the pilots operating sophisticated aircraft. Bird strike damage falls into three basic categories: engine ingestions, canopy penetrations and impact to the fuselage or attached equipment. It is usually an expensive encounter for aircraft, resulting in many millions of dollars in damage annually. As a result, NAS PAX has made its BASH program its highest natural resources management priority.

NAS PAX has a variety of facilities and natural areas that inadvertently provide ideal nesting and roosting spots for a variety of birds. Birds that roost on towers, antennas, and some other structures are both a nuisance and hazard. Procedures have been developed to reduce structure attractiveness for roosting and nesting. NAS PAX's active program to reduce exposure to bird and animal hazards on and around the airfield has resulted in minimal BASH incidents.

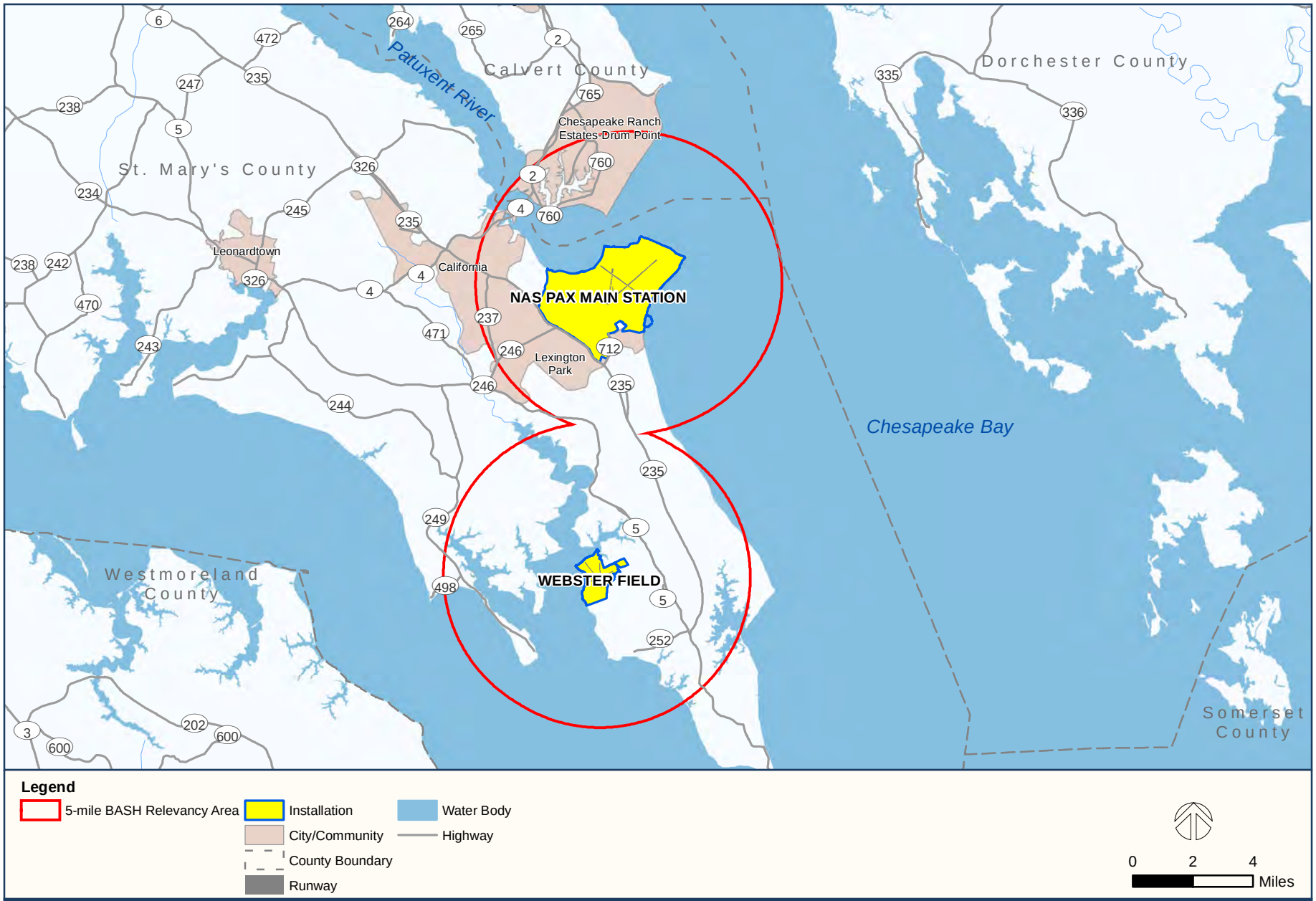
The FAA recommended BASH area of relevancy for bird and wildlife attractants is a 5 statute mile radius from the airfield indicated on Figure 3-21 for both NAS PAX Main Station and Webster Field.



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig3-20_HRAIZ_20141211_CJM.pdf

Figure 3-20
High Risk of Adverse Impact Zone



Sources: ESRI, 2010; FAA, 2014

Figure 3-21
BASH Relevancy Area

NAS_PAX_Fig3-21_BASH_20141211_CJM.pdf

4. Compatibility Tools

Inside Chapter 4 . . .

Introduction 4-1
Federal Plans and Programs 4-2
State of Maryland Plans and Programs 4-8
Maryland County and Municipal Plans and Programs 4-13
Commonwealth of Virginia Plans and Programs 4-28
Virginia County and Municipal Plans and Programs 4-33
Regional Planning Entities 4-35
Other References 4-36

Introduction

This section provides an overview of governmental plans and programs (tools) that are currently used or may be applied to either directly or indirectly address compatibility planning and issues identified within the Naval Air Station Patuxent River (NAS PAX) Joint Land Use Study (JLUS) Study Area.

There are three types of planning tools that are evaluated; permanent, semi-permanent, and conditional. Permanent planning tools include acquisition programs, either fee simple purchase of property or the purchase of development rights. Semi-permanent tools include regulations such as zoning or adopted legislation. Examples of conditional tools include comprehensive plans, memorandums of understanding, intergovernmental agreements, and other policy documents that can be modified.

An overview of relevant federal, state, and local plans and regional planning entities is included.

Federal Plans and Programs

Air Installations Compatible Use Zones

The United States Department of Defense (DOD) initiated the Air Installations Compatible Use Zones (AICUZ) program to assist government entities and communities in anticipating, identifying, and promoting compatible land use and development near military installations with aircraft activity. The AICUZ program involves coordinating the efforts of installation commanders and local community leaders and other government agencies to encourage compatible development of land in proximity to military airfields. It also serves to protect the health, safety, and welfare of civilians and military personnel by encouraging land development compatible with aircraft operations, while protecting the public investment in the installation. This program recommends compatibility measures and land uses that are compatible with specific elements of military airfields including elevated sound levels, accident potential zones, and obstruction clearance criteria.

- The Chief of Naval Operations Instruction (OPNAVINST) 11010.36C guides development and operations at Naval airfields. An AICUZ provides recommendations to local government and other entities for actions they can take to further compatibility goals and objectives of their comprehensive plans, zoning ordinances, and other land use policies and regulations. The most recent AICUZ studies were completed for NAS PAX Main Station in 2009 and for Webster Field in 2006. The noise contours and safety zones identified in the AICUZ studies are shown in Chapter 3 Military Profile of this JLUS.

Bird / Wildlife Aircraft Strike Hazard Program

The Bird / Wildlife Aircraft Strike Hazard (BASH) program is a DOD Partners in Flight program created to help implement and improve aviation safety programs. The BASH program is designed to minimize wildlife and bird strike damage to military aircraft by controlling habitat near airports, alerting aircrew and operations personnel of bird activity, and providing increased levels of flight safety, especially during the critical take-off and landing phases of flight. Specifically, the plan is designed to:

- Designate a Bird Hazard Warning Group (BHWG) and outline the members' responsibilities.
- Establish procedures to identify high hazard situations and establish aircraft and airfield operating procedures to avoid these situations.
- Ensure that all permanent and transient aircrews are aware of bird hazards and the procedures for avoidance.
- Develop guidelines to decrease the attractiveness of the airfield to birds and other wildlife and disperse the number of animals on the airfield.

The NAS PAX BASH program is outlined in NAS Patuxent River Instruction 3750.5H, which was most recently updated in 2014. NAS PAX's BASH program is inclusive of all birds, mammals, and reptiles, and is meant to reduce the wildlife strike hazard to aircraft operating at NAS PAX, Webster Field and the Bloodsworth Island Range by creating an integrated Mammal and Bird Control and Hazard Abatement Program. The program is designed to minimize aircraft exposure to potentially hazardous wildlife strikes at and around NAS PAX. The BASH program per Instruction 3750.5H includes precautionary actions to be taken to avoid aircraft strikes including education and training by appropriate personnel, management of the program by various personnel, including the Air Operations Officer, Air Traffic Control, Airfield Facilities Division, NAS PAX Security, Natural Resources Management, the United States Department of Agriculture Biologist, Installation Environmental Program Manager, and all Air Station Tenant Activities. The BASH program establishes condition codes specific to real-time conditions, and includes a report form and procedures in the event of a strike.

Clean Air Act

The Clean Air Act (CAA) of 1970, 42 U.S.C. 7401 et seq., amended in 1977 and 1990, is the primary federal statute governing air pollution. The CAA designates six pollutants as criteria pollutants, for which National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health and welfare. The six criteria pollutants are particulate matter (PM10 and PM2.5), carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and ozone.

The ambient air quality standards include primary and secondary standards. The primary standards are established at levels to protect public health, with an adequate margin of safety. The secondary standards are established at more stringent levels in order to protect the public welfare. The Maryland Department of the Environment has adopted the Environmental Protection Agency's (EPA's) NAAQS without any exceptions. Federal law requires states or local air quality control agencies to have a State Implementation Plan that prescribes measures to eliminate or reduce the severity and number of violations of NAAQS and to achieve expeditious attainment of these standards. Areas that meet the NAAQS for a criteria pollutant are designated as being in attainment. Areas where the criteria pollutant level exceeds the NAAQS are designated as being in nonattainment. Areas re-designated from nonattainment to attainment are commonly referred to as maintenance areas, indicating that the area is in attainment but subject to an EPA approved maintenance plan for a specific pollutant.

CAA is important to NAS PAX because if the local region is not in attainment for criteria pollutants, certain missions may have to be impeded or suspended until such a point when the regional air has improved to acceptable levels.

Clean Water Act

The Clean Water Act (CWA) governs the management of water resources and controls and monitors water pollution in the US. The CWA establishes the goals of eliminating the release of toxic substances and other sources of water pollution to ensure that surface waters meet high quality standards. In so doing the CWA prevents the contamination of nearshore, underground, and surface water sources.

CWA is important to NAS PAX because a clean and reliable source of water is necessary to sustain human presence on base. Decreases in water supply could limit the amount of on-base personal, which in turn, could jeopardize certain base missions.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451, et seq., as amended) encourages states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. The CZMA was initially created in 1972 and is administered by the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management. The CZMA provides a procedure for states to review federal actions for consistency with their own approved coastal management program. It also provides approved states with matching federal funding to administer their programs. To manage their extensive coastlines and associated uses and resources, both Virginia and Maryland administer comprehensive Coastal Programs for their state. Public access to the shore is also a primary CZMA objective.

Lands that are owned or managed by the federal government are excluded from the CZMA requirements. Section 307 (c)(1) of the Federal Coastal Zone Management Act Reauthorization Amendments (CZMA and CZMARA) of 1979, states that each federal agency conducting or supporting activities affecting any land, water use, or natural resource of the coastal zone must do so in a manner to the maximum extent practicable, consistent with the enforceable policies of each state's CZM program and policies. By this definition, NAS PAX is not subject to CZMA enforcement; however, if a proposed federal activity affects coastal resources or uses beyond the boundaries of the federal property, Section 307 of CZMA applies. Section 307 stipulates that federal projects that affect land uses, water uses, or other coastal resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's federally-approved coastal management plan. Federal consistency with a state's coastal zone management program is demonstrated by means of a coastal consistency determination that is submitted to the state agency responsible for review and comments. Applying for and complying with state permits when required by federal law also achieves consistency.

Department of Defense Energy Siting Clearinghouse

Section 358 of the 2011 National Defense Authorization Act pertains to studying the impacts of the development of new energy production facilities on military operations and readiness. The Energy Siting Clearinghouse serves to coordinate the DOD review of existing applications for energy projects. Several key elements of Section 358 include designation of a senior official and lead organization to conduct the review of energy project applications, a specific time frame for completion of a hazard assessment associated with an application (30 days), specific criteria for DOD objections to projects and a requirement to provide an annual status report to Congress. This legislation facilitates procedural certainty and a predictable process that promotes compatibility between energy independence and military capability.

Department of Energy Office of Energy Efficiency and Renewable Energy

The US Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy is responsible for developing and delivering market-driven solutions for energy-saving homes, buildings, and manufacturing; sustainable transportation; and renewable electricity generation.

The DOE's Wind Program funds research and development in wind power technology and evaluates market barriers such as environmental impacts, project siting, permitting processes, and the potential effects on US airspace and waterways. The program also assesses domestic wind energy potential, serves as a technical information resource, assists in the development of wind plant siting and permitting guidelines, and helps to develop testing centers for wind energy equipment.

The DOE's Solar Power Program funds research for developing and delivering innovative solar power technology that can compete with other sources of energy. Much of the research supports photovoltaic (PV) and solar thermal technologies that can be used to convert the sunlight into energy.

Projects furthered by DOE work could affect NAS PAX. Wind and solar projects have the ability to produce height and glare issues respectively. If projects are proposed within the Study Area, there may be incompatible encroachment on military aviation activity.

Endangered Species Act

The Endangered Species Act (ESA) establishes a program for the conservation of threatened and endangered plants and animals and their habitats. The US Fish and Wildlife Service (USFWS) and NOAA are the lead implementing agencies of the ESA. The ESA requires federal agencies, in consultation with the USFWS and/or the NOAA Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a taking of any listed species of endangered fish or wildlife. ESA provides a platform for the protection of critical habitat and species that may be at risk of extinction. Location of an endangered species within NAS PAX military influence areas may inhibit full realization of military missions due to preservation requirements.

Federal Aviation Act

The Federal Aviation Act was passed in 1958 to provide methods for overseeing and regulating civilian and military use of airspace over the United States. It requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable air space. The intent is to serve the needs of both civilian aeronautics and national defense, but it does not specifically address the specific needs of military agencies. Military planning strives to work alongside local, state, and federal aviation law and policies but sometimes must supersede these and other levels of government due to national security interests. The Federal Aviation Administration (FAA) was created as a result of the Federal Aviation Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has a public right of freedom of transit in air commerce through the navigable air space of the United States. The rule was

formally announced in the 1963 Court of Claims ruling in Aaron v. United States and states that flights 500 feet or more above ground level (AGL) do not represent a compensable taking because flights 500 feet AGL enjoy a right of free passage without liability to the owners below.

Another important outcome of the Federal Aviation Act is Federal Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation determines compatibility based on the height of proposed structures or natural features in relation to the distance from the runways centerline. Using a distance formula from this regulation, local jurisdictions can assess the height restrictions near airfields. Additional information on Part 77 is located on the Federal Aviation Administration Internet site at http://www.faa.gov/.

Department of Housing and Urban Development Noise Regulation

The United States Department of Housing and Urban Development (HUD) has instituted policies through 24 Code of Federal Regulations (CFR) Part 51 designed to promote the creation of controls and standards for community noise abatement by state and local governments to reduce noise levels for homes. Included among the various policies are:

(1) a requirement that noise exposure and sources of noise be given adequate consideration as an integral part of urban environment in connection with all HUD programs, which provide financial support to planning;

(2) a withholding of HUD assistance for the construction of new dwelling units on sites (which have or are projected to have unacceptable noise exposure), or are in runway Clear Zones or incompatible uses in Accident Potential Zones;

(3) encouragement of modernization efforts for existing buildings in noise environments; and

(4) grants and allowances to state and local governments to provide acoustical privacy in multifamily dwellings through building design and acoustical treatment.

Generally, external noise exposure within Noise Zone 3 (as identified in an installation's AICUZ study) is considered unacceptable and within Noise Zone 2 is normally unacceptable with respect to new construction. HUD funds may also be available to encourage noise abatement planning and acoustical treatment for proposed and existing incompatible land uses within the noise zones identified in an AICUZ study.

Approvals of mortgage loans from the Federal Housing Administration and the Veterans Administration are subject to this HUD circular. The circular sets forth a discretionary policy to withhold funds for housing projects when noise exposure is in excess of proscribed levels. Residential construction may be permitted within certain noise contours, provided sound attenuation is accomplished. The added construction expense of sound attenuation, however, may make siting in these noise exposure areas financially less attractive. Because the HUD policy is discretionary, variances may also be permitted, depending on regional interpretation and local conditions. These new structures could then incorporate noise-inhibiting features into their design and construction when using these loans. HUD also has a policy (24 CFR 51D), which prohibits funding for projects in runway Clear Zones and Accident Potential Zones unless the project is compatible with the safety zones identified in an AICUZ study. Such policies help to protect NAS PAX from incompatible development.

Integrated Natural Resource Management Plan

Under the Sikes Act Improvement Act of 1997 (16 U.S.C. Section 670a et seq. and Public Law 105-85), Congress directed the Secretary of Defense to improve a program to conserve and rehabilitate natural resources on military installations. To facilitate the program, the secretary of each military service prepared and implemented an Integrated Natural Resources Management Plan (INRMP) for each military installation located in the US. An INRMP supports the military mission, protects the ecological condition, and provides for appropriate public use of military-owned and withdrawn lands.

NAS PAX maintains an INRMP for the Main Station, Webster Field, the Bloodsworth Island Range, and Navy Recreation Center Solomons. The INRMP addresses land management, forest management, fisheries management, cultural resources management, outdoor recreation management, and environmental education.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 is a federal regulation that established a US national policy promoting the protection and enhancement of the environment and requires federal agencies to analyze and consider the potential environmental impact of their actions. The purpose of NEPA is to promote informed decision-making by federal agencies by making detailed information concerning significant environmental impacts available to both agency leaders and the public.

All projects receiving federal funding require NEPA compliance and documentation. NEPA is applicable to all federal agencies, including the military. In the NEPA process, an Environmental Impact Statement (EIS) is considered after the Environmental Assessment (EA) determines if the action is necessary, and needs further federal review and approval. If neither an EA nor EIS is necessary, and the proposed action does not have a significant effect on the human environment, a Categorical Exclusion (CE) would be implemented. This category was developed for federal agencies as guidance on the NEPA implementation process. The CE allows for agencies to continue with the proposed action without further NEPA review.

A NEPA document can serve as a valuable planning tool for local planning officials. An EA or EIS can assist in the determination of potential impacts that may result from changing military actions or operations and their effect on municipal policies, plans and programs, and the surrounding community. An EA is used to determine if impacts are significant, in which case an EIS would be prepared with subsequent Record of Decision. An EA must include a form of public involvement such as public meetings and a public review and comment period of the Draft EA. If impacts are determined to not be significant, a Finding of No Significant Impact is prepared and a subsequent Record of Decision is issued. If impacts are determined to be significant, then an EIS must be prepared.

The information obtained by the EA or EIS is also valuable in planning coordination and policy formation at the local government level. The EA and EIS are public processes which encourage participation by all interested parties, including NAS PAX.

National Pollutant Discharge Elimination System

Pursuant to the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources such as pipes or man-made ditches that discharge pollutants into US waters. According to the law, individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Traditionally, NPDES focused on point sources however, more recently the focus has shifted to nonpoint sources. Nonpoint sources generally include sheet flow runoff from pavement, agricultural fields and lawn areas, which by their nature, are more difficult to regulate.

Within the NAS PAX JLUS Study Area, nonpoint sources have impacted surface and groundwater resources, particularly with respect to nutrients (animal wastes, fertilizers, etc.). The impacts of nonpoint pollution are included as one of the main justifications for the strategies contained in Maryland's comprehensive planning process.

Navy Encroachment Management Program

An Encroachment Action Plan (EAP) is an important tool that is developed as a blueprint for an installation or range's Encroachment Management Program. An EAP is designed to identify, quantify, assess, and provide recommendations to mitigate or prevent encroachment impacts around Navy installations. An EAP responds to the requirements of the Navy Encroachment Management Program as described in OPNAVINST 11010.40. Encroachment is primarily any non-Navy action planned or executed which inhibits, curtails, or possesses the potential to impede the performance of Navy activities. An EAP provides the host installation with a methodological approach to address existing and potential encroachment that may impact the Navy's mission. This includes regularly sharing information, analysis, and insights relevant to encroachment and the requirements of current and future test and training operations. Each Navy installation utilizes its EAP to support the analysis and implementation of encroachment mitigation efforts.

The NAS PAX EAP was most recently completed in July 2007 and is currently in the process of being updated. The EAP is actively maintained and serves as an internal encroachment monitoring and management plan for the installation.

Noise Control Act of 1972

The Noise Control Act of 1972 determined that noise that is not adequately controlled has the potential of endangering the health and welfare of people. It states that all Americans are entitled to an environment free from noise that can jeopardize their general health and quality of life. Along with state, local, and territorial governments, actions from the federal government were needed to ensure that the objectives of the Noise Control Act were met.

Concurrently, military installations were experiencing the impacts related to encroaching urban development locating adjacent to the installation and the resulting complaints regarding noise from military operations. In 1973, the DOD responded by establishing the AICUZ program as described previously in this chapter. As communities grow, it is important that the military installation, developers, and the communities work together to mitigate the issue of noise and develop ways to coexist compatibly.

Range Air Installations Compatible Use Zones

A Range Air Installations Compatible Use Zones (RAICUZ) study is a DOD program used to identify safety zones and noise contours associated with military-related operations and training exercises such as weapons delivery and target bombing practice conducted on a range. The primary purpose of a RAICUZ study is to provide local government and land management agencies with recommended land uses to protect the general welfare of the public from impacts related to military training and operations and preserve the viability of the military mission and readiness.

The most recent RAICUZ Study for the Chesapeake Test Range was completed in 2009 and contains recommendations on how to achieve the following objectives of the RAICUZ program:

- Precluding public exposure to hazards and noise associated with air-to-ground ranges and promoting compatible land use near air-to-ground ranges;
- Protecting Navy and Marine Corps investment by safeguarding the current and potential operational capabilities of those ranges;
- Informing the public about the RAICUZ program and seeking cooperative efforts to minimize potential safety and noise impacts in the vicinity of the air-to-ground ranges;
- Establishing working relationships between the installation and appropriate local, regional and state community councils, commissions, Indian tribes and planning and zoning departments in order to mutually communicate proposed actions that could affect public health, safety and welfare as well as operational and training capabilities and compatible land use recommendations.

Readiness and Environmental Protection Initiative

The Readiness and Environmental Protection Initiative (REPI) was authorized by Congress to financially assist the military services in working with other government agencies, including local governments, to establish buffers around military installations. In an effort to protect the future use of installations and training land, the fiscal year (FY) 2003 National Defense Authorization Act authorized the Military Services (Army, Navy, Marine Corps, and Air Force) to enter into agreements with eligible entities, such as conservation organizations, local governments, non-governmental organizations, and willing land owners to acquire real estate or conservation easements (from willing sellers only) in the vicinity of, or ecologically related to, a military installation or military airspace. This program serves as a dual benefit program: to protect military readiness by preventing incompatible development along borders between military installations and their neighbors and to protect sensitive environmental natural resources. The statutory authority can be found in the United States Code at 10 U.S.C. 2648a.

Through the REPI program, nine DOD installations in the Chesapeake Bay watershed currently maintain active REPI partnerships. These installations are Aberdeen Proving Ground, Fort A.P. Hill, Marine Corps Base Quantico, NAS Oceana, NAS PAX, Naval Support Activity

Hampton Roads, Naval Support Facility (NSF) Indian Head, and NSF Dahlgren. The total number of acres conserved/protected at these installations as of FY 2013 was 14,193 acres.

Telecommunications Act of 1996 and the Federal Communications Commission

The Telecommunications Act of 1996 was the first comprehensive update to a federal telecommunication law in over 60 years and was in large part intended to open up the marketplace to greater competition. Changes in the means through which information is produced, accessed, stored, and shared made the federal government response imperative. The increasing use and development of personal mobile phones, satellite transmission, high speed fiber optics, and other related factors are often pushing demand beyond the system capacity.

New telecommunication tower siting requires compliance with the Federal Communications Commission's (FCC) environmental review standards and procedures, including NEPA and ESA compliance, National Historic Preservation Act compliance, adherence to any applicable FAA requirements and structure registration with the FCC. The actual approval of physical installations is subject to state and local permits and approvals; however, state and local authority is limited by FCC law. For instance, states and local jurisdictions cannot base their decisions on any purported environmental effects of radio frequency transmissions. Telecommunications towers have the potential to cause vertical obstruction issues near NAS PAX. Requirements for tower placement can help to reduce potential incompatibility.

State of Maryland Plans and Programs

Chesapeake Bay Critical Area

The Critical Area Commission for the Chesapeake and Atlantic Coastal Bays was created as the Chesapeake Bay Critical Area Commission within the Department of Natural Resources in 1984 (Chapter 794, Acts of 1984). Initially, the Commission's charge was to adopt necessary criteria and regulations to minimize the adverse effects of human activity on the Chesapeake Bay ecosystem and guide future development. For the Chesapeake Bay Critical Area, these criteria and regulations were completed in 1985. From 1985 to 1990, the Commission reviewed and approved local critical area plans for those jurisdictions required by law to have such a plan. The Critical Area helps to protect NAS PAX from certain developments which may encroach on military influence areas. The Critical Area Program is a land use and resource protection program established by law to improve water quality and protect wildlife habitat in Maryland's tidal shoreline areas. The program operates through local county and municipal plans and ordinances. The law requires every Maryland jurisdiction with land in the Critical Area, to implement a Critical Area program through local ordinances, codes, plans, and policies

The law identified the Critical Area as all land within 1,000 feet of the Mean High Water Line of tidal waters or the landward edge of tidal wetlands and all waters of and lands under the Chesapeake Bay and its tributaries.

Land within the Critical Area is classified as Resource Conservation Area (RCA), Limited Development Area (LDA), and Intensely Developed Area (IDA). These designations are based on land uses that existed on December 1, 1985 in the Chesapeake Bay Critical Area and on June 1, 2002 in the Atlantic Coastal Bays Critical Area.

Certain provisions of the Critical Area criteria apply throughout the Critical Area and are applied uniformly regardless of the Critical Area designation. Other provisions are specific to the land classifications of IDA, LDA, and RCA; these result in particular development criteria and performance standards.

Some development activities are not permitted in the Critical Area because of their potential to adversely affect habitat and water quality. For example, sanitary landfills and solid or hazardous waste collection or disposal facilities are not permitted in the Critical Area unless there is no environmentally acceptable alternative outside the Critical Area. In these cases, it must be demonstrated that the facilities are needed to correct an existing water quality or wastewater management problem. Local governments can also prohibit other uses that they believe would adversely affect habitat or water quality if located within the Critical Area.

Generally, the prohibition or limitation of specific uses within the Critical Area is part of a local government's zoning code or ordinance.

Intensely Developed Areas are where residential, commercial, institutional, and industrial developed land uses predominate and there is relatively little natural habitat. At the time of original mapping, IDAs were designated through a determination that the area had at least one of the following characteristics: a density of development equal to or greater than four dwelling units per acre; the presence of public sewer and water systems with a density of greater than three dwelling units per acre; or a concentration of industrial, institutional or commercial uses. In addition, these areas had to consist of at least 20 contiguous acres or the entire upland portion of a municipality within the Critical Area, whichever was less. Because IDAs are developed areas where there may be little or no natural habitat, the focus of the Critical Area regulations is on improving water quality through stormwater management, the use of permeable surfaces, and the preservation of existing natural forest vegetation.

Limited Development Areas are areas developed at low or moderate intensity. They also contain areas of natural plant and animal habitats, and the quality of runoff from these areas has not been substantially altered or impaired. At the time of original mapping, areas having at least one of the following features were classified as LDAs: housing density between one dwelling unit per five acres and four dwelling units per acre; areas not dominated by agriculture, wetland, forest, barren land, surface water or open space; and areas having public sewer, public water, or both. Areas with IDA characteristics, but that were less than 20 adjacent acres, were classified as LDA.

Resource Conservation Areas are areas characterized by nature-dominated environments, such as wetlands, forests, and abandoned fields, and resource utilization activities, such as agriculture, forestry, fisheries, and aquaculture. At the time of original mapping, areas having at least one of the following features were classified as RCAs: a density of one dwelling unit per five acres or less; or, a dominant use of agriculture, wetland, forest, barren land, surface water, or open space.

Economic Growth, Resource Protection, and Planning Act

The 1992 Economic Growth, Resource Protection, and Planning Act articulates Maryland's growth policy through seven visions centered on concentrating development in suitable areas, protecting sensitive areas, and establishing funding mechanisms to achieve the visions. This also requires local jurisdictions to review, and if necessary, update their plans once every ten years, and to address these same visions in their comprehensive plans. All local jurisdictions, with few exceptions, incorporated these visions into their comprehensive plans on or before July 1, 1997.

The Economic Growth, Resource Protection, and Planning Act is codified in §5-7A-01 of the State Finance and Procurement Article of the Annotated Code. The Planning Visions Bill: 2009 Smart, Green, and Growing Legislation (Senate Bill 273 / House Bill 294) updated the planning visions with 12 new visions that address quality of life and sustainability, public participation, growth areas, community design, infrastructure, transportation, housing, economic development, environmental protection, resource conservation, stewardship, and implementation approaches. These new planning visions are the state's land use policy and a local jurisdiction is required to include the visions in the local comprehensive plan and implement them through zoning ordinances and regulations.

Sustainable Growth and Agricultural Preservation Act

Also known as the Septic Law, the 2012 act is represented as a step towards smart growth for the State of Maryland. The Septic law limits septic systems that are developed onto large residential lots and establishes growth through a mapping system known as the four tiers, which highlights areas that are served by a public sewer, on-site waste disposal or septic system. Under this law, guidance is provided for local jurisdictions on where to promote growth in its rural, forested, resource and agricultural lands. For the citizens of Maryland this will allow for more predictable and accountable development. This will also help NAS PAX to better assess future development impacts within the vicinity.

Maryland Coastal Zone Management Program

In response to the federal CZMA, the Maryland Coastal Zone Management Program (Chesapeake & Coastal Program) was formally created in 1978 representing a unique partnership between the state and the federal government and playing a dynamic role in shaping environmental policy in the state.

The CZMA provides Maryland with the means to administer its Coastal Zone Management Program and the opportunity to work with partners at the local level to develop programs, plans and strategies to address specific coastal issues. Maryland is awarded funds based on the size of its coastal population and the length of its tidal shoreline. Maryland currently receives about $2.5 million annually from the NOAA Office of Ocean and Coastal Resource Management.

Coastal Zone Management grants are generally 18 months in duration, from October 1 of one year to March 31 two years out. The total funds awarded to the program from each of these 18-month grants ranges from $4.5 to $4.7 million which includes both federal funds and non-federal match. Under each separate contract, normally 12 months in duration, funded projects are reimbursed for funds expended once work is completed.

The Maryland coastal zone is comprised of the land, water, and subaqueous land between the territorial limits of Maryland in the Chesapeake Bay, Atlantic Coastal Bays, and the Atlantic Ocean, as well as the towns, cities, and counties that contain and help govern the thousands of miles of Maryland shoreline. The Maryland coastal zone extends from three miles out in the Atlantic Ocean to the inland boundaries of the 16 counties and City of Baltimore that border the Atlantic Ocean, Chesapeake Bay and the Potomac River up to the District of Columbia. This area encompasses two-thirds of the state's land area and is home to almost 70 percent of Maryland's residents. All of the Maryland counties involved in the NAS PAX JLUS are located within Maryland's designated coastal zone.

Maryland Military Installation Council

The Maryland Military Installation Council (MMIC) originated as the Maryland Military Installation Strategic Planning Council established in August 2003 (Chapter 335, Acts of 2003). Effective June 1, 2006, the Council was restructured as the Maryland Military Installation Council (Chapter 634, Acts of 2006). MMIC serves as a forum for local community, military installation, business, state agency, and elected official dialogue on issues associated with Maryland's military installations. MMIC is a division of the Maryland Department of Business and Economic Development. MMIC works to identify what public infrastructure and community support is needed for the development and expansion of Maryland's military installations and what the potential impact of that development and expansion will be on local communities. MMIC also researches how other jurisdictions cope with increased development around military installations and reviews state policies in order to best support the mission of the military installations and maximize economic benefits to local communities.

Maryland Energy Administration

The mission of the Maryland Energy Administration (MEA) is to promote affordable, reliable, and clean energy. MEA's programs and policies help lower energy bills, fuel the creation of green collar jobs, address environmental and climate impacts, and promote energy independence. The state has a goal of producing 20,000 megawatts of clean energy by 2022. Clean energy can be defined as energy produced through renewable resources, such as solar, wind, geothermal, and biomass. The MEA has taken the lead in promoting the development of on and offshore wind power. Placement of various renewable energy production facilities have the potential to encroach on NAS PAX and its military influence areas.

Maryland Renewable Portfolio Standard

Maryland's Renewable Portfolio Standard requires that 20 percent of the state's electricity be generated from renewable energy sources (such as wind, solar, and biomass) by 2022. Beginning in 2006, electricity suppliers were required to provide 3.5 percent of retail electricity sales in the state from renewables. The renewables requirement increases gradually, ultimately reaching a level of 20 percent.

In 2013 the state established an offshore wind carve-out of up to 2.5 percent beginning in 2017, with the actual annual requirements to be established by the Maryland Public Service Commission (PSC) subject to the 2.5 percent limitation. Both the solar carve-out and the offshore wind carve-out are part of the overall Tier 1 requirement, thus they have the effect of reducing the requirements for other Tier 1 resources. Tier 1 resources include solar, wind, qualifying biomass (excluding sawdust), methane (from the anaerobic decomposition of organic materials in a landfill or a waste water treatment plant), geothermal, ocean (including energy from waves, tides, currents and thermal differences), fuel cells powered by methane or biomass, and small hydroelectric plants (systems less than 30 megawatts in capacity and in operation as of January 1, 2004). As a result of Senate Bill (SB) 348 in 2008, poultry-litter incineration facilities connected to the Maryland distribution grid now qualify as a Tier 1 resource. Additionally, as a result of SB 690 enacted in May 2011 and effective October 1, 2011, waste-to-energy facilities and facilities that use refuse-derived fuel which are connected to the Maryland distribution grid also now qualify as Tier 1 resources. Prior to this, waste-to-energy facilities were only eligible as Tier 2 resources and facilities that use refuse-derived fuel were not specifically addressed. As a result of 2012 legislation, certain geothermal heating and cooling systems and biomass systems that generate thermal energy also qualify as Tier 1 resources.

Tier 2 sources include hydroelectric power other than pump-storage generation and waste-to-energy facilities through October 1, 2011. The Maryland Offshore Wind Energy Act of 2013 created a mechanism to incentivize the development of up to 500 megawatts of offshore wind capacity at least 10 nautical miles off of Maryland's coast.

Greenhouse Gas Emissions Reduction Act

The Greenhouse Gas Emissions Reduction Act of 2009 (GGRA) requires Maryland to reduce greenhouse gas emissions 25 percent by 2020, relative to 2006 levels. Maryland is one of nine states currently participating in the Regional Greenhouse Gas Initiative (RGGI), a multi-state cap-and-trade program meant to reduce carbon dioxide (CO_2) emissions from electricity generating plants. RGGI is designed to reduce CO_2, a greenhouse gas, from the state's electricity generators by roughly 10 percent from current levels by 2019. As part of this Act, a plan that achieves a 25 percent statewide reduction in greenhouse gas (GHG) emissions by 2020 was mandated and resulted in the development of the 2013 Greenhouse Gas Reduction Plan.

The GGRA has many objectives, including further clean-up of the Chesapeake Bay, helping to meet new National Ambient Air Quality Standards, and meeting federal and state requirements for regional haze, mercury, and other air toxins. The GGRA's primary objective is to reduce GHG emissions while helping Maryland with economic recovery and creating new green jobs. The GGRA specifically required the development of a baseline inventory using the year 2006 level of emissions. This inventory was developed based on six categories of greenhouse gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbon, and perfluorocarbon. Collectively, these gases are referred to as carbon dioxide equivalent, or CO_2e. The 25 percent reduction is subtracted from the baseline to create a target level of emissions for 2020.

2013 Greenhouse Gas Reduction Plan

Maryland's Greenhouse Gas Reduction Plan was developed as part of the Greenhouse Gas Emissions Reduction Act addresses energy and its relationships to transportation, land use, farming and forestry, solid waste, building construction standards, and other related areas. The plan identifies a variety of strategies and programs that are expected to assist in meeting greenhouse gas reduction goals. Some of the key strategies and programs that were identified as those that will drive more than 80 percent of GHG emission reductions include the implementation of:

- **Maryland Renewable Energy Portfolio Standard (RPS)** program to attain 20 percent of the state's electricity from renewable sources by 2022. Maryland's RPS should contribute to a reduction of 10.96 million metric tons of CO_2e ($MMtCO_2e$) in the state's GHG emissions by 2020.
- **EmPOWER Maryland** was enacted in 2008 and set a target to reduce both Maryland's per capita total electricity consumption and peak load demand by 15 percent below 2007 levels by 2015. EmPOWER includes numerous state and utility managed energy efficiency and conservations programs. EmPOWER programs, with some General Assembly and PSC-approved enhancements,

should reduce Maryland's GHG emissions by 10.52 MMtCO2e by 2020.

- **Zero Waste** is Maryland's long-term strategy to an 85 percent reduction in the generation of solid waste by 2030. Zero Waste is a concept that calls for the near complete elimination of solid waste sent to landfills or incinerators for disposal, and where, instead, the vast majority of Maryland's solid waste is reused, recycled, composted, or prevented through source reduction. Maryland's zero waste efforts should contribute to a 4.80 MMtCO2e reduction in the state's GHG emissions by 2020.

- **RGGI** is a cooperative effort by nine Northeast and Mid-Atlantic states to design and implement a regional cap-and-trade program to reduce CO2 emissions from power plants in the region. RGGI serves as the framework program by which the EmPOWER and RPS programs are implemented. Recent efforts to strengthen RGGI will reduce Maryland's GHG emissions by 3.60 MMtCO2e by 2020.

- **Building and Trade Codes** in Maryland include minimum energy efficiency requirements and provide long-term GHG savings. Maryland's Building Performance Standards are updated by regulation every three years following the three-year cycle of the International Code Council. Progressive building and trade codes adjustment in Maryland should contribute to a 3.15 MMtCO2e reduction in the state's GHG emissions by 2020.

1997 Priority Funding Areas Act

The 1997 Priority Funding Areas Act directs state funding for growth related infrastructure to Priority Funding Areas (PFAs), providing a geographic focus for state investment in growth. PFAs are existing communities and places where local governments request state funding for future growth. Growth-related projects include most state programs that encourage growth and development such as highways, sewer and water construction, economic development assistance, and state leases or construction of new office facilities. This act legislatively designated certain areas as PFAs and established criteria for locally designated PFAs. The criteria include permitted density, water and sewer availability and designation as a growth area in the jurisdiction's comprehensive plan. The Priority Funding Area Act is codified in §5-7B of the State Finance and Procurement Article of the Annotated Code of Maryland.

PFA location within the JLUS Study Area can potentially cause development of incompatible uses and encroachment on military influence areas.

Real Estate Disclosure (Southern Maryland Disclosure)

The Southern Maryland Association of Realtors has included an addendum to the standard purchase / sale contract to incorporate the following:

Military Aircraft Operations. The property may be located within or near several military aircraft operation centers located in Calvert County, Charles County, Prince George's County or St. Mary's County. Properties located within or near such military aircraft operation centers may be impacted by varying degrees of noise levels and potential military aircraft accidents as well as noise from gunfire or explosive testing. The following is a description of such military aircraft operation centers; however the following list is not all inclusive:

(A) *NAS PAX typically conducts flight operations seven days per week, between 8 a.m. and 11 p.m. However, infrequent flight operations occur outside these times. The effects from the Navy's flight operations extend beyond the boundaries of the naval facility. The present level and type of operations will continue for the foreseeable future. For additional information, contact the NAS Patuxent River Public Affairs Office.*

(B) Buyer acknowledges that Buyer, prior to the submission of a written offer to purchase the property, is solely responsible to contact the military aircraft operation centers, as identified above, which may impact upon the property in order to ascertain the potential noise levels and accident probabilities in relation to the location of the property within or near one or more of the above military aircraft operation centers.

Disclosure requirements are very important to help decrease the potential for citizen complaints due to military activity within the JLUS Study Area.

Maryland County and Municipal Plans and Programs

In Maryland, authority to regulate land use is delegated by the state to counties and municipalities. The counties and municipalities are not required to exercise these authorities, but if these powers are exercised, they must be exercised in accordance with specific provisions of state law.

The nature of a jurisdiction's authority to regulate local land use depends on that jurisdiction's form of local government. For instance, the "Land Use Article" of the Annotated Code of Maryland provides the legal basis for planning at the municipality and county level throughout most of Maryland. In such cases, the Article grants the authority to prepare a comprehensive or master plan, a zoning ordinance, and subdivision regulations to many of the state's municipalities, as well as to the City of Baltimore and to "non-charter" counties. Maryland's municipalities and non-charter counties use these three tools to manage land use within their boundaries.

Five of the Maryland counties within the NAS PAX JLUS Study Area are "non-charter" counties (Calvert, Caroline, Charles, Somerset, and St. Mary's) and therefore derive their authority to regulate land use from the Land Use Article. The remaining counties in Maryland's portion of the JLUS Study Area (Dorchester, Talbot, and Wicomico) are charter counties. In the case of charter counties, Maryland's General Assembly grants planning and zoning authority under the "Express Powers Act" and not through the Land Use Article.

These distinctions may have relevance to the particular scope of the delegated authority, to procedural requirements affecting land use planning and regulation or to other such matters. In addition to their comprehensive plans and zoning ordinances, counties and municipalities may also elect to use other tools to address specific compatibility issues. For example, Maryland state regulations require a general notification of potential noise from military installations, but local jurisdictions may further specify that this notification be accomplished through the land development process or real estate transfer. They may also require specific noise abatement techniques for construction in defined areas (such as a zoning overlay district) with measurable and clearly identified noise impacts.

The Comprehensive Plan and Zoning Ordinance

Comprehensive plans capture how people want their communities to function and grow. In Maryland, local jurisdictions are required to review and, if necessary, update their comprehensive plans every ten years. The Maryland Department of Planning offers technical assistance for these updates. The Land Use Article of the Annotated Code of Maryland outlines different elements that the comprehensive plan must address and gives the planning commission the authority to include additional elements not required by Land Use Article. The Maryland Department of Planning has published two documents on comprehensive plans: Preparing a Comprehensive Plan (#13 in the Models & Guidelines Series) and Revisiting the Comprehensive Plan: The Ten Year Review (#20 in the Models & Guidelines Series).

The most fundamental implementation tool is zoning. A zoning ordinance establishes regulations for the use of land and some standards for development within identified zoning district boundaries. A related zoning map identifies properties that fall within different zoning categories. Zoning regulations must be uniform for each class or kind of development throughout each district, but regulations usually differ between districts.

Calvert County

Calvert County is located on the east side of the Patuxent River directly north of NAS PAX Main Station. NAS PAX is recognized in Calvert County plans as an economic driver that may encourage high-tech firms to locate in southern Calvert County.

Comprehensive Plan

The current Calvert County Comprehensive Plan was updated in 2010. The following considerations are identified within the components of the plan:

- The NAS PAX Main Station AICUZ Study (2009) indicates that the 65 to 70 decibel (dB) day-night average sound level (DNL) noise contour (which are described in greater detail in Chapter 3 of the NAS PAX JLUS), in which residential uses are considered inappropriate, extends into the southern tip of Calvert County. Neither the Comprehensive Plan nor the Solomons Town Center Master Plan discusses the noise implications of Naval flight operations on Solomons Town Center or the surrounding portions of the county.
- The Comprehensive Plan notes the proximity of NAS PAX Main Station to the Solomons and Lusby Town Centers located at the south end of Calvert County. The Plan also notes the necessary infrastructure and suitable location to attract high-technology defense contractors to the town centers.
- Calvert County recognizes that its roads are links in the regional traffic network. The Comprehensive Plan supports road improvements necessary to reduce congestion on MD Routes 4 and 2/4. Such improvements would help to bring employees and visitors to NAS PAX.
- The Comprehensive Plan discusses potential plans to expand the Thomas Johnson Bridge, which connects Calvert County to St. Mary's County.
- The plan recommends a regional approach to transportation, continued participation with St. Mary's and Charles counties in the Southern Maryland Regional Transportation Coordination Program, and coordination of transportation planning with state, federal, and regional agencies.
- The close proximity of Calvert County's southern tip to NAS PAX suggests the need for the coordination of planning and regulatory issues to address the impacts of revised noise contours from NAS PAX flight patterns, the evaluation and mitigation of impacts of wind turbines within the Inner Test Range, and to plan principal road and transit improvements.
- The Comprehensive Plan does not discuss coordination and communication between Calvert County and the Navy.

Zoning Ordinance

The Calvert County Zoning Ordinance is the primary tool used to implement the land use policies established in the Comprehensive Plan. Zoning in Calvert County is comprised of i) Base Districts (rural and residential, commercial and mixed use, industrial and office, and commercial marine) which correspond to general categories of land use and cover most of the county, and ii) Town Center zoning ordinances for unincorporated towns within the county. Overlay zones, which address the preservation of specific resources, include historic, agricultural preservation, and critical area zones.

The following aspects of compatibility planning are addressed within the requirements of the Calvert County Zoning Ordinance:

- Structure heights in Calvert County would not likely pose compatibility issues related to vertical obstructions, but as noted under "Frequency Spectrum Impedance/Interference" they do present potential concerns for radar operations. The zoning regulations establish the following maximum heights:
- "50 feet plus roof" for nonresidential uses or "40 feet plus roof" for residential structures in areas of Calvert County other than the town centers. The height may be increased (no limit given) in the Light Industrial and Employment Center districts.

- 36 feet in the area governed by the Solomons Town Center Zoning Ordinance;
- Exemptions from height limits are provided for features such as fire towers, hose towers, cooling towers, steeples, flag poles, silos, smokestacks, masts, transmission line poles and towers, water tanks, and communication towers; and
- 150 feet for wind energy systems.
- Most of Calvert County is within the NAS PAX radar viewshed. In much of southern Calvert County, structures from 50 to 150 feet in height could interfere with radar. In the central portion of the county, structures from 200 to 600 feet high are a concern. Only the northern third of the county is out of the radar viewshed.
- The County's zoning regulations are mostly consistent with the findings of the NAS PAX Main Station AICUZ Study noise assessment and recommendations. The 60-65 dB noise zone covers a large portion of southern Calvert County, including part of Solomons Town Center. This level of noise is considered acceptable for residential land uses and the zoning in this area is consistent with the AICUZ Study. However, the NAS PAX Main Station AICUZ Study (2009) indicates that the 65 to 70 dB DNL noise zone, in which residential uses are considered inappropriate, extends into the southern tip of Calvert County. This portion of the county is zoned Residential with allowed density of one unit per four acres, with a possible increase if transferrable development rights are used.
- Calvert County's Zoning Ordinance permits wind energy systems in most zoning districts subject to a maximum height of 150 feet and other conditions, including a determination by the Department of the Navy that the wind energy system will not cause interference with military activities.

Caroline County

Caroline County is located east and north of Talbot and Dorchester counties. Caroline County's planning tools relate to several of the factors that could impact compatibility with NAS PAX's mission, but the planning documents reviewed for this study do not formally recognize the nexus between land use management in the county and military compatibility.

Comprehensive Plan

Caroline County's current Comprehensive Plan was adopted in 2010. The plan makes no mention of NAS PAX Main Station or of Webster Field. The plan's policies do not appear to be influenced by NAS PAX activities and contains no policy statements that would explicitly affect military compatibility.

Zoning Ordinance

Caroline County's Zoning Ordinance establishes land use requirements that could affect compatibility with NAS PAX's overall mission. The Ridgley Airport in central Caroline County is occasionally used by T-34 aircraft from NAS PAX for training purposes, but unlike most of the other Eastern Shore counties, Caroline County does not have an overlay zone associated with its airport. The following relate to provisions of Caroline County's Zoning Ordinance and have potential application to address compatibility:

- County zoning limits structures to a maximum height of 40 feet countywide except the Industrial District where the general height limit is 50 feet.
- Except within an area defined as an airport approach zone by the Federal Aviation Administration or other government agency, height regulations do not apply to certain structures such as communication towers, silos, steeples, stacks, flagpoles, water towers, windmills (except those for small wind energy systems). Small wind energy systems are also exempted from the 40-50 foot height limit but have a maximum height limit of 199 feet.
- Public buildings and institutional uses are allowed a maximum height of 75 feet. These height limits are consistent with naval aviation because they are below the operational floors of military airspace over the county.

- There is no prohibition in the Zoning Ordinance on lights, glare, or other uses or activities which could endanger the landing, taking-off, or maneuvering of aircraft over the county.

- As of early 2014, there is no height limit on “windmills” unless the use is a "small wind energy system" or was in the approach area to an airport. Small wind energy systems are permitted in all zoning districts to a maximum height of 199 feet and a maximum rated capacity of 100 kilowatts. These provisions are consistent with NAS PAX’s radar operations because the radar viewshed over Caroline County begins at 300 feet. As of April 2014, Caroline County has adopted the 2014-2 Bill, permitting the use of wind and solar energy systems. Adoption of the bill could lead to military compatibility issues if Caroline County begins to build wind energy systems that are taller than 300 feet.

Charles County

Charles County abuts the eastern and northern boundaries of St. Mary’s County. Charles County coordinates its planning program with those of Calvert and St. Mary’s counties through participation in the Tri-County Council for Southern Maryland.

Comprehensive Plan

The Charles County current Comprehensive Plan was adopted in 2006 and establishes policies for land use, transportation, and public facilities that will enable the County to preserve sensitive areas and accommodate projected residential and employment growth. The plan notes that the county’s residential growth has been influenced by NAS PAX, as base consolidation in the 1990s relocated employees from other military installations. As of April 29, 2014 the Charles County Commissioners have adopted the Tier Map as described in the Sustainable Growth and Agricultural Preservation Act. Reflectively Chapters 3 (Land Use) and 11 (Agriculture, Forestry, and Fisheries) were revised to support the new adoption.

The following compatibility factors are related to Comprehensive Plan policies.

- If aircraft from NAS PAX begin to use Maryland Airport in the future, noise from the airport could become a compatibility issue for NAS PAX. Charles County’s 2006 Comprehensive Plan recommends adoption of an overlay zoning district around Maryland Airport to alert County staff, residents, and businesses regarding the potential for off-airport navigation hazards and noise, and to require review of proposed development by the Maryland Aviation Administration. In the spring of 2014 the County began a land use compatibility study of the Maryland Airport with an overlay zone as a part of the planning process discussion. The study is anticipated to be completed in the fall of 2014.

- The Comprehensive Plan’s transportation element takes into account the need for workforce and visitors to access NAS PAX. Although the transportation element focuses primarily on north / south travel between Charles County and Prince George’s County / Washington D.C., the plan also recommends improvements to address congestion on east / west commuter routes, especially MD Route 5, an arterial road that connects Charles County with St. Mary’s County.

Zoning Ordinance

Charles County’s Zoning Ordinance is the primary tool available to implement the land use policies established in the Comprehensive Plan. Zoning in Charles County is comprised of base districts (rural, residential, commercial, mixed use, industrial and village zones) and planned development zones, which allow higher intensity and mixed used development with additional review. Charles County also has overlay zones to address the appearance of highway corridors and protection of environmental resources.

The Charles County Zoning Ordinance contains the following provisions associated with compatibly planning:

- Structure heights in Charles County would not likely create compatibility issues related to vertical obstructions, but the allowed heights for communication towers present potential concerns for radar operations.

- Maximum structure heights established by the Zoning Ordinance range from 36 to 60 feet for most uses. The Waldorf Town Center Districts allow potential heights up to 10 stories; certain uses, such as hospitals, are also allowed to have taller structures. Exceptions to the height limits are permitted for communication towers, antennas, and certain other structures.

- As noted in the Comprehensive Plan issues, if the Maryland Airport in Charles County becomes an occasional landing and take-off facility for naval aircraft, noise from the airport may become a compatibility issue. The zoning regulations do not address airport noise, although adoption of the overlay zone recommended in the Comprehensive Plan could address this issue.

- Allowed heights for communication towers in Charles County present a potential conflict with military radar usage.

- The eastern half of Charles County is within the NAS PAX radar viewshed. For different parts of the viewshed within the County, structures higher than 150 feet could potentially interfere with radar operations.

- Building height across most of Charles County is not a concern with respect to electromagnetic interference because County zoning ensures that building heights do not exceed 60 feet and the lowest radar viewshed contour in the county is 100 feet in most areas. However, broadcasting towers can be as high as 300 feet and there is no height limit established for other wireless communication towers and certain minor features such as steeples and flagpoles.

- Charles County currently does not allow wind energy systems. If regulations allowing wind energy systems are proposed, consideration of Navy operations will become important.

Dorchester County

NAS PAX is located directly west across the Chesapeake Bay from southern Dorchester County. The communities along Dorchester County's portion of the Chesapeake Bay are the closest communities on the entire Eastern Shore to NAS PAX. The City of Cambridge is the largest city in Dorchester County.

Comprehensive Plan

Dorchester County's Comprehensive Plan was adopted in 1999 and last amended in 2008. It focuses on three main principles including preserving and protecting rural communities and natural resources, planning for growth in appropriate areas, and ensuring the adequacy of infrastructure to support planned growth. Dorchester County's Comprehensive Plan does not contain any provisions that specifically relate to the protection of military activity in the region of NAS PAX.

Zoning Ordinance

Dorchester County's Zoning Ordinance is the main tool available to ensure compatibility of the county's land use with the Navy's mission at NAS PAX. Zoning in Dorchester County is comprised of 13 primary districts which correspond to general categories of land use, seven overlay districts, and floating districts which are zoning districts of undetermined location which may only be placed on the zoning map upon petition of a property owner and not by government initiative. A floating district may only be applied to a specific property if stated criteria are satisfied, a finding of compatibility is made, and a site plan is approved for the property.

One of the overlay districts is an airport protection district, which was created specifically to support the operation and future expansion of the Cambridge-Dorchester Regional Airport. To ensure compatibility with aviation use and prevent hazards to air traffic, the Airport Protection District imposes height limits for specific types of structures in the vicinity of the airport. These limits may be more restrictive than the limits in the primary districts.

The following provisions of Dorchester County's Zoning Ordinance may be considered in planning for enhanced compatibility:

- County zoning limits structures to a maximum height of 45 feet in all primary districts except the Heavy Industrial District where the general height limit is 50 feet.

- The height limits in the Zoning Ordinance contain exemptions for several types of structures including churches, schools, institutional and public buildings, public utility structures, farm buildings (not including residences), chimneys, spires, stacks,

flagpoles and similar features. Communication towers are permitted to a maximum height of 600 feet in the Neighborhood Business, Light Industrial or Heavy Industrial zoning districts or on government property, and to a maximum height of 200 feet in Resource Conservation and Agricultural Conservation zones with an approved special exception.

- The zoning regulations allow small wind energy systems up to a maximum of 80 feet high on parcels one acre or smaller and to a maximum of 200 feet high on larger parcels. Wind energy systems constructed to these maximum allowable heights have the potential to cause radar interference across most of the county.

- The exemptions from height limits described above do not apply to the Airport Protection District. The Airport Protection District defines the imaginary surfaces surrounding the airport and extending into the airspace surrounding and overlying the airport. Structures within the Airport Protection District are prohibited from being higher than these imaginary surfaces, which vary from ground level to 350 feet above the airport elevation depending on location and distance from the airport. The effect of these prohibitions is to create more restrictive height limits than the primary district limits in the immediate vicinity of the airport and to prevent incompatibilities from vertical obstructions in the vicinity of the airport. The Airport Protection District prohibits any use which would make it difficult for pilots to distinguish between airport lights and other lights that would result in glare in the eyes of pilots, impair visibility in the vicinity of the airport, or otherwise endanger the landing, taking-off or maneuvering of aircraft.

- The general height limits that apply to Dorchester County's primary zones and Airport Protection Zone are compatible with radar operations at NAS PAX for most uses except small wind energy systems in the southwestern portion of the county. Wind energy systems built to the maximum allowable height in the southwestern portion of the county would intersect the 50-foot contour of NAS PAX's radar viewshed.

- The exemptions to the County's height limits contained in the Zoning Ordinance could create incompatibilities with the radar operations over much of the county. Much of the southwestern portion of Dorchester County is within the radar viewshed's 50-foot contour. Structures taller than 50 feet in the western portion of the county could interfere with radar from NAS PAX. The entire county is contained within the 600-foot radar viewshed contour, so communication towers built to the maximum allowed height of 600 feet in Neighborhood Business, Light Industrial or Heavy Industrial zoning districts or on government property would have the potential to create interference or impedance anywhere in the County.

- Dorchester County has an agreement with NAS PAX to refer applications for wind energy systems to NAS PAX for its review. This provides a mechanism to address potential incompatibilities from small wind energy systems.

Dorchester County Noise Regulations

Dorchester County's noise ordinance (Chapter 115 of the county code) prohibits "noise disturbance". The ordinance does not refer specifically to noise from the Cambridge-Dorchester Regional Airport or from transient air traffic, but does specifically prohibit noise disturbance from "an aircraft which maintains its flight pattern in small or limited airspace."

City of Cambridge

The City of Cambridge is located in northeastern Dorchester County on the south bank of the Choptank River. Talbot County is across the river to the north. Downtown Cambridge is the historic central business district for a large rural area encompassing Dorchester County and the southeastern parts of Talbot County. Cambridge is the county seat of Dorchester County, hosting the courts and the main legislative and administrative functions of government, as well as the Cambridge Branch of Chesapeake Community College.

Comprehensive Plan

The City of Cambridge Comprehensive Plan was adopted in 2011. The plan assumes steady population growth, with key policies that include working with Dorchester County to prevent urban or suburban

development outside the Cambridge municipal boundaries, developing underused or vacant land within the city, revitalizing the core of Cambridge, increasing allowable housing densities within a new and expanded "downtown district," upgrading its street infrastructure, and improving its waterfront.

The plan does not mention NAS PAX or make any consideration for implications associated with NAS PAX operations.

Zoning Ordinance

The Cambridge Zoning Ordinance, adopted in 2003, divides the city into several residential, commercial, industrial and neighborhood conservation zoning districts. Planned waterfront districts provide detailed standards for waterfront areas, while overlay zones for historic preservation, the Chesapeake Bay Critical Area, and floodplains provide resource protection.

The City is considering adoption of a proposed Unified Development Code that would consolidate the current zoning and subdivision ordinances.

Although NAS PAX and military operations are not specifically identified within the City's regulations, the following provisions may be considered in the assessment of compatibility with both NAS PAX operations and local airport operations.

Height limits for most structures in Cambridge are between 35 and 75 feet, measured to the highest point of the structure. Different height regulations are allowed for the following structures:

- Communication towers are not subject to a local height limit
- Hospitals are permitted at 100 feet in height.
- Various building elements including water towers, fire escapes, parapet walls, smoke stacks, elevator towers, flagpoles and other features are exempt from height limits.

These allowed heights should not interfere with aircraft flight paths but as noted below, structure height may be a concern with regard to radar interference.

Cambridge is located within the 100 foot contour of the NAS PAX radar viewshed. Depending on the exact location within the town, a structure taller than 100 feet could be within the radar viewshed. As commercial, office, and industrial buildings in the city are permitted with a height of up to 75 feet, conflicts between allowed development in Cambridge and NAS PAX's military mission are possible if roof mounted features are exempt.

Somerset County

Somerset County is located southeast of NAS PAX. Airspace assets associated with NAS PAX located in or affecting Somerset County include restricted areas, military training routes, and unmanned aerial system flight routes.

Comprehensive Plan

The Somerset County Comprehensive Plan is the primary planning document for guiding growth and land preservation in the county. The plan has been amended several times since adoption, most recently in 2010. It focuses mainly on land use, economic and community development, and natural resource protection.

The plan makes no mention of NAS PAX. Its policies do not appear to be influenced by NAS PAX, and it does not contain any policy statements which explicitly address military compatibility.

Zoning Ordinance

Somerset County's Zoning Ordinance establishes 11 base districts including an airport district surrounding the Crisfield Municipal Airport.

The following provisions may be considered in planning for enhanced compatibility

- Somerset County's base zoning allows structures to a maximum height of 45 feet, with the following exceptions:
- There is no height limit on utility lines, towers, steeples, flagpoles, stacks, silos, tanks, antennas or monuments.
- Small wind energy systems can have a maximum height of 160 feet.

- The Airport District prohibits structures and trees with heights that would intrude on the Crisfield Airport approach, horizontal, and transitional surfaces.
- The Airport District addresses safety through limits on land uses and required setbacks.
- The following uses are not permitted in the Airport District: residences, hospitals, day care centers, nursing homes, schools, most retail uses, and most industrial uses.
- Permitted uses include colleges, community centers, libraries, places of worship, offices, hotels, outdoor recreation, agriculture, warehousing, and wholesale sales.
- Runways, landing strips, refueling areas, fuel storage, and taxi areas must be at least 1,000 feet from any lot occupied by a dwelling, school, places of worship, or day care center.
- Aircraft noise is not addressed in Somerset County's Zoning Ordinance, which could cause incompatibility issues because T-34 aircraft occasionally use Crisfield-Somerset County Airport for touch-and-go operations.
- The County's Zoning Ordinance could allow conflicts related to impedance/interference from wind energy systems. Small wind energy systems are currently permitted in all zoning districts to a maximum height of 160 feet with no maximum rated capacity, but the NAS PAX radar viewshed starts at 100 feet in the western portion of the county.
- The County has an informal procedure of referring applications for wind energy systems to the Navy for its review.
- A proposed zoning amendment would have allowed industrial wind energy systems. The amendment had been indefinitely tabled by the County Commissioners at the time this JLUS was prepared. Under the amendment, were these systems to be taller than 200 feet, the County would recommend that the applicant contact NAS PAX and require the application to undergo military compatibility review by the Department of Defense Siting Clearinghouse, as part of the FAA Obstruction Evaluation / Airport Airspace Analysis.
- The Airport District prohibits any uses which would create electrical, magnetic, or other interference with radio communication between the airport and aircraft, cause difficulty for pilots to distinguish between airport lights and other lights, result in glare in the eyes of the pilots using the airport, impair visibility in the vicinity of the airport, or otherwise endanger the landing, taking-off, or maneuvering of aircraft.
- The Airport District prohibits manufacturing establishments or other uses which produce smoke interfering with the safe use of the airport. The District also prohibits uses or structures which would emit or discharge smoke, gas, and odor that would or may interfere with the health, safety, and general welfare of the public in the use of the airport.

City of Crisfield

The City of Crisfield is a waterfront community located in southwestern Somerset County on the Tangier Sound. Land use in the city consists of commercial districts along MD Route 413 and the central business district, residential neighborhoods, and water-dependent / water-related uses in the marina and downtown marine areas.

Comprehensive Plan

The Crisfield Comprehensive Plan, updated in 2010, reported that the city was in a time of expansion and change, driven by interest in waterfront property for residential use. Much of the shoreline was historically devoted to commercial and industrial uses related to the fishing industry; this changed as multi-family condominium buildings replaced traditional maritime activities. Several waterfront condominium projects were in the approval process as the plan was written, with approximately 540 dwellings proposed. Sewer system constraints prevent growth beyond these planned projects until the system is expanded.

The Comprehensive Plan does not mention NAS PAX or include any provisions associated with noise and vibration, interagency coordination,

or other factors that may be addressed through a local comprehensive plan as they relate to either military operations or other aviation operations.

Zoning Ordinance

Information on the City of Crisfield zoning was unavailable.

St. Mary's County

St. Mary's County has long recognized the importance of their role as host to NAS PAX Main Station and Webster Field. NAS PAX and Webster Field have a significant role in the county's economy not only as the county's largest employer but also as a source of highly skilled and high paying jobs.

Comprehensive Plan

St. Mary's County's current Comprehensive Plan was most recently updated in 2010. It seeks to preserve and enhance the character of St. Mary's County and to improve the quality of life for its citizens while managing the pace of growth and development. The Comprehensive Plan incorporates the state's 12 visions addressing quality of life and sustainability, public participation, growth areas, community design, infrastructure, transportation, housing, economic development, environmental protection, resource conservation, stewardship, and implementation approaches. The steps the County takes to achieve these visions are important because as the installation's host county, St. Mary's County has a unique capacity to impact the installation's mission through its planning and land use decisions.

The following items concerning military compatibility are based on a review of the Comprehensive Plan:

- Policies identifying the need for encroachment partnering with the Navy to identify and mitigate all forms of encroachment that may potentially impact base operations.
- The Comprehensive Plan recommends incorporation of both AICUZ and RAICUZ recommendations into the County's planning documents.
- Coordination of economic growth has resulted in the County developing a strategic partnership with the Navy including a signed MOU on encroachment mitigation and prevention.
- The Navy recommends that certain land uses that concentrate large numbers of people be constructed outside the Accident Potential Zones (APZs) established in the 2009 AICUZ Study. The APZ II zone associated with NAS PAX extends into the Lexington Park Development District. The Comprehensive Plan identifies this area as a target for future growth and includes several recommendations intended to focus mixed use development with urban character in this area.
- The transportation component of the Comprehensive Plan contains several recommendations to improve vehicular access to NAS PAX Main Station and the surrounding Lexington Park Development District.
- The Comprehensive Plan contains a goal to provide adequate water, sewer, road capacity and other infrastructure to support the Navy and other industry and businesses in the surrounding area.
- The Comprehensive Plan notes the need to revisit the Letter of Authorization between the County and NAS PAX regarding authorization to operate aircraft in restricted airspace.
- Additional policies to support NAS PAX through educational partnerships and other joint efforts are identified.

Zoning Ordinance

St. Mary's County's Zoning Ordinance is the main tool available to implement the land use policies established in the Comprehensive Plan. Zoning in St. Mary's County is composed of Base Districts (rural and residential, commercial and mixed use, industrial and office, and commercial marine) which correspond to general categories of land use and cover most of the county, and Special Districts which are intended to accommodate specific uses.

The following components relate to specific aspects of St. Mary's County's Zoning Ordinance and may be applied to achieve enhanced compatibility planning :

- County zoning establishes general height restrictions for each zone but allows exemptions for certain uses such as communications towers, water towers, and chimneys. Allowable heights tend to be higher in non-residential and mixed-use zones (including the Lexington Park Development District which is located immediately west of NAS PAX Main Station and partially within the NAS PAX APZ II Zone as identified in the 2009 AICUZ Study).
- Base zoning districts in the vicinity of Webster Field limit structures to no more than 50 feet but include the same exemptions as the zoning districts near NAS PAX Main Station.
- Section 43.4 of the Zoning Ordinance requires clarification. Section 43.4.1 requires that development proposals within the AICUZ Overlay Zone provide evidence of filing of a Notice of Proposed Construction or Alteration with the FAA for all subdivisions and site plans; Section 43.4.2.a states that it is required only for buildings exceeding 100 feet in height. The applicant is required to forward copies of the FAA application with the Department of the Navy Commander at NAS PAX.
- The County does not regulate land uses based upon the noise levels identified in the 2009 NAS PAX Main Station AICUZ Study. Low- and medium-density residential areas including parts or all of the Lexington Park, Southampton, Southgate Park, Cedar Cove, and Forest Park neighborhoods are within the 65 dB to 70 dB DNL noise zone, which is not considered compatible with residential use in the 2009 AICUZ Study.
- The AICUZ Overlay Zone addresses noise levels by requiring new construction to adhere to soundproofing standards, but application of the requirements depends upon adoption of noise contour lines on the county zoning map, which has not occurred despite an explicit recognition in Section 43.2 of the Zoning Ordinance that noise from concentrated numbers of low-flying aircraft is expected to produce discomfort, annoyance, or a potentially unhealthy environment. The AICUZ Overlay Zone is also inconsistent with the AICUZ Study because it does not encompass all of the land areas shown in the 2009 AICUZ Study as having noise levels over 65 dB DNL.
- The AICUZ Overlay Zone addresses the generation of dust, smoke and steam in the vicinity of NAS PAX Main Station through a performance standard that prohibits generation of these and other airborne materials in quantities that would impair visibility in the vicinity of the airport or otherwise interfere with aircraft operations, but no such performance standard applies to the area surrounding Webster Field.
- The AICUZ Overlay Zone prohibits developments that would create difficulty for pilots to distinguish between airport lights and other lights or which would cause glare in the eyes of pilots using the airport or airport facilities. Zoning Ordinance Section 61.3 also requires shielded light fixtures and limits light spillover onto adjacent properties to 0.5 foot-candles. A lighting plan is also evaluated as part of site plan review in the vicinity of NAS PAX Main Station, but no such prohibitions or reviews apply to the area surrounding Webster Field.

Lexington Park Development District Master Plan

The Lexington Park Development District is identified in the St. Mary's County Comprehensive Plan as the principal growth area in the county. The Lexington Park Development District Master Plan, which is in draft form as of June 2014, is intended to shape future growth in the Lexington Park Development District with an emphasis on revitalization of downtown Lexington Park, economic diversification, and a balanced transportation infrastructure. To balance the need for economic development in Lexington Park with the needs of NAS PAX Main Station, the Lexington Park Development District Master Plan makes three general recommendations that would address some of the inconsistencies between the Navy's AICUZ study and the County's Zoning Ordinance related to vertical obstruction, noise, and safety zone compatibility factors described in this JLUS. These three recommendations are as follows:

- Updating the AICUZ Overlay Zone to include noise zones consistent with the latest AICUZ study issued by the Navy;
- Update the Zoning Ordinance to incorporate the 2009 AICUZ Study; and
- Clarify land use densities and intensities and building code regulations regarding accident potential and noise impacts. The plan contains specific implementation steps to address this general goal in the Development District including:
- Redevelopment of outmoded retail space in downtown Lexington Park with more pedestrian amenities and more open space, but with retail and office uses not substantially greater than those found in 2013. This is intended to ensure that development of the downtown remains compliant with policies to avoid encroachment on the mission and operations of NAS PAX;
- Re-defining downtown Lexington Park as a green oasis by preserving natural features and directing new development and redevelopment away from accident potential zones to avoid encroaching on the base;
- Replacement of existing uses with AICUZ-compatible businesses and structures as existing businesses turn over;
- Development of specific sites within the AICUZ compatibility areas for AICUZ-compliant employment uses and design, with additional new development proposed for sites outside the AICUZ compatibility areas; and
- Relocation of the retail core to the north of the AICUZ compatibility areas across from Nicolet Park.

Land Preservations, Parks, and Recreation Plan

The 2012 Land Preservation, Parks, and Recreation Plan (LPPRP) describes accomplishments in parks and recreation development, land preservation, and conservation since the 2005 LPPRP, addresses the recommendations for parks and recreation made in the 2009 State LPPRP, and identifies St. Mary's County's needs and priorities through 2027. It describes three specific actions taken by the County in close proximity to NAS PAX that would address land use and ground transportation compatibility.

- The County acquired the 150-acre Fenwick property in 2006 for purposes that include protecting NAS PAX Main Station against encroaching residential uses. The property will be used for agricultural land, farmers market, and possibly a park and other community uses.
- The County also expanded the Mattapany Rural Legacy Area in 2009 to facilitate provision of a natural buffer near the base. Both of these measures will help preserve a buffer of thinly populated land around NAS PAX Main Station, thereby addressing the land use compatibility factor.
- A top priority for funding is the Three Notch Trail, a bicycle and walking trail that, when complete, will run 25 miles from Charlotte Hall to Lexington Park. The trail will address the ground transportation factor by providing an alternative mode of ground transportation between NAS PAX Main Station, Lexington Park, and the portions of the county to the north.

Other County Plans

St. Mary's County's Water and Sewer Plan and Multijurisdictional Hazard Mitigation Plan contain recommendations that relate to infrastructure and frequency spectrum capacity compatibility, respectively.

- The area surrounding NAS PAX Main Station is within the County's development district for water and sewerage service and has public water and sewer. The Navy operates independent water systems for NAS PAX Main Station and Webster Field. Due to continuous moderate growth at Webster Field, the Navy is planning for a new fire suppression tank in the next five to seven years. The County's water and sewer plan does not envision water and sewer service to areas surrounding Webster Field. Some emergency support for the County water system is available through an interconnection with the NAS PAX Main Station water system.

- All sewage from NAS PAX Main Station is pumped to St. Mary's County's Marlay-Taylor Water Reclamation Facility. The Navy has a contract to reserve a treatment capacity of 1.2 million gallons per day. The 2006 average daily flow from NAS PAX Main Station was 574,000 gallons per day. Growth in the Lexington Park area and the Three Notch Road corridor would put additional pressure on this facility. The Navy operates a 45,000-gallon per day package plant for its facilities at Webster Field and at the US Coast Guard station. There are currently no plans to expand sewer service at Webster Field.
- As described in St. Mary's County Multijurisdictional Hazard Mitigation Plan, the County has coordinated with NAS PAX to use the Navy AM radio station to make broadcasts before, during, and after emergencies. This arrangement leverages existing transmission capacity on the base to reach the maximum number of potentially affected persons with critical information during times of emergency.

Leonardtown Plans and Programs

Leonardtown is located in southeastern St. Mary's County on the waterfront of Breton Bay, off the Potomac River. It is the only incorporated town in St. Mary's County and acts as the county seat. St. Mary's County government offices and the courthouse are in Leonardtown, as well as a hospital, several schools, a county library and the College of Southern Maryland.

Comprehensive Plan

Leonardtown's Comprehensive Plan, last updated in 2010, provides a framework which development issues can be evaluated and public policy implemented consistent with the town's long-range growth and development goals. Although Leonardtown is a small town, with an 2010 estimated population of 2,930 , it has over 1,000 acres of undeveloped land within its municipal boundaries. The Comprehensive Plan aims to protect Leonardtown's small town character while allowing new development to occur in incremental stages over the plan's 20-year horizon. Most new development is to be low- and medium-density residential use, while commercial and office uses are intended to remain concentrated within the downtown and along the Route 5 corridor at the western edge of town.

The following compatibility factors relate to the Leonardtown Comprehensive Plan:

- Leonardtown is within the NAS PAX radar viewshed. The Comprehensive Plan does not address possible conflicts between town land uses and military radar operations.
- The Comprehensive Plan notes that in the late 1990s, NAS PAX attracted an influx of technical jobs resulting from the consolidation of several Navy activities. This added around 5,000 jobs. Spin-off development added approximately 13,000 jobs in the region around the naval base, including Leonardtown.
- The plan designates substantial undeveloped land for future housing development and recognizes that some of this growth is to support NAS PAX and associated businesses.
- The town plans improvements to its water and sewerage systems to support new development envisioned by the Comprehensive Plan.
- The Comprehensive Plan does not recommend or reference possible communication with the Navy on planning and land development issues.

Zoning Ordinance

The Leonardtown Zoning Ordinance divides the town into residential, commercial, marine commercial, and institutional-office districts. Most of the town's undeveloped land is in the Planned Unit Development–Mixed Use District. A Planned Infill and Redevelopment zoning district is an overlay zone to promote compatible redevelopment of underused or vacant infill properties. The Zoning Ordinance also establishes a Recreation and Parks zoning district, focused on publicly-owned parks, open space and recreation facilities.

The following requirements are included in the Leonardtown Zoning Ordinance and may be applied to achieve enhanced compatibility planning:

- The structure heights in Leonardtown do not present potential obstructions to NAS PAX flight operations. However, as noted under "Frequency Spectrum Impedance/Interference", certain heights do present potential concerns for radar operations.
- Leonardtown is entirely within the NAS PAX radar viewshed. Depending on the exact location within town, structures taller than 150 feet could be within the radar viewshed. The town's height limits generally will not allow structures tall enough to be within this viewshed, but communication towers may be a concern.
- The maximum building height allowed by the Leonardtown Zoning Ordinance is 45 feet for most buildings, measured to the highest point of the roof. Certain structures can be higher:
- Buildings in the Institutional-Office zoning district have a maximum height of 100 feet if additional setbacks are provided.
- Public buildings, institutional uses and churches can be up to 60 feet high.
- Communication towers have no height limit, although extensive justification is required for a tower higher than 199 feet.
- Spires, chimneys, agricultural buildings, and stair or elevator towers are exempt from height limits.
- The potential for noise issues exists in Leonardtown due to its location near aircraft training routes and other flight paths, and within a helicopter operating area from NAS PAX.

Talbot County

Talbot County is located northeast of NAS PAX. One of the NAS PAX military flight training routes traverses the southern tip of the county between the Town of Trappe and the Choptank River; however, various types of aircraft from NAS PAX occasionally use Easton Municipal Airport (also known as Newnam Field) in central Talbot County for touch-and-go operations, instrument approaches, and low approaches.

Talbot County Comprehensive Plan

Talbot County's Comprehensive Plan was last updated in 2005. It identifies 11 sub-goals for land use, transportation, economic development, and housing as well as other common elements that are important to achieving the plan's primary goals relevant to compatibility planning. Talbot County's Comprehensive Plan states that Easton Municipal Airport is a general aviation airport that services privately-owned and military aircraft.

The Comprehensive Plan also identifies the need for County policies that encourage the continued vitality of the Easton Municipal Airport by protecting the airport from encroachment of residential, retail, or commercial uses. Compatible uses, such as airport related businesses and light industry should be encouraged in appropriate areas near the airport. The Comprehensive Plan also recommends that the County acquire avigation easements on properties surrounding the airport.

Zoning Ordinance

Talbot County's Zoning Ordinance establishes 11 base districts within the following three categories:

- Rural Cluster Districts;
- Residential, Village Center and other Rural Districts; and
- Commercial and Industrial Districts.

Talbot County's Zoning Ordinance also establishes floating and overlay districts, one of which is the Easton Airport Overlay District. The district was created for the dual purposes of 1) preventing hazards or obstructions to aircraft operating to, from, or in the vicinity of the Easton Municipal Airport and 2) informing residents and businesses undertaking development activity about the presence of the airport.

The following provisions contained in the Zoning Ordinance address potential mechanisms and opportunities that may be considered in addressing compatibility planning.

- The Zoning Ordinance establishes a general maximum structure height throughout the county of 40 feet with the following exceptions:
- 75 feet for steeples, chimneys, and private antennas;
- 100 feet for fire towers, hospitals, silos, and monuments;
- 200 feet for communication towers and grain elevators.
- In lieu of predetermining the allowable vertical heights of building within the Airport Overlay District, the Zoning Ordinance requires the Planning Director to consider input from the airport manager prior to giving zoning approval for any proposed construction activity in the Easton Airport Overlay District. Heights that would constitute a hazard or obstruction to aircraft are identified on an "Airport Airspace Drawing" that is maintained by Easton Municipal Airport.
- According to the Comprehensive Plan, the zoning regulations prohibit residential uses adjacent to the Easton Municipal Airport; however, the zoning mechanism for this is not clear. The base zoning districts within the Airport Overlay District are primarily industrial and commercial but include some existing residential neighborhoods with "Town Residential" zoning and the Airport Overlay Zone does not state that new residences are prohibited.
- A Runway Safety Area study completed at the Easton Municipal Airport in 2003 found that a runway conversion planned at that time would allow the runway protection zone to be clear of incompatible land uses.
- Zoning regulations include a prohibition on residential uses adjacent to the Easton Municipal Airport. This prohibition also address potential noise- and safety-related compatibility conflicts by redirecting sensitive uses such as residences away from the Easton Municipal Airport; however, the mechanism for enforcing this prohibition is unclear.
- Small wind energy systems with a maximum capacity of 100 kilowatts are permitted to a maximum height of 160 feet as an accessory use in all districts.

Wicomico County

Wicomico County is located east of Dorchester County and is the second closest county on the Eastern Shore to NAS PAX, Dorchester being the closest.

Comprehensive Plan

The Wicomico County Comprehensive Plan was last updated in 1998 and is in the process of being updated. It is organized around seven visions for balancing economic growth and protection of the county's natural heritage and natural resources. The plan does not address NAS PAX Main Station or Webster Field directly, but it does address factors such as land use, public infrastructure, transportation, housing, and economic development that could affect military compatibility.

Although not specific to military operations, the following components of the Comprehensive Plan may be useful in the assessment of compatibility with military operations:

- Although the Comprehensive Plan does not specifically mention compatibility with military aviation, it contains language that is supportive of aviation in general, and specifically in relation to the Salisbury-Ocean City-Wicomico Regional Airport. It specifically identifies the need to avoid land uses that could conflict with the airport's operations.
- The Comprehensive Plan's support for the airport is directly relevant to compatibility with NAS PAX's mission because several types of military aircraft use the airport and the airspace immediately surrounding it for various types of training on flights originating from NAS PAX.
- The Comprehensive Plan supports establishment of an Airport Industrial Area surrounding the airport based on the constraints that noise from the airport would put on other uses in the area. This recommendation seeks to discourage potential future

incompatibilities by focusing land uses that are incompatible with aircraft noise away from the airport

- The Comprehensive Plan identifies acquisitions that should be made in order to accomplish fee simple ownership of the Runway Protection Zones, as recommended by the Federal Aviation Administration. This recommendation would enhance public safety in an area of concentrated military aviation activity.

Zoning Ordinance

Wicomico County's Zoning Ordinance establishes 16 base districts within the following four categories:

- Resource conservation districts;
- Residential districts;
- Commercial districts; and
- Institutional, business, and industrial districts.

The Zoning Ordinance also establishes overlay districts, one of which is an Airport Protection District that was created specifically to support operation and future expansion of the Salisbury-Ocean City-Wicomico Regional Airport. To ensure compatibility with aviation and prevent hazards to air traffic, the Airport Protection District imposes height limits in the vicinity of the airport that may be more restrictive than the limits in the primary district, depending on the location, proposed use, and whether it is exempt from the base district height restriction.

Although NAS PAX and military operations are not specifically identified within the County's regulations, the following provisions may be considered in the assessment of compatibility with both NAS PAX operations and local airports operations.

- County zoning limits structures to a maximum height of 35-50 feet in all base districts, except the Heavy Industrial district, where structures may exceed these limits with special exception approval. These height limits are generally sufficient to avoid incompatibilities with military aircraft, which operate at higher altitudes across most of the county.
- The height limits in the Zoning Ordinance contain exemptions for several types of structures including communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, water towers, and similar items. These exempted uses have no height limits, but military air traffic over the county operates at heights above the practical construction limits for these uses.
- Height limits in the Airport Protection District are set by the Wicomico County Public Works Department in conjunction with the Airport Manager within the approach zones to the Salisbury-Ocean City-Wicomico Regional Airport and at 150 feet above ground level within the airport's turning zones. The effect of these prohibitions is to create more restrictive height limits than the primary district limits in the immediate vicinity of the airport and to prevent incompatibilities from vertical obstructions in the vicinity of the airport.
- Within the Airport Protection District, certain uses are prohibited that would be especially sensitive to noise from the airport. Prohibited uses include residential uses such as single-family homes, apartments and townhouses, day care centers, hospitals, schools, and places of assembly.
- The County owns land within the Airport Business Zone and targets this land to be developed for uses that support the airport. Site plans within this zone are subject to approval by the Airport Commission.
- Small wind energy systems are permitted to a maximum height of 150 feet.
- Wicomico County's Airport Protection District prohibits:
- land use that creates electrical interference with radio communications between the airport and aircraft, including radio and television transmitting towers or studios, wireless telecommunication towers, and antennas and large radiation or X-ray equipment;

- any land use that emits smoke or odor. This provision addresses potential compatibility issues from smoke but does not address potential issues from other uses that could obscure pilots' view of the airport; and
- any land use that contains lights or signals which may be confused with airport navigational lights or results in glare to pilots approaching, leaving, or circling the airport or which impairs visibility.

Commonwealth of Virginia Plans and Programs

The Commonwealth of Virginia has several laws that establish the guidelines for its cities and counties to regulate land uses and plan for their future. The body responsible for creating, drafting, and enacting legislation to assist in governing the Commonwealth of Virginia is the General Assembly comprised of the Senate and House of Delegates. The State of Virginia is a Dillon Rule state, meaning that the municipal governments only have the powers that are expressly granted to them by the state legislature: those that are necessarily implied from that grant of power and those that are essential and indispensable to the municipality's existence and functioning.

The Code of Virginia specifically addresses planning and zoning for cities and counties. Title 15.2 – Counties, Cities and Towns contains provisions for comprehensive plans, zoning ordinances, subdivision ordinances, and the Virginia Uniform Statewide Building Code (USBC).

Capital Improvement Program

Virginia Code § 15.2-2239 provides that the local planning commission shall prepare and submit a Capital Improvement Program (CIP) to the governing body or official charged with preparation of a local budget. The preparation of a CIP is not required, but if directed by the local governing body, the planning commission shall prepare and revise annually a CIP that is based on the comprehensive plan for a period not to exceed the ensuing five years. The CIP is an integral component of a jurisdiction's overall growth management program that outlines the scheduling of public physical improvements and related costs over a five-year period.

Official Map

The official map is defined and described in §15.2-2233 through §15.2-2238 of the Virginia Code. The official map is a discretionary tool of plan implementation and is not required to be adopted by every jurisdiction. The official map is mean to show the location of any legally established public street, alley, walkway, waterway, or public area of a locality and future or proposed elements of the like.

Subdivision and Site Plan Regulations

Land subdivision and development standards are contained in §15.2-2240 through §15.2-2279 of the Virginia Code. As prescribed, a subdivision ordinance will specify administrative procedures to be followed in the division of land; design standards for subdivisions; and the identification of improvements (e.g., streets, utilities) to be installed. The subdivision ordinance establishes the procedures, platting and design requirements, as well as surety guarantees for public infrastructure improvements, associated with the subdivision of land into parcels or lots of development. Each local government in Virginia is required to adopt a subdivision ordinance to assure that land development occurs in an orderly and safe manner. Zoning Standards authorizing the use of zoning in Virginia are found in §15.2-2280 of the state code. The purposes of zoning are spelled out in §15.2-2283 of the code, while matters that a locality shall consider when developing a zoning ordinance and when applying or using the zoning ordinance are outlined in §15.2-2284. Zoning is considered the quintessential tool of comprehensive plan implementation. Zoning divides a locality into specific districts and establishes regulations concerning the use, placement, spacing, and size of land and buildings within the respective districts. Zoning is intended to avoid disruptive land use patterns by preventing activities on one property from generating external effects that are detrimental to other properties.

Building Code

The Virginia USBC contains the building regulations that must be complied with when constructing a new building or structure or when adding an addition to an existing building. It must also be used when maintaining or repairing an existing building or renovating or changing the use of a building or structure. The provisions of the Virginia USBC are based on nationally recognized model building and fire codes published by the International Code Council, Inc. The model codes are made part of the Virginia USBC through a regulatory process known as incorporation by reference. The Virginia USBC also contains administrative provisions governing the use of the model codes and establishing requirements for the enforcement of the code by the local building departments and other code enforcement agencies. The USBC is divided into three stand-alone pieces: the Virginia Construction Code, Virginia Rehabilitation Code, and Virginia Maintenance Code.

- The **Virginia Construction Code** contains regulations specific to the construction of new buildings and structures, as well as alterations, additions and change of occupancy in existing buildings and structures.
- The **Virginia Rehabilitation Code** contains optional regulations specific to the rehabilitation of existing buildings that may be used as an acceptable alternative to the Construction Code.
- The **Virginia Maintenance Code** contains the regulations for the maintenance of existing structures, which are enforced at the discretion of the local governments.

The Virginia USBC has specific provisions for changes to the International Building Code (IBC) such requiring sound attenuation standards for residential structures within certain aircraft noise zones. The Virginia USBC allows for properties to have a nonconforming use if it already existed before the passage of the code. If a permit for an update is requested to the building or structure, it generally must comply with the code when the update is completed.

Provisions contained within the Virginia USBC that may be useful in compatibility planning include the following:

- **R327.2 Airport Noise Attenuation.** This section applies to the construction of the exterior envelope of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress within airport noise zones when enforced by a locality pursuant to Virginia Code § 15.2-2295. The exterior envelope of such structures shall comply with Section 1207.4 of the state amendments to the IBC.
- **1207.1 Scope.** Sections 1207.2 and 1207.3 shall apply to common interior walls, partitions, and floor / ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public areas such as halls, corridors, stairs, or service areas. Section 1207.4 applies to the construction of the exterior envelope of Group R occupancies within airport noise zones and to the exterior envelope of Group A, B, E, I and M occupancies in any locality in whose jurisdiction a United States Master Jet Base is located or any adjacent locality when such requirements are enforced by a locality pursuant to Virginia Code § 15.2-2295.
- **1207.4 Airport Noise Attenuation Standards.** Where the DNL [as described in Chapter 3 of the NAS PAX JLUS] is determined to be 65 dBA [A-weighted decibel] or greater, the minimum Sound Transmission Class rating of structure components shall be provided in compliance with Table 1207.4. As an alternative to compliance with Table 1207.4, structures shall be permitted to be designed and constructed so as to limit the interior noise level to no greater than 45 DNL. Exterior structures, terrain, and permanent plantings shall be permitted to be included as part of the alternative design. The alternative design shall be certified by a registered design professional.

Conservation Reserve Enhancement Program

The Conservation and Recreation Enhancement Program aims to improve Virginia's water quality and wildlife habitat by offering rental payments to farmers who voluntarily restore riparian buffers, filter strips, and wetlands through the installation of approved conservation practices. State cost-share payments are administered through local Soil and Water Conservation District offices. The state will reimburse up to 25 percent of conservation practice costs deemed eligible by the local

Soil and Water Conservation District, not to exceed $200 per acre of restored buffer or wetland. There is also a 25 percent state income tax credit for out-of-pocket expenses, thus further reducing the landowner's cost. Federal reimbursement is made through the Farm Service Agency for up to 50 percent of a participant's eligible expenses for implementing best management practices, such as fencing or alternative watering systems. Preservation of any natural lands helps to further compatibility in NAS PAX military influence areas.

Joint Exercise of Powers

Virginia Code § 15.2-1300(A) authorizes local governments to jointly exercise any power granted to it with any other local government having similar powers. This would extend to the joint exercise of land use planning and zoning authority around a military installation if such an effort were desired by local governments having authority over the area. This is intended to foster cooperation between municipalities facing common issues. This could theoretically allow the adoption and enforcement of a regionally uniform set of land use regulations, building codes, and other compatibility measures in areas of concern to help enhance compatibility with a military installation.

Land Preservation Tax Credits

Virginia allows an income tax credit for 40 percent of the value of donated land or conservation easements. Taxpayers may use up to $100,000 per year for the year of sale and the ten subsequent tax years. Unused credits may be sold, allowing individuals with little or no Virginia income tax burden to take advantage of this benefit.

To be eligible for tax credits, the easement must qualify as a charitable deduction under the Internal Revenue Service Code and meet additional requirements under the Virginia Land Conservation Incentives Act. Donors claiming a state tax credit of $1 million or more must meet the Conservation Value Review Criteria adopted by the Virginia Land Conservation Foundation Board. Easements help preserve open space and farmlands which further mission compatibility.

Land and Water Conservation Fund

The Department of Conservation and Recreation administers a grant-in-aid program for acquisition and development of public outdoor recreation areas and facilities. These grants are for public bodies only. Towns, cities, counties, regional park authorities and state agencies may apply for 50 percent matching fund assistance from the Virginia Outdoors Fund. When available, these funds are provided through state general fund appropriations and from federal apportionment from the Land and Water Conservation Fund meant for the acquisition and / or development of outdoor recreation areas. This is a reimbursement program meaning that the sponsoring agency should be capable of financing the project while requesting periodic reimbursement.

Purchase of Development Rights Program

The Office of Farmland Preservation at the Virginia Department of Agriculture and Consumer Services helps localities establish local Purchase of Development Rights (PDR) programs. PDRs compensate landowners who voluntarily place an agricultural conservation easement on their property.

A Model PDR Program for Virginia outlines the program elements that each local PDR program should address and has recommendations for maximizing the success of these local programs in Virginia. Twenty-two localities have established a local PDR program.

Virginia Land Conservation Fund

The Virginia Land Conservation Fund is administered by the Virginia Land Conservation Foundation to conserve certain categories of land. Those categories include: open spaces and parks, natural areas, historic areas, and farmland, and forest preservation. The foundation establishes, administers, and makes expenditures from the Virginia Land Conservation Fund, which is special, non-reverting money in the state treasury. An interagency taskforce reviews and recommends grant applications to the Virginia Land Conservation Fund. Grant awards are based on applications for 50 percent or less of total project costs pursuant to specific criteria defined in each category.

Virginia Open Space Lands Preservation Trust Fund

This Fund helps landowners cover costs of conveying conservation easements and the purchase of all or part of the value of the easements. Conservation easements preserve farmland, forestland, and natural and recreational areas by restricting intensive uses, such as development and mining, which would alter the conservation values of the land. Priority may be given to applicants who seek cost reimbursement only, demonstrate financial need, or cover a family-owned or -operated farm. Costs that the fund may reimburse include:

- legal costs,
- appraisal and other costs, and
- all or part of the easement's value.

Real Estate Disclosures

While only specifically authorized and required for use in conjunction with defined noise and accident potential areas around military air installations, the statutory framework does currently exist in Commonwealth law for the implementation of real estate disclosures for military operational impacts. Disclosures are currently required for both the sale and rental of property that is potentially impacted by noise or safety concerns from an air installation.

The Virginia Code was amended through Senate Bill 1029 to enhance the degree of coordination required between local governments and military installations within areas covered by their comprehensive plans and / or land use regulations. Specifically, Virginia Code § 15.2-2200 was amended to add the following statement in the declaration of legislative intent regarding land use planning:

> *(C) Specific references to require intergovernmental collaboration (military and local government) have recently been added to Virginia's land use regulation law:*
>
> *(D) § 15.2-2200. Declaration of legislative intent. This chapter is intended to encourage localities to improve the public health, safety, convenience, and welfare of their citizens and to plan for the future development of communities to the end that transportation systems be carefully planned; that new community centers be developed with adequate highway, utility, health, educational, and recreational facilities; that the need for mineral resources and the needs of agriculture, industry, and business be recognized in future growth; that the concerns of military installations be recognized and taken into account in consideration of future development of areas immediately surrounding installations and that where practical, installation commanders shall be consulted on such matters by local officials; that residential areas be provided with healthy surroundings for family life; that agricultural and forest land be preserved; and that the growth of the community be consonant with the efficient and economical use of public funds.*
>
> *(E) § 15.2-2204 D. When (i) a proposed comprehensive plan or amendment thereto, (ii) a proposed change in zoning map classification, or (iii) an application for special exception for a change in use involves any parcel of land located within 3,000 feet of a boundary of a military base, military installation, military airport, excluding armories operated by the Virginia National Guard, or licensed public-use airport then, in addition to the advertising and written notification as required by this section, written notice shall also be given by the local commission, or its representative, at least 30 days before the hearing to the commander of the military base, military installation, military airport, or owner of such public-use airport, and the notice shall advise the military commander or owner of such public-use airport of the opportunity to submit comments or recommendations.*

Senate Bill 1029 also added a mandate for local planning commissions to consult the military regarding potential development that could affect an installation with the following amendment to Virginia Code §15.2-2211:

(F) Local governments in Virginia that exercise planning and zoning authority are required to coordinate with and consult military installations whenever a comprehensive plan amendment, zoning map amendment or an application for a special exception that would result in a change of use affects any parcel of land within 3,000 feet of a military installation.

Because NAS PAX is located in Maryland and not in Virginia, the Maryland communities participating in this JLUS are not affected by this requirement.

(G) Virginia Code § 15.2-2211. Cooperation of local planning commissions and other agencies. The planning commission of any locality may cooperate with local planning commissions or legislative and administrative bodies and officials of other localities so as to coordinate planning and development among the localities. The planning commission of any locality shall consult with the installation commander of any military installation that will be affected by potential development within the locality so as to reasonably protect the military installation against any adverse effects that might be caused by the development. Planning commissions may appoint committees and may adopt rules as needed to effect such cooperation. Planning commissions may also cooperate with state and federal officials, departments and agencies. Planning commissions may request from such departments and agencies, and such departments and agencies of the Commonwealth shall furnish, such reasonable information which may affect the planning and development of the locality.

This language is very important for NAS PAX because it helps to decrease the chance for complaints by citizens that may interfere with military operations.

Virginia Coastal Zone Management Act

Westmoreland and Northumberland counties are within Virginia's designated coastal zone. Virginia has developed and implemented a federally-approved coastal resources management program describing current coastal legislation and enforceable policies. The Virginia Coastal Resources Management Program has nine enforceable policies: fisheries management, subaqueous lands management, wetlands management, dune management, non-point source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management. Federal consistency determinations in Virginia are reviewed by the Virginia Department of Environmental Quality, which coordinates reviews with other state agencies as well as county and regional planning agencies. Policies which dictate use of the Virginia Coast are important to NAS PAX because such a large part of NAS PAX activities take place near coastal areas.

Virginia Energy Plan

The 2010 Virginia Energy Plan assesses Virginia's energy picture through an examination of the state's primary energy sources: electricity, coal, nuclear, natural gas, renewables, and petroleum. The plan recommends actions to meet several key goals:

- Grow both traditional and alternative energy production, jobs and investment.
- Increase the use of conservation and efficiency.
- Expand public education about Virginia's energy production and consumption, its effect on the economy, and how Virginians can use energy more efficiently.
- Maximize the investment in clean energy research and development through the work of the Universities Clean Energy Development and Economic Stimulus Foundation.

Section 6 of the Energy Plan contains information regarding renewable energy sources, including wind. Estimates for potential offshore wind generating capacity exceed 28,000 megawatts.

The plan includes the ambitious goal of making Virginia the "energy capital of the East Coast" and sets a target of growing in-state energy production by 20 percent by the year 2020. Energy production facility siting has the potential to encroach on NAS PAX military influence areas.

Virginia Military Advisory Council

The Virginia Military Advisory Council is a statutorily constituted body (Virginia Code § 2.2-2666.1) comprised of military representatives from installations in the Commonwealth of Virginia as well as several elected and appointed officials. The Virginia Military Advisory Council was formed by the executive branch of the state government to maintain a cooperative and constructive relationship between the Commonwealth and the leadership of the several Armed Forces installations within the Commonwealth, and to encourage regular communication on continued military facility viability, the exploration of privatization opportunities and issues affecting preparedness, public safety, and security.

Virginia County and Municipal Plans and Programs

The Code of Virginia grants every local government in Virginia the authority to prepare and adopt a comprehensive plan (§15.2-2223) and grants zoning authority and the power to enact subdivision regulations to local governments (§15.2-2224). Comprehensive plans and subdivision ordinances are mandatory and local jurisdictions are required to prepare and implement them by state law. The local jurisdictions have the authority to enact zoning but are not required to do so. Westmoreland and Northumberland counties have both enacted zoning.

The primary tools used by county and municipal governments in the NAS PAX JLUS Study Area are the comprehensive plan and the zoning ordinance. A comprehensive plan identifies a broad "vision" for the community, as well as the policies, goals, and strategies deemed necessary to accomplish important objectives. A zoning ordinance is used to implement comprehensive plan recommendations, typically by segregating incompatible uses, establishing design standards and generally organizing community elements in some rational orderly framework. These tools are supplemented in some of the jurisdictions by special area or topical plans, ordinances and regulations.

Comprehensive Plans

Virginia law mandates that every local government in Virginia prepare and adopt a comprehensive plan (§15.2-2223). The comprehensive plan is the foundation for all decision-making in matters involving land use planning and growth management. The comprehensive plan is considered advisory and serves as a guide for the physical development of the territory within specific jurisdictional boundaries. Although the comprehensive plan itself does not directly regulate land use, the plan does have status as a fundamental instrument of land use control once it is adopted by the local governing body.

The state code (§15.2-2224) identifies four primary tools communities can use to implement local plans: Capital Improvement Program, the Official Map, Subdivision and Site Plan Regulations, and Zoning.

Northumberland County

Northumberland County is located in the eastern portion of Virginia at the northeastern tip of the Northern Neck Peninsula. This 223-square mile county, primarily rural and agricultural, has extensive shorelines along the Potomac River to the north and the Chesapeake Bay to the east. The unincorporated community of Heathsville is the county seat.

Comprehensive Plan

The 2006 Northumberland County Comprehensive Plan establishes policies and goals for land use, public facilities and services, water quality, and shoreline protection.

The current comprehensive plan does not address possible conflicts between county land uses and military operations and does not recommend or reference possible communication with the Navy on planning and land development issues

Zoning Ordinance

The Northumberland County Zoning Ordinance divides the county into base districts that include conservation, agricultural, residential, business and industrial districts. A historical overlay zone protects historic resources. The Floodplain Ordinance is a separate chapter of the County's code, but floodplain zones are displayed on the County's official zoning maps.

Although NAS PAX and military operations are not specifically identified within the County's regulations, the following provisions may be considered in the assessment of compatibility with military operations.

- The maximum building height allowed by the Northumberland County Zoning Ordinance is 45 feet for most buildings, measured to the highest point of the roof. Different height regulations are allowed for the following structures:
- spires, chimneys, cooling towers, flagpoles, water towers, monuments and radio or communication towers are not subject to maximum height:
- Public or semi-public buildings, such as a schools, churches, libraries or hospitals have a maximum height 60 feet
- The Zoning Ordinance includes standards for noise generated by particular industrial and other uses; however, provisions associated with aircraft overflight noise are not addressed.
- Wind turbines are permitted by special exception in all districts. No criteria are given. Because of the potential disruption of radar signals by wind turbines, the special exception provision without standards for height or for coordination with the Navy creates a potential conflict with military missions.

Westmoreland County

Westmoreland County covers an area of 236 square miles bounded, on the north by the Potomac River, on the west by King George County, on the east by Northumberland County, and on the south by Richmond County and the Rappahannock River. The Town of Montross is the county seat.

Comprehensive Plan

The 2010 Westmoreland County Comprehensive Plan establishes goals for land use, transportation, and water quality protection. The county's primary growth areas are the towns of Colonial Beach at the county's northern tip, and the Town of Montross, which is located in the center of the county.

The current comprehensive plan does not address possible conflicts between county land uses and military operations and does not recommend or reference possible communication with the Navy on planning and land development issues; however, an update to the plan is currently in progress which could seek to correct this issue.

Zoning Ordinance

The Westmoreland County Zoning Ordinance divides the county into base zoning districts that include agricultural, rural, village, residential, commercial, marine commercial, and industrial. Overlay zones are also used such as the Chesapeake Bay Area Overlay District, which primarily addresses water quality issues.

Although NAS PAX and military operations are not specifically identified within the County's regulations, the following provisions may be considered in the assessment of compatibility with military operations.

- The maximum building height allowed by the Westmoreland County Zoning Ordinance is 45 feet for most buildings, measured to the highest point of the roof. Different height regulations are allowed for the following structures:
  - (1) Rooftop antennas have a maximum height 125 feet.
  - (2) Telecommunication monopoles and towers have a maximum height 150 feet.

(3) agricultural structures, cupolas, chimneys, flag poles, water tanks, monuments, and necessary mechanical accessories, as well as utility structures in the industrial zone are not subject to maximum height.

- The Zoning Ordinance includes standards for noise generated by particular industrial and other uses; however, provisions associated with aircraft overflight noise are not addressed.
- Windmills are permitted accessory uses in all districts but do not have a standard definition or development criteria (such as setbacks or height).

Regional Planning Entities

There are a number of regional entities engaged in various advocacy, scientific, educational, and organizational activities throughout the Study Area. The following four were deemed most relevant to the JLUS effort.

Tri-County Council of Southern Maryland

The Tri-County Council of Southern Maryland (TCCSMD) is the regional development and planning organization for Southern Maryland and is the NAS PAX JLUS sponsor. Created 40 years ago, the mission of the TCCSMD is to serve as a forum for the discussion and resolution of issues affecting the Southern Maryland Region (Calvert County, Charles County, and St. Mary's County) and select, advocate, and advance those activities that will best serve the interests of all the people of Southern Maryland.

The TCCSMD serves as an information and data source, engages in regional planning, serves as an advocate for the region's interests and priorities at the federal and state levels, qualifies the region for federal and state assistance, and develops programs to meet region-wide needs and goals. Activities are intended to promote the social and economic development and environmental protection of the region.

Mid Shore Regional Council

The Mid-Shore Regional Council (MSRC) serves Caroline, Dorchester, and Talbot counties in Maryland. The MSRC operates as a cooperative regional planning and development agency within the three counties to foster physical, economic, and social development. The Council initiates and coordinates plans and projects for the development of human and economic resources. The MSRC is a federally designated Economic Development District that enables federal funding to the region through the US Department of Commerce's Economic Development Administration. The focus of MSRC's efforts is associated with the pursuit of economic development, including the facilitation of regional economic development strategies. One such effort is to assess the feasibility of establishing a regional technology school or utilizing Chesapeake College to offer regional technology programs.

Northern Neck Planning District Commission

The Northern Neck Planning District Commission (PDC) is the regional planning organization and economic development agency for Northumberland and Westmoreland counties in Virginia. It is a voluntary association of local governing bodies that serves to address local issues and solve problems with regional significance and impact through mutual cooperation. Regional programming includes intergovernmental coordination, review and assistance, economic development activities, transportation planning, grant program identification and applications, environmental planning, and local requests.

Tri-County Council for the Lower Eastern Shore

The Tri-County Council for the Lower Eastern Shore of Maryland was formed by an Act of the Maryland General Assembly in 2001. The Council facilitates regional planning and development in Somerset, Wicomico, and Worcester counties and works closely with the Economic Development Administration, US Department of Agriculture Rural Development, and Maryland Department of Business and Economic Development.

Other References

In the interest of land use compatibility between the military and the local community, the DOD Office of Economic Adjustment (OEA) and other public interest groups, such as the National Association of Counties (NACo), have prepared educational documents and videos that educate and inform the public about encroachment issues and methods that can be used to address existing or future compatibility concerns. Five resources that have been published to inform the public on land use compatibility are identified as follows:

Guides

***The Practical Guide to Compatible Civilian Development near Military Installations (July 2007),* OEA**

This guide offers general information on community development and civilian encroachment issues. The guide can be found at: http://www.oea.gov/.

Joint Land Use Study Program Guidance Manual (November 2006)

This manual provides guidance on the JLUS program, process, and efforts to support compatible development. This manual can be obtained on the OEA internet site at the following address: http://www.oea.gov/.

Encouraging Compatible Land Use between Local Governments and Military Installations: A Best Practices Guide (April 2007), NACo

This guidebook presents case studies of best practices between the military and communities through communication, regulatory approaches, and Joint Land Use Studies. The guide can be accessed on the NACo internet site at the following address: http://www.naco.org/.

Videos

The Base Next Door: Community Planning and the Joint Land Use Study Program, OEA

This informative video discusses the issue of encroachment near military installations as urban development occurs within the vicinity. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=6UiyWDgLeJM

Managing Growth, Communities Respond, OEA

This video highlights the lessons learned from three communities (Kitsap Naval Base in Bangor, Washington; Fort Drum in Jefferson County, New York; and Fort Leonard Wood in Pulaski County, Missouri) that have successful programs for managing growth near their respective military installations. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=rea6d3bDp3c

5. Compatibility Assessment

Inside Chapter 5 . . .

Compatibility 5-1
Anti-Terrorism / Force Protection 5-2
Biological Resources 5-6
Energy Development 5-7
Frequency Spectrum 5-12
Interagency Coordination / Communication 5-28
Land / Air / Sea Space Competition (LS) 5-43
Land Use 5-45
Legislative Initiatives 5-46
Light and Glare 5-49
Noise 5-53
Roadway Capacity 5-80
Safety Zones 5-84
Vertical Obstructions 5-94
Water Quality / Quantity 102

Compatibility

Compatibility, in relation to military readiness, can be defined as the balance or compromise between community needs and interests and military needs and interests. The goal of compatibility planning is to promote an environment where both community and military entities communicate, coordinate, and implement mutually supportive actions that allow both to achieve their respective objectives.

A number of factors assist in determining whether community and military plans, programs, and activities are compatible or in conflict. For this Joint Land Use Study (JLUS), 24 compatibility factors were reviewed to identify, determine, and establish a prioritized set of key study area issues. These compatibility factors are grouped into three broad categories: man-made factors, natural resource factors, and competition for scarce resources.

Man-Made Factors

1. Interagency Coordination / Communication
2. Land Use
3. Safety Zones
4. Vertical Obstruction
5. Local Housing Availability
6. Infrastructure Extensions
7. Anti-Terrorism / Force Protection
8. Noise
9. Vibration
10. Dust / Smoke / Steam
11. Light and Glare
12. Energy Development
13. Air Quality
14. Frequency Spectrum Impedance / Interference
15. Public Trespassing
16. Cultural Sites
17. Legislative Initiatives

Natural Resource Factors

18. Water Quality / Quantity
19. Sensitive Biological Resources
20. Marine Environments

Competition for Scarce Resources

21. Scarce Natural Resources
22. Land, Air, and Sea Spaces
23. Frequency Spectrum Capacity
24. Roadway Capacity

The methodology for the Naval Air Station Patuxent River (NAS PAX) JLUS consisted of a comprehensive and inclusive discovery process to identify key stakeholder issues associated with the compatibility factors. At the initial Policy Committee (PC) and Technical Advisory Group (TAG) meetings and public workshops, stakeholders were asked to identify the location and type of issue in conjunction with compatibility factors they thought existed today or could occur in the future. As a part of the evaluation phase, the PG, TAG, and the public examined and prioritized the extent of existing and potential future compatibility. Other factors and associated issues were analyzed based on available information and similarity with other community JLUS experiences around the country.

The evaluation of issues directly and indirectly affects the selection and inclusion of recommended strategies in the JLUS Report. When reviewing the assessment information in this chapter, it is important to note the following:

- This chapter provides a technical background on the factors and issues discussed based on available information. The intent is to provide an adequate context for awareness, education, and development of JLUS recommendations. It is not designed or intended to be utilized as an exhaustive technical evaluation of existing or future conditions within the Study Area.
- Of the 24 compatibility factors considered, several were determined to be inapplicable to this JLUS: Local Housing Availability, Infrastructure Extensions, Dust / Smoke / Steam, Air Quality, Public Trespassing, Cultural Resources, Marine Environments, and Scarce Natural Resources.
- Similar issues were consolidated into single compatibility factors. For example, the Noise and Vibration issues were consolidated into one factor since the impacts associated with each of these are typically very similar and Frequency Spectrum Impedance / Interference was combined with Frequency Spectrum Capacity due to the overlapping nature of several of the issues identified.
- Each issue has an accompanying set of existing tools. These existing tools are meant to show the reader what is currently in place that affects the specific compatibility issue. Existing tools will not always aid compatibility but can offer a certain relevancy that can be built off of to help create strategies for future implementation.

The following sections discuss the issues and existing tools by alphabetized factor.

Anti-Terrorism / Force Protection

Anti-Terrorism Force Protection (AT / FP) relates to the safety of personnel, facilities, and information on an installation from outside threats. Security concerns and trespassing can present immediate compatibility concerns for installations. Due to current global conditions and recent events, military installations are required to implement more restrictive standards to address AT/FP concerns. The Department of Defense (DOD) AT / FP standards require all DOD components to adhere to design/planning criteria and minimum construction standards to mitigate vulnerabilities and threats to an installation and its occupants. Important aspects of these criteria and standards include minimum standoff distances or required separation between buildings and roadways and parking lots and buildings and trash enclosures.

Compatibility Assessment

ISSUE AT-1	***Leased Space Off-Base.*** NAS PAX leases and occupies office space off-installation that does not meet security requirements. Proper AT/FP requirements are not met at these sites that are located within the community.

As a result of absorbing missions from the 1991 and 1993 rounds of the Base Realignment and Closure (BRAC) actions, NAS PAX experienced a shortage of office space for programs. As of 2011, the station reached 110 percent of its office capacity which has resulted in off-station office space solutions to accommodate government staff. These off-site leases are located in commercial office parks within proximity to NAS PAX.

While accommodating personnel off-site (such as non-essential contractors being sent off base to work) alleviates the general facility space deficiency at NAS PAX, it does not provide the same level of protection to mission critical activities from external threats and vulnerabilities. All DOD buildings are subject to AT/FP requirements that seek to minimize injuries or fatalities in the most effective and economic manner possible. The primary methods used include:

- Maximizing standoff distances between the location an explosive is likely to be detonated and the building.
- Constructing facilities to avoid progressive collapse (i.e., a chain-reaction failure of the structure such as upper floors collapsing onto lower floors.)
- Reducing flying debris hazards, particularly from glass fragments.

Such criteria apply to:

- New buildings
- Lease renewals
- Buildings where DOD has partial occupancy that exceeds 25 percent of the building's useable area
- Buildings that provide billeting (housing for 11 or more) and high-occupancy family housing (more than 13 units per building)
- Existing buildings with a repair/addition project that costs more than 50 percent of the Plant Replacement Value (PRV).
- Existing buildings with an addition project where the new footprint exceeds 50 percent of the gross square footage.

Facilities that are not AT/FP compliant may be more vulnerable to attack in situations of compromised security. Off-site commercial buildings are typically not constructed to the same standards as federal facilities and do not provide the required standoffs between buildings or from vehicle parking and access areas. These standards require structural laminated glazing, mass notifications systems, emergency cut-off switches for HVAC systems, internal utility routing, and improved equipment bracing which are non-traditional features in conventional construction. These deficiencies could threaten the physical security of the building, its inhabitants, and technological systems.

The DOD's AT/FP requirements (UFC 4-010-01) were revised in October 2013 to remove "all requirements for leased buildings and required all DOD leased buildings off DOD installations to comply with standards established by the Department of Homeland Security's Interagency Security Committee in The Risk Management Process for Federal Facilities."

In accordance with Deputy Secretary of Defense Memorandum dated 7 December 2012, the security standards established by the Department of Homeland Security's Interagency Security Committee in *The Risk Management Process for Federal Facilities* apply to all off-installation leased space managed by DOD.

Based on these requirements, it has been determined that current NAS PAX off-site facilities meet AT/FP requirements at this time; however, as additional office space is needed, alternative methods such as the use of Enhanced Use Lease (EUL) or the requirement of stricter security standards should be considered to meet those needs.

ISSUE AT-2	***Issue AT-2 Waterfront Access to NAS PAX.*** NAS PAX Main Station is accessible via the Chesapeake Bay and Patuxent River. High levels of waterway traffic create security concerns when boaters approach NAS PAX shorelines.

NAS PAX Main Station occupies a prominent location at the mouth of the Patuxent River and Chesapeake Bay. These waterways serve a variety of users including commercial fishermen, domestic and international cargo ships, and civilian watercraft. This wide range of users contributes to heavy traffic proximate to NAS PAX shorelines and creates a concern that associated watercraft could breach waterfront security in an attempt to enter NAS PAX. Open waterfront access is available along approximately 2.5 miles of the station's coastline, and the presence of piers, bridges, open beach space, and designated fishing spots can attract those on the water to approach the installation. Although both Coast Guard and Naval personnel patrol the waterways along the coast, security breaches have occurred. These breaches are typically harmless navigation errors; however, the open shoreline presents a weakness in AT/FP controls around NAS PAX.

Although Webster Field is also surrounded on two sides by water, the presence of the Coast Guard Station and the activity level of patrol boats in the area have effectively served as a deterrence to security threats.

Existing Tools

Unified Facilities Criteria DOD Minimum Antiterrorism Standards for Buildings

Unified Facilities Criteria (UFC) 4-010-01 prescribes the minimum antiterrorism standards for DOD buildings to seek effective ways to minimize the likelihood of mass casualties from terrorist attacks against DOD personnel in the buildings in which they work and live. The latest version of this UFC (October 2013), Section 1-8.4 Leased Buildings states that for DOD personnel in off-installation leased space:

> *"In accordance with Deputy Secretary of Defense Memorandum dated 7 December 2012, the security standards established by the Department of Homeland Security's Interagency Security Committee (ISC) in The Risk Management Process for Federal Facilities shall apply to all off-installation leased space managed by DoD and all DoD occupied space in buildings owned or operated by the U.S. General Services Administration (GSA). The ISC standards apply to leased space in the U.S. and in foreign countries. Current tenants and tenants who initiated lease requests prior to 7 December 2012 shall apply the ISC standards in accordance with existing or renewed lease agreements to the extent practicable."* [Emphasis added]

Risk Management Process for Federal Facilities

The Risk Management Process for Federal Facilities identifies standard security conditions for leased buildings pursuant to Section 1-8.4 of UFC 4-010-01 DOD Minimum Antiterrorism Standards for Buildings. The Risk Management document defines the criteria and processes that those responsible for the security of a facility should use to determine its facility security level and provides an integrated, single source of physical security countermeasures for all non-military federal facilities and provides guidance for customization of the countermeasures for federal facilities.

The risk management provisions are applicable to all buildings and facilities in the US occupied by federal employees for nonmilitary activities including existing buildings, new construction, or major modernizations; facilities owned, to be purchased, or leased; stand-alone facilities, federal campuses, and where appropriate, individual facilities on federal campuses; and special-use facilities.

The risk management process utilizes a "building block" approach to identify, assess, and prioritize the risks to Federal facilities by defining the facility's base security level (FSL) and commensurate achievable level of protection. This implements cost-effective measures appropriate for mitigating vulnerability thereby reducing the risk to an acceptable level.

For leased spaces, the responsibility for making the final FSL determination rests with the tenant(s) who must devise a risk

management strategy and, if possible, fund the appropriate security countermeasures to mitigate risk in the following facilities:

- For single-tenant facilities owned or leased by the government, a representative of the tenant agency will make the FSL determination in consultation with the owning or leasing department or agency and the security organization responsible for the facility.
- In multi-tenant facilities owned or leased by the government, the Designated Official, in coordination with a representative from each Federal tenant (i.e., the Facility Security Committee), will make the FSL determination, in consultation with the owning or leasing department or agency and the security organization responsible for the facility.

Depending on the level of protection, increased security measures may apply to the following:

- Site—including the site perimeter, site access, exterior areas and assets, and parking;
- Structure—including structural hardening, façade, windows, and building systems;
- Facility Entrances—including employee and visitor pedestrian entrances and exits, loading docks, and other openings in the building envelope;
- Interior—including space planning and security of specific interior spaces;
- Security Systems—including intrusion-detection, access control, and CCTV camera systems; and
- Security Operations and Administration—including planning, guard force operations, management and decision making, and mail handling and receiving.

NAS PAX Enhanced Use Lease

NAS PAX is contemplating an EUL of approximately 45 acres on seven parcels of land on NAS PAX property. The legal framework that established EUL allows an installation to offer up underutilized property to private industry for development through a long-term leasing agreement.

The proposed development must be compatible to the mission activities of the installation and improve the use of installation property in a way that enables the installation to be more efficient in fulfilling its mission.

The use of EULs provide tangible benefits to military installations through the opportunity to realize reductions in installation operating costs or capital costs through cash or in-kind services such as maintenance, repair, or demolition. Revenues received from the enhanced use lease can also be used to fund other installation needs.

The proposed development of a modernized work campus at NAS PAX would create space and may eliminate future AT/ FP concerns associated with NAS PAX personnel working in off-site leased space.

Code of Federal Regulations Title 33

The Code of Federal Regulations (CFR) Title 33 governs navigation and navigable waters within the United States. Section 334.180 of CFR Title 33 prohibits civilians and associated craft from approaching closer than 75 yards to the beaches, shoreline, or piers of NAS PAX and associated property. Civilians and associated craft are also prohibited from approaching navy rafts, barges, or platforms closer than 100 yards. When the Navy is conducting diving operations in the range area, civilians and associated craft are required to stay at least 200 yards clear of the operations.

NAS Patuxent River Master Plan

The NAS PAX Master Plan completed in 2012 includes a proposed Security AT/FP Enhancement Plan intended to exceed the minimum terrorism standards established by DOD. NAS PAX is proposing enhanced security measures for seaward perimeter surveillance, including the following:

- Fully funding and deploying a camera system augmented with glare lighting to blind and delay approaching dangers and provide greater response time.
- Installation of delay and denial measures to increase alert and response time appropriately, i.e., additional physical barriers that can be deployed at basin and creek entrances.
- Creating physical barriers such as rip rap to make water landings more difficult.

- Developing a formalized boundary above the high-water mark with man-made and vegetative barriers to create a clear zone between the barrier and shoreline to deter an assault.
- Light and post large signs visible from offshore indicating the presence of armed patrols and additional signs mounted on buoys.
- Coordinate with other agencies or services to enhance waterborne patrols.

Biological Resources

Biological resources include federal and state listed species (threatened and endangered species) and their habitats. These resources may also include areas such as wetlands and migratory corridors that are critical to the overall health and productivity of an ecosystem. The presence of sensitive biological resources may require special development considerations and should be included early in the planning process.

Compatibility Assessment

ISSUE BIO-1	***Wildlife Refuges in Region.*** Nesting birds and other wildlife species could be impacted by military exercises. This is exacerbated during breeding and migrating times, working against investments that have been made to protect threatened species.

According to the Navy's Natural Resources Conservation Strategic Plan, conservation of the natural resources is a vital component of the national environmental agenda and being conscientious stewards of resources entrusted to the federal government's use is vital to maintain public confidence and support. The Navy manages natural resources through its Integrated Natural Resources Management Plan (INRMP) that serves as the primary planning guide for natural resources management for each installation and operational area. Although the focus of an INRMP is on the natural resources contained within military property, the Navy works with local communities and public entities to improve the overall ecosystem by the formation of partnerships and environmental protection initiatives.

There are currently no documented concerns associated with military operations having a direct impact on the impairment of biological resources; however, during the JLUS process, the public expressed concern over the protection of the region's natural resources and the need to avoid potential impacts to wildlife in the area, particularly those that occupy local wildlife refuges and may migrate through the NAS PAX ranges.

There are two National Wildlife Refuges operated and maintained by the US Fish and Wildlife Service (USFWS) within the overall NAS PAX operating area, protecting over 30,000 acres of habitat. Blackwater National Wildlife Refuge, located in Dorchester County, encompasses 27,000 acres. Glenn Martin National Wildlife Refuge in Somerset County consists of 4,500 acres, covering half of Smith Island.

The Blackwater Refuge provides a vital sanctuary for many migratory birds, most notably, the American Bald Eagle. The refuge is one stop along a major migration route called the Atlantic Flyway. The Blackwater Refuge has been designated by the Ramsar Convention as a "Wetlands of International Importance" and the Audubon has adopted it as an "Internationally Important Bird Area." Overall, the area provides a home for over 250 species of birds, with 85 of those species using the Refuge for breeding. This includes a large bald eagle breeding population, one of the largest on the East Coast.

The Glenn Martin National Wildlife Refuge provides a crucial winter home and nesting habitat for migratory waterfowl. The thousands of birds in the refuge consist of all types and change with the seasons. The area has been known to support large colonies of birds, which nest in groups. The Bloodsworth Island Range, located north of the Glenn Martin Refuge is voluntary closed by the Navy during migratory waterfowl season, October to February.

In order to assist in the protection of biological resources, the DOD has established a variety of programs and partnerships. The Navy's Partners in Flight (PIF) was established for the conservation of migratory birds. The

PIF is part of an even larger initiative known as the North American Bird Conservation Initiative (NABCI), designed to protect all species of birds (including land birds, waterbirds, and shorebirds; both migratory and resident). National Resources Office (NRB) staff members have been very active in both PIF and NABCI and should continue their involvement in these programs, within DOD and beyond.

Existing Tools

Friends of Blackwater

Friends of Blackwater is a volunteer nonprofit conservation group that assists the Blackwater National Wildlife Refuge in achieving its needs and goals. The members of the group help in various ways, including supporting a cooperative education program, the Eagle's Nest Bookstore, a scholarship program, eagle and osprey cameras, and have written multiple testimonies submitted to Congress. The group has raised funds and has received donations and grants to financially support the refuge.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan was originally implemented in 1986 and has been renewed, expanded, and updated. Joint ventures implement regional initiatives throughout the continent. The Atlantic Coast Joint Venture manages and operates the conservation program in the Chesapeake Bay area. The venture consists of a partnership of multiple states, agencies, and organizations. The group's objectives involve biological planning, conservation design and delivery, monitoring and evaluation, and research. Recommendations have been made through the plan for the Bloodsworth Island Range (BIR), including voluntary temporary shutdown, access by the Maryland Department of Natural Resources (DNR) to survey, and habitat improvement.

Partners in Flight

Partners in Flight was launched in 1990 to address concerns about decreasing bird populations. Partners in Flight is a cooperative organization dedicated to combining, coordinating, and increasing resources of organizations. They have developed Bird Conservation Plans that identify priority species and recommend management strategies. Partners in Flight is composed of regional working groups with state chairs to coordinate activities locally and regionally.

Readiness and Environmental Protection Initiative

The Readiness and Environmental Protection Initiative (REPI) helps to protect wildlife through buffers around military installations. As mentioned in chapter 4, the REPI program benefits Navy missions by fostering agreements between eligible entities and military services.

Energy Development

Development of energy sources, including alternative energy sources (such as solar, wind, geothermal, or biofuels) could pose compatibility issues related to glare (solar energy), or vertical obstruction (wind generation), or water quality / quantity.

The moving blades of a wind turbine create a Doppler effect that can interfere with radio transmissions between air traffic controllers and aircraft and other types of communications, such as satellites. Recent studies indicate that large numbers of wind turbines located between five and eight miles from a radar system can have a negative impact on the system and interfere with readings. The impacts on radar are increased with the height, number, and clustering of turbines. The greatest impact is caused by their location proximate to the radar system. Although research is still being conducted, it is not fully known how tall, large, or how many wind turbines must be present to compromise radar operations.

Solar facilities can cause substantial amounts of glare depending on their type, location, angle, and direction, resulting in a reduction of a pilot's view, even at a very high altitude.

Compatibility Assessment

ED-1	***Solar Panels Near Flight Paths.*** The use of solar panels is currently restricted within flight paths due to the potential for adverse effects to military operations resulting from reflection from solar panels.

Certain alternative energy technologies such as solar panels incorporate reflective materials in their construction that assist in the generation of energy for distribution and power, but also produce unintended glare. The location and direction of glare can impair the vision of military and civilian pilots who may be training or performing activities in the vicinity of the airport or within designated flight routes. Visual impairment can decrease pilot and aircraft safety and ultimately that of the general public should an accident occur. It is for this unintended reason that many jurisdictions near NAS PAX restrict the use of solar arrays.

Though solar energy technology and use has been evolving over the past several decades as a mainstream form of renewable energy generation, the recent expansion in the industry and corresponding decrease in cost has only recently made it a practical consideration for airports. Solar energy presents itself as an opportunity for airports to produce on-site electricity and to reduce long-term electricity use and energy costs. While solar energy has many benefits, it does introduce some new and unforeseen issues, like possible glare (also referred to as reflectivity) and communication systems interference, which have complicated FAA review and approval of the technology.

The solar panels in the form of a photovoltaic system (PV) is a technology that can readily be designed into an existing landscape can be placed in locations that are not used for aviation activities and therefore have little value to the airport or for alternative developments. Relative to other renewable energy systems, various industry studies have determined that solar PV is more compatible with airport land use for the following reasons:

- Is most cost-effective when serving a smaller on-site electricity demand as opposed to large-scale generation for the electricity grid;
- Has a low profile and modular design, which is compatible with low-demand airport property such as rooftops and airfields;
- Is designed to absorb sunlight (rather than reflect it), minimizing potential impacts of glare; and
- It does not attract wildlife, which is a critical aviation hazard.

The siting of solar arrays is particularly well-suited to airports because of the available space at airports, unobstructed terrain, and energy demand. Airport managers have recognized the business advantages of solar power as an alternative revenue source and in providing long-term cost savings. In addition, public policy benefits to municipal, county, and state government agencies that manage airports and have set greenhouse gas reduction goals offer a real and purposeful basis for these projects. Due to the State of Maryland's energy reduction mandate, private solar energy purchases / leases / hybrid purchase-lease agreements are increasing due to the rebates and promise of reduced energy cost. If proximate to NAS PAX, these private solar agreements could pose incompatibility issues for airport and flight operations due to glare.

Despite these benefits, the potential glare from solar facilities and any other facilities with reflective surfaces do pose a concern to military pilots. The military has expressed concerns regarding the possible effects of solar facilities on its training mission; however, the FAA has developed guidelines for siting such solar arrays. The FAA, with support from the U.S. Department of Energy (DOE), has developed a protocol to analyze the potential impacts of glare. When a project is proposed on airport property, the FAA has broad authority. The airport, as recipient of FAA funds for infrastructure improvements, is responsible for presenting information so that the FAA can assess a project's compliance with airspace protection laws (referred to as Part 77) and environmental laws (such as the National Environmental Policy Act).

Concerns about glare are specific to on-airport activities; however certain factors such as optimal proximity (the distance away from airfield facilities and flight paths) require evaluation on a case by case basis in

consultation with the airport manager who may defer to FAA guidance. While the restrictions placed on solar arrays are understandable, this can be avoided by using the right technologies in an efficient manner.

Existing Tools

Technical Guidance for Evaluating Selected Solar Technologies on Airports

The FAA Office of Airports / Airport Planning and Environmental Division established technical guidance for use by local airports managers to assist in providing a readily usable reference for FAA technical staff who review proposed airport solar projects and for airport sponsors that may be considering a solar installation. It addresses a wide range of topics including solar technology, electric grid infrastructure, FAA safety regulations, financing alternatives, and incentives.

As a result of its broad authority to protect airspace, the FAA must be given data to review any construction or alteration on a public use airport regardless of height or location. This guidance manual identifies the steps that solar development proponents must take to avoid impacts on aviation and the environment. Airport sponsors are required to assess airspace penetration, reflectivity, and communication systems interference for all airport solar projects. The FAA is also authorized to review all projects for compliance with national environmental laws.

This set of guidelines provides a checklist of FAA procedures to ensure that proposed photovoltaic or solar thermal hot water systems are safe and pose no risk to pilots, air traffic controllers, or airport operations. Although the guidelines are still applicable, it should be noted that as of October 2013, the FAA is reviewing multiple sections of the guidance as a result of new information and field experience, particularly with respect to compatibility and glare.

Solar Glare Hazard Analysis Tool (2013)

In February 2013, The FAA made available a beta version of the Solar Glare Hazard Analysis Tool (SGHAT), developed by the DOE's Sandia National Laboratories, for assessing potential glare impacts from individual projects. The SGHAT determines when and where solar glare can occur throughout the year from a PV array as viewed from specified observation points by use of an interactive map for specifying solar project sites and observer locations. Latitude, longitude, and elevation are automatically recorded through the map interface, providing necessary information for sun position and vector calculations.

If glare is identified as a potential result, the tool is able to predict potential hazards and produces a color-coded display of the potential for the glare to result in an ocular impact. Upon completion of the initial results, the model can also be used as a planning tool to alter the project's design characteristics (including footprint, orientation, and tilt angle) and evaluate the potential reflections produced and the opportunities to minimize or eliminate the effects of glare on sensitive receptors.

The FAA has established informal guidelines for how SGHAT should be used so that the agency can determine how glare affects controllers who are working in air traffic control towers and pilots who are arriving at the airport on final approach. Once the area of the solar project is located and its design characteristics recorded, information on each of the glare-sensitive receptors must be input. Improvement and wider disbursement of this tool for use by additional users is currently in progress.

ISSUE ED-2	***Wind Energy Development.*** There is a need for a formal and coordinated site selection process and standard criteria for potential wind energy development. Interest in the use of wind turbines on agricultural lands as an opportunity for increasing profitability has grown; however, such uses would interfere with military operations and instrumentation viewsheds**.**

Generally, the installation of personal wind towers (which are typically shorter than 50 feet in height) on residential land is not a concern that would impact flight operations, provided they are not located within the runway safety zones or the Approach-Departure Clearance Surfaces. If a resident wishes to erect a personal wind tower on their land, this would be determined on a case-by-case basis in accordance with local zoning ordinances and regulations.

Future commercial wind energy exploration presents possible threats to NAS PAX despite its potential for private industry. The presence of wind farms present challenges to air and weapons testing such as:

- Obstruction
- Radio frequency (RF) clutter
- Screening.

Radio frequency (RF) clutter sources, such as wind turbines, have the potential to corrupt the accuracy of these measurements. This corruption is produced by the rotating wind turbine blades inducing undesired Doppler shift on the radar signal. Wind farms heighten this effect due to the increase in density of wind turbines.

This is of particular concern in areas within the NAS PAX radar viewshed associated with NAS PAX's Advanced Dynamic Aircraft Measurement System (ADAMS). As described in chapter 3, ADAMS is the Navy's only outdoor radar measurement test range that performs radar measurements of targets in flight. The ATR Inner Test Range airspace is used to conduct dynamic flights from which ADAMS collects in-flight radar measurements.

These measurements are key to providing the DOD with decision quality information to ensure major weapon systems acquisition are meeting defined requirements as well as providing measurements to support system developments. ADAMS provides a wide range of radar measurement capabilities that are a result of the highly capable instrumentation radar suite combined with the available test range airspace in which to perform the measurements. NAS PAX ATC utilizes a digital system to monitor and track its aircraft during training flights. The presence of large wind farms can have several effects on radar systems depending on the number and height of turbines, the distance between the turbines, and the distance from the radar. The two main impacts of large wind farms are screening, or blocking out portions of the "field of view" so that it cannot see aircraft that fly behind the "screen"; and causing false readings on the radar that make it appear there are aircraft flying in the area that are not really there.

All types of wind development have the potential to affect radar operations at PAX because of viewshed interference. Consequently, this impact depends on the height of the wind turbines, the distance from PAX, and the density of the turbines. Commercial wind development has the potential to affect a number of other systems. Further research can reveal the likelihood and extent of such impacts.

Both Virginia and Maryland are actively pursuing the development of land-based and shoreline wind energy. Based on recent studies, there are particular locations with ideal prospects for economically viable wind power, primarily within coastal and off-shore areas. The Department of Defense has policy in place to coordinate the site selection process with local jurisdictions.

Wind energy in coastal Maryland is becoming a possibility. The proposed Great Bay Wind Center energy project includes 29 turbines in Somerset County, approximately 10 miles north of the City of Crisfield. Phase I of the project is currently under federal review. To alleviate the impacts the that the turbines might have on Navy testing and training, both the Navy and the wind energy developer proposed mitigation options, though neither party reached agreement. The Department of Defense issued a letter to the Secretary of the U.S. Department of Transportation on October 30, 2014 formally rejecting the wind project, stating that it would pose an unacceptable risk to national security of the United States. The ultimate fate of this project is yet to be determined pending the outcome of an FAA evaluation and ongoing technical studies that would inform any mitigation agreement between the Department of Defense and the wind project operator.

In addition, both states consider land-based wind turbine towers as a potential source of income for farmers, to supplement and subsidize income from agricultural operations. While economic sustainability of farmland is a major policy objective in both states, towers located in low level flight paths could create safety hazards and impair operations due to radar interference.

An increased emphasis and priority on the development of alternative energy sources is becoming a national, state, and local priority that is being driven by private industry. NAS PAX is currently working with industry representatives, local legislators, and private universities to pursue solutions that enable the coexistence of the ADAMS capability and wind turbines. These efforts include continuous vetting of published papers on radar to wind turbine mitigations, review of current radar to wind turbine impact methodology by an independent technical panel, science and technology studies of waveform encoding, detailed radar impact studies of turbines and wind farmer education regarding radar cross section scattering, follow-up studies on potential mitigation solutions, and a continual dialogue with the wind industry.

Existing Tools

DOD Energy Siting Clearinghouse

The Navy strives to balance operations and training requirements with community development in the vicinity of Navy land, sea, and air assets. These activities may include the development of renewable energy projects, transmission lines, residential/commercial structures, and other forms of development or alterations of land, air, and sea space.

To avoid potential mission impacts, the Navy collaborates with federal regulatory agencies, state and local governments, and the business community to communicate concerns early in the planning and development process and achieve compatible solutions. As described in chapter 4, the main responsibility of the DOD Energy Siting Clearinghouse is to comprehensively review and evaluate proposed energy projects and their possible effects on DOD operations. All proposed projects within military training routes or airspace must undergo the formal review process. With this process in place, it is extremely unlikely that a project would be approved that would cause any risk to national security.

The siting of wind farms in proximity to Navy installations are subject to review by the DOD Siting Clearinghouse.

St. Mary's County Comprehensive Zoning Ordinance

The St. Mary's Comprehensive Zoning Ordinance contains an AICUZ and AE (Airport Environs) Overlay including a prescriptive set of compatible land uses to ensure compatibility with NAS PAX.

Small wind energy systems up to 150 feet in height are permitted as accessory uses to a principal use within all zoning districts and commercial communication towers are permitted with conditional standards in the RPD (Rural Preservation District), RCL (Rural Commercial Limited), RL-T (Residential, Low Density – Transitional), VMX (Village Center Mixed Use), TMX (Town Center Mixed Use), CMX (Corridor Mixed Use), CC (Community Commercial), I (Industrial), and OBP (Office and Business Park) Zoning Districts.

The St. Mary's County Comprehensive Zoning Ordinance provides height exemptions for public communication towers in all zoning districts and for commercial communication towers in residential, mixed-use, and industrial/office park zoning districts with conditional use approval. The ordinance allows small wind energy systems up to 150 feet in all zoning districts as an accessory to a principal use. These allowances may create compatibility issues due to height regulations and potential radar interference proximate to aviation facilities.

Calvert County Zoning Ordinance

The Calvert County Zoning Ordinance permits ground-mounted wind energy systems up to 150 feet in all zoning districts, except in the WL (Wetlands) and HD (Historic) Zoning Districts, as special exception subject to approval by NAS PAX. NAS PAX must determine that the wind energy system will not cause interference with military activities.

Charles County Zoning Ordinance

Charles County has recently amended their Zoning Ordinance to incorporate provisions for wind and solar systems in the County's planning, zoning, and development regulations. Charles County allows both small, personal wind energy systems and large, commercial wind energy systems. Smaller uses are permitted in zoning districts by right and larger systems will require special exceptions in all zoning districts. Large wind energy systems are not to exceed 150 feet.

Talbot County Code

Talbot County amended the Zoning, Subdivision and Land Development Chapter of the County Code to permit small wind turbine systems of up to 160 feet as an accessory use in all zoning districts throughout the county. Wind turbine production facilities are permitted in LC (Limited Commercial), GC (General Commercial) and LI (Limited Industry) and permitted as a special exception use in AC (Agricultural Conservation) and CP (Countryside Preservation).

Caroline County Zoning Ordinance

Caroline County adopted a zoning amendment to allow small wind energy systems of up to 199 feet in height in all zoning districts. With the exception of agricultural or business operations (which allow two systems), only one system is allowed per lot or parcel.

Dorchester County Zoning Ordinance

The Dorchester County Council amended their Zoning Ordinance to include small wind energy systems of up to 80 feet in height as an accessory use for all zoning districts. Systems located in the AP (Airport Protection) district must comply with district building standards. The ordinance also prohibits small wind energy systems within the

Chesapeake Bay Critical Area tidewater buffer unless they are in accordance with Buffer Exemption Area (BEA) criteria.

Wicomico County Code
The Wicomico County Council approved an amendment to the Zoning Chapter of the County Code which permits small wind energy systems of up to 150 feet. Systems are allowed as an accessory use in all zoning districts, provided that they meet building standards for their respective zoning district.

Frequency Spectrum

Frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices on a daily basis.

Compatibility Assessment

ISSUE FS-1	***Disruption to Communications Equipment.*** Frequency interference is a great concern around airfields where the loss of communication has caused both the crash of military systems and aviation equipment critical to uninterrupted communication and safe use of systems.

The military's uninterrupted use of frequency spectrum is required for safe and effective testing and operations. The military's frequency spectrum needs for testing, evaluation, and training are generally increasing, while the spectrum available for DOD use is generally decreasing. Any device that uses the electromagnetic spectrum to perform its primary function can be described as spectrum dependent. These devices include transmitters, receivers, and, in some applications, a transmitter and receiver combined in the same unit called a transceiver.

The two federal agencies that authorize the use of the electromagnetic spectrum are the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA). According to the NTIA Office of Spectrum Management:

> *Almost every agency of the federal government uses the spectrum in performing mandated missions. The DOD uses the spectrum extensively for tactical and non-tactical uses. In the United States tactical uses are generally limited to a number of specific testing sites and training facilities, but DOD's non-tactical applications are extensive and include aircraft command and control, mobile communication in and around military bases, and air field and long distance communications using satellites.*

Frequency interference is related to other transmission sources. Interference can result from a number of factors:

- Using a new transmission frequency that is near an existing frequency;
- Reducing the distance between two antennas transmitting on a similar frequency;
- Increasing the power of a similar transmission signal;
- Using poorly adjusted transmission devices that transmit outside their assigned frequency or produce an electromagnetic signal that interferes with a signal transmission; and
- Using existing electronic sources created by portable systems that affect entire communities utilizing Wi-Fi broadband systems and industrial sources that produce electronic noise by-product.

Man-made sources of radio frequency (RF) energy are generally intended to make use of the electromagnetic environment for communications, radar, lighting, etc. The antennas and transmitters at NAS PAX Main Station and Webster Field operate in the RF band of the electromagnetic

spectrum, which is defined as the range of EM waves with frequencies between 3 kilohertz (kHz) to 300,000 megahertz (MHz). The portion of the RF region where frequencies are above 1,000 MHz is commonly called microwave.

The safe transport of all individual flights between airports is based on radio frequencies being available and interference free so that all of the aviation systems function properly. The FAA's Spectrum Engineering Services Office provides these fundamental services by ensuring radio frequency assets are always clear and available, both now and in the future.

The management and regulation of the use of radio frequencies is becoming more complex as technology rapidly expansions and as demand for wireless applications (cell phones and wireless broadband) continues to soar. At the same time, the safety of operating aviation systems remains of paramount importance.

An Environmental Impact Statement completed by NAS PAX for the purpose of evaluating an increase in operations identified the following as potential sources that may be responsible for any television and radio interference that may occur:

Electrical Interference. Anything with a motor such as home appliances, automobiles, trucks, or airplanes can cause electrical interference with home entertainment equipment. Radio communication equipment, such as CB radios, pagers, cellular phones, or other communications devices can also interfere with home entertainment equipment. The level of interference varies depending on the quality of the receiver in the home entertainment system. Some receivers are better than others in protecting from interference. In addition, “leaky insulators” on overhead power lines can also cause interference with home entertainment equipment.

Multipath. When a signal bounces off an object it usually reaches an antenna "out of phase" with the signal received directly from the source. This will "cancel out" or lower the signal strength of the desired received signal. For example, a television picture gets "fluttery" when an airplane flies by. In addition to military aircraft, there are many commercial and civilian airplanes flying within the Chesapeake Bay region that can cause multipath interference with home entertainment systems.

Ducting. When there is an unusual temperature variation in the atmosphere, the natural phenomenon of ducting may occur. This happens anytime when there are cool nights and warm days, usually in the spring or fall. Ducting causes radio frequency signals to bounce back down to earth and to be received at unusual distances from their source. This is a problem around the Chesapeake Bay, given the region’s distance from the predominant source of signals in Washington and Baltimore. When ducting occurs, stations from Norfolk and Richmond may be received along with weak signals from farther north. Ducting is also worse around water, as water does not change temperature as fast as the air above.

In order to successfully complete its operational activities, the military relies on a range of frequencies for communications and support systems. Webster Field operates in a controlled RF environment that allows for aircraft tracking and the development of communication based technologies such as shipboard air traffic control and landing systems and shipboard radio communication system design, integration, and engineering support; however, interruptions to equipment have occurred and resulted in system crashes and disruptions.

Because Radio Frequency is a valuable resource, its use is regulated by the government; however, not all equipment that uses RF energy is required to have a license or assignment. Part 15 is the portion of the FCC rules that regulates the unlicensed radio frequency devices. Electronics that use RF to operate are referred to as “Part 15 devices”. Because of their limited, ultra-low power outputs, they are conditionally permitted to operate in almost all RF bands.

Part 15 devices are common commercial items such as garage door openers, remote controls for electronic equipment, and similar commercially available equipment that operate at ultra-low power output in almost all of the frequency bands, including those dominated and heavily utilized by DOD. Part 15 devices use the same RF resources as the licensed users of the electromagnetic spectrum, including the DOD, fire stations, hospitals, and police forces.

Civilian use of Part 15 devices can interfere with military equipment such as the electronic systems used by the NAS PAX Atlantic Test Range (ATR), and ATR electronic equipment can interfere with Part 15 devices owned by private individuals. Baby monitors, cordless telephones, laptop computers, wireless computer mice, remote keys, wireless headsets, garage door openers, low-powered walkie-talkies, and wireless modems are just a few examples of the portable, wireless electronics that use an invisible resource, the RF spectrum, and the increasing demand on RF can cause challenges for the consumer as well as other users of RF.

NAS PAX's size and large number of tenants exacerbate the probability of interference due to Part 15 devices.

The widespread use of these devices using in frequency ranges that overlap the military frequency bands could also potentially degrade the radar's performance. In Southern Maryland, particularly in St. Mary's County, the massive array of sensitive antenna and sensor systems used by NAS PAX are especially susceptible to complications associated with frequency interruption and interference.

ISSUE FS-2	***Disruption to Emergency Service Communications Equipment.*** Local emergency responders experience interruptions in radio frequency. Radio devices used in emergency response have unexpectedly turned off or failed because of frequency problems.

During emergencies, the importance of communications systems is paramount. These communications systems include the wireline and wireless telephone networks, broadcast and cable television, radio, Public Safety Land Mobile Radio, satellite systems, and increasingly, the Internet. Local emergency responders through the JLUS interview process reported disruptions or equipment failures of emergency service equipment including radio devices. The failure of emergency communications systems can present a critical point failure at a time when emergency management systems are critical.

Since September 11, 2001 and Hurricane Katrina, the FCC has taken action to ensure that 911 services and other critical communications remain operational during emergency events. For example, in response to recommendations of an independent panel reviewing the impact of Hurricane Katrina, the FCC's Public Safety and Homeland Security Bureau is working on several fronts to improve communications during emergencies, including streamlining collection of outage information during times of crisis through the Disaster Information Reporting System, helping ensure that communications workers receive "essential personnel" credentials during emergencies, working with other federal agencies to improve interoperability among first responders, and promoting use of enhanced 911 best practices.

Components associated with emergency communications must operate effectively in order to achieve a successful response to an emergency. Today's channel allocations in public safety communications bands can handle limited data applications, but emerging applications demand higher data rates and broadband capabilities for communications among first responders and public safety agencies. Recent developments and use of video applications and visualized location-based services by first responders has increasingly required reliable communications paths with higher bandwidth requirements. The widespread use of Part 15 devices paired with the operation of military communication equipment by NAS PAX and at regional airports that rely on GPS systems has the ability to disrupt equipment used by both consumers and emergency responders. This challenge will continue to present itself as the federal government reallocates frequency bands and moves forwards in improving its approach to ensuring that public safety is protected.

ISSUE FS-3	***Widespread Use of Wireless Devices.*** Frequency interference issues have increased as wireless demands and technology use skyrockets. Residents can and have experienced inoperable garage and car doors as well as other systems sharing frequency bands**.**

Competition for radio spectrum has intensified in recent years, particularly in bands that are optimal for mobile systems (approximately 200MHz–4GHz). This factor has had a dramatic impact on the perceived (and actual) value of spectrum and has biased decisions for spectrum re-allocation heavily in favor of the private sector.

As previously described, over the past few decades the growth in consumer electronics has led to an increased number of inexpensive devices built to operate without a license (Part 15 devices). As a result of the proliferation of such devices, those located near military bases or other designated users of RF spectrum may be more susceptible to

inoperability of devices. Although interference and malfunction of Part 15 devices used by the consumer may be disruptive and a public nuisance, by definition, users of Part 15 devices must accept any interference that may occur from the authorized users of radio frequencies such as by the military or other government entities. Mitigation measures are available to the consumer such as installation of filters between wireless routers or the use of different channels for certain devices. The manufacturers of garage door openers have been actively engaged with working with the DOD to develop technologies that reduce or avoid the potential for garage door malfunctions and may be able to provide a retrofit to allow operation on a frequency that is not used by the local military in certain circumstances and locations proximate to military installations.

According to FCC Public Notice DA 05-424, dated Feb. 15, 2005, garage door opener manufacturers offered to assist consumers in the resolution of frequency interference to devices including making available for consumer purchase a replacement transmitter and receiver to operate on a different frequency than that used by government or military services and mobile radio systems.

Consumers who experience problems with garage door openers should contact the manufacturer or local repair shops for assistance or call the FCC Call Center at 1-888-225-5322.

ISSUE FS-4	***Vertical Elements.*** Tall structures that are at currently unregulated heights (less than 199 feet) can result in vertical obstructions, which in turn cause frequency issues and electromagnetic interference.

Cellular towers and tall structures including buildings and alternative energy development facilities can pose a threat to the equipment used to maintain communications and perform successful test and operations by the ATR. The locations and elevations of these towers can potentially impede communications between radar tracking devices and their selected targets, whether it be an aircraft or projectile intended for target, or create a Doppler effect – returning contaminated data from targets.

Radar signals transmitted or relayed directly from a source to a ground- or tower-based receiver (i.e. do not use satellite or other remote relay) require an unimpeded line of sight corridor to function properly. Tall structures can interfere with radar signal transmissions. The ATR Inner Test Range consists of an extensive network of radar tracking devices that require an unobstructed line of sight to operate properly.

NAS PAX has established a radar viewshed which illustrates an area where the height of structures may interfere with these transmissions that extend throughout the JLUS Study Area and beyond.

The heights of structures that create potential signal interference are variable, ranging from surface height closest to NAS PAX, to a height of 600 feet at the outer perimeter boundary of the viewshed. The viewshed contains concentric zones delineating heights of structures that pose an interference hazard with radar transmissions. The further from the transmitter source, the higher the structures can be without creating interference. In addition to the radar viewshed that must remain clear of obstructions in order to avoid frequency interference, a High Risk of Adverse Impact Zone (HRAIZ) has been designated around NAS PAX. The HRAIZ was determined by the Navy as a result of an independent study to validate the approach used to produce scientific data for the assessment of the adverse effects of renewable energy projects on military test missions. The HRAIZ is the area where the introduction of energy infrastructure could have an adverse impact on military testing, training, and operational capabilities that cannot be feasibly and affordably mitigated. The HRAIZ is only intended to serve as a risk management tool for industry, state, and local governments, and the public to identify geographic areas where there is a high likelihood of adverse impact to national security.

Certain counties within the JLUS Study Area have established zoning regulations which either do not have a height limit or exempt non-habitable structures (i.e. towers, antennas, silos, smokestacks, transmission line poles and towers, water tanks, etc.) from height limits. Since structures directly impact the potential for creating radar interference with the ADAMS radar, and height of is a primary consideration, it is important to understand the regulatory height of permissible structures within the ADAMS radar viewshed.

Table 5-1 identifies the height regulations within the viewshed jurisdictions. Jurisdictions that exempt heights for non-habitable structures may create potential radar interference and create a Doppler effect. It is important to note that any structure greater than 199 feet is subject to an FAA Obstruction Evaluation and is reviewed on a case-by-case basis to determine adverse impacts.

Table 5-1. Height Restrictions within NAS PAX Radar Instrument Viewshed by Jurisdiction

Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
St. Mary's County	■ 40 feet – Residential districts except, ■ 75 feet – Residential High District ■ 60 feet – Commercial Marine District ■ 100 feet – Mixed Use Commercial, Office Business, and Industrial Districts	■ 150 feet – Small wind energy systems ■ No restriction – Communication Towers	■ Small wind energy systems permitted in all zoning districts accessory to a principal use ■ Public and non-commercial communication towers permitted in all zoning districts ■ Amateur antennae and microwave equipment permitted with limited standards in all zoning districts ■ Commercial communication towers permitted with conditional standards in RPD (Rural Preservation District), RCL (Rural Commercial Limited), RL-T (Residential, Low Density – Transitional), VMX (Village Center Mixed Use), TMX (Town Center Mixed Use), CMX (Corridor Mixed Use), CC (Community Commercial), I (Industrial), and OBP (Office and Business Park) Zoning Districts
Calvert County	■ 40-50 feet – All uses	■ 85 feet – Wind energy systems, roof-mounted ■ 150 feet – Wind energy systems, ground-mounted ■ No restriction – Fire towers, hose towers, cooling towers, steeples, flag poles, silos, smokestacks, masts, transmission line poles and towers, water tanks, and monuments	■ Wind energy systems permitted in all zoning districts except WL (Wetlands)and HD (Historic Districts) as special exception subject to a determination by the NAS PAX that the wind energy system will not cause interference with military activities ■ Communication antennas and towers permitted as special exception on government property in all zoning districts except WL (Wetlands), APD (Agricultural Preservation Districts), and HD (Historic Districts) ■ Communication antennas permitted as special exception on private property in all zoning districts except APD (Agricultural Preservation Districts) ■ Communications towers permitted as special exception on private property in all zoning districts except WL (Wetlands) and HD (Historic Districts)

Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
Charles County	■ 36-40 feet – All uses except, ■ 50 feet – Uses in the Core Retail/Residential, Core Employment/ Residential, and Heavy Industrial Zoning Districts ■ 60 feet – Uses in the Central Business and Business Park Zoning Districts ■ Maximum 5 story buildings in the Waldorf Central Zone ■ Maximum 10 story buildings in the Acton Urban Center Zone	■ One additional foot for every two feet of setback – Houses of worship, private schools, hospitals, or high-rise apartment dwellings ■ No restrictions – Fire or parapet walls, towers, steeples, flagpoles, radio and television antennas, and silos	■ Public utility towers and wireless communication antennas permitted as special exception in all zoning districts
Talbot County	■ 40 feet – All uses except, ■ 20 feet – Self-storage warehousing ■ 35 feet – Uses in Gateway Overlay District ■ Variable height – Easton Airport Overlay District	■ 75 feet – Steeples, chimneys, private antennas ■ 100 feet – Fire towers, hospitals, silos, monuments ■ 200 feet – Communication towers, grain elevators	■ Antenna towers for essential communications permitted with conditions in all zoning districts ■ Antenna towers for non-essential communications permitted in Limited Commercial, General Commercial, and Limited Industrial; permitted as special exception in Agricultural Conservation, Countryside Preservation, Western Rural Conservation, Rural Conservation Districts ■ Silos permitted as an accessory to a principal use permitted in all districts except for Limited Commercial, General Commercial, and Limited Industrial ■ Hospitals permitted by special exception in the General Commercial Zoning District ■ Monuments permitted in the General Commercial and Limited Industrial Zoning Districts ■ Wireless communication towers greater than 100 feet permitted as special exception in all zoning districts except for Rural Residential, Town Conservation, Town Residential, and Village Center

Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
Town of Easton	■ 35 feet – All uses except, ■ 40 feet –Uses in Industrial District ■ 50 feet – Uses in Central Business Commercial, General Commercial, and Limited Commercial District ■ 60 feet – Uses in Government Institutional District ■ 110 feet – Uses in Regional Healthcare District subject to FAA restrictions and regulations	■ No restrictions – Roof structures, housing stairways, elevators, heating, cooling and ventilation equipment and fans, tanks, ventilating fans or similar equipment, fire or parapet screening or sound attenuation walls or panels, steeples, grain tanks, silos, smoke stacks or vents, masts and antennas, tanks, monuments, or other structures that project into the air. The provisions of this section shall not apply to any structure or use within any airport clear zone ■ 200 feet – Towers provided compliance with applicable Federal or State law.	■ Small energy wind turbine permitted in A-1 (Agricultural), R7-A(Residential), R-10A (Residential), R-10M (Residential), and G/I (Government / Institutional) Zoning Districts ■ Towers permitted as special exception in the CG (General Commercial), I (Industrial), I-1 (Select Industrial), and BC (Business Commercial) Zoning Districts
Caroline County	■ 40 feet – All uses except, ■ 50 feet – Uses in Industrial District ■ 75 feet – Public buildings and institutional uses ■ 199 feet – Small wind energy systems	■ No restrictions - Silos, steeples, stacks, flagpoles, water towers, windmills (excluding small wind energy systems) except within the Airport Approach Zone ■ No height limit for communication towers	■ Small wind energy systems permitted in all zoning districts ■ Communication towers permitted as special exception in all zoning districts except MH (Mobile Home District)
Dorchester County	■ 45 feet – All uses except, ■ 50 feet – Heavy Industrial District	■ Three additional feet for every one foot of setback – Churches, schools, institutional and public buildings, public utility structures, farm buildings (not including residences), and buildings in an industrial zoning district ■ No restrictions – Chimneys, spires, stacks, flagpoles, and similar features ■ 65 feet – Home television towers and private business towers ■ 200 feet – Small wind energy systems ■ 600 feet – Communication towers	■ Communication antennas attached to a building permitted in all zoning districts ■ Communication towers permitted on government land for amateur radio operators or home television towers permitted in all zoning districts ■ Communications towers permitted in B-2 (Neighborhood Business), I-1 (Light Industrial), and I-2 (Heavy Industrial) Zoning Districts; and as special exception in RC (Resource Conservation), RR-C (Rural Residential-Conservation), and A-C (Agricultural Conservation) Zoning Districts ■ Small wind energy systems permitted as accessory to principal use in all zoning districts

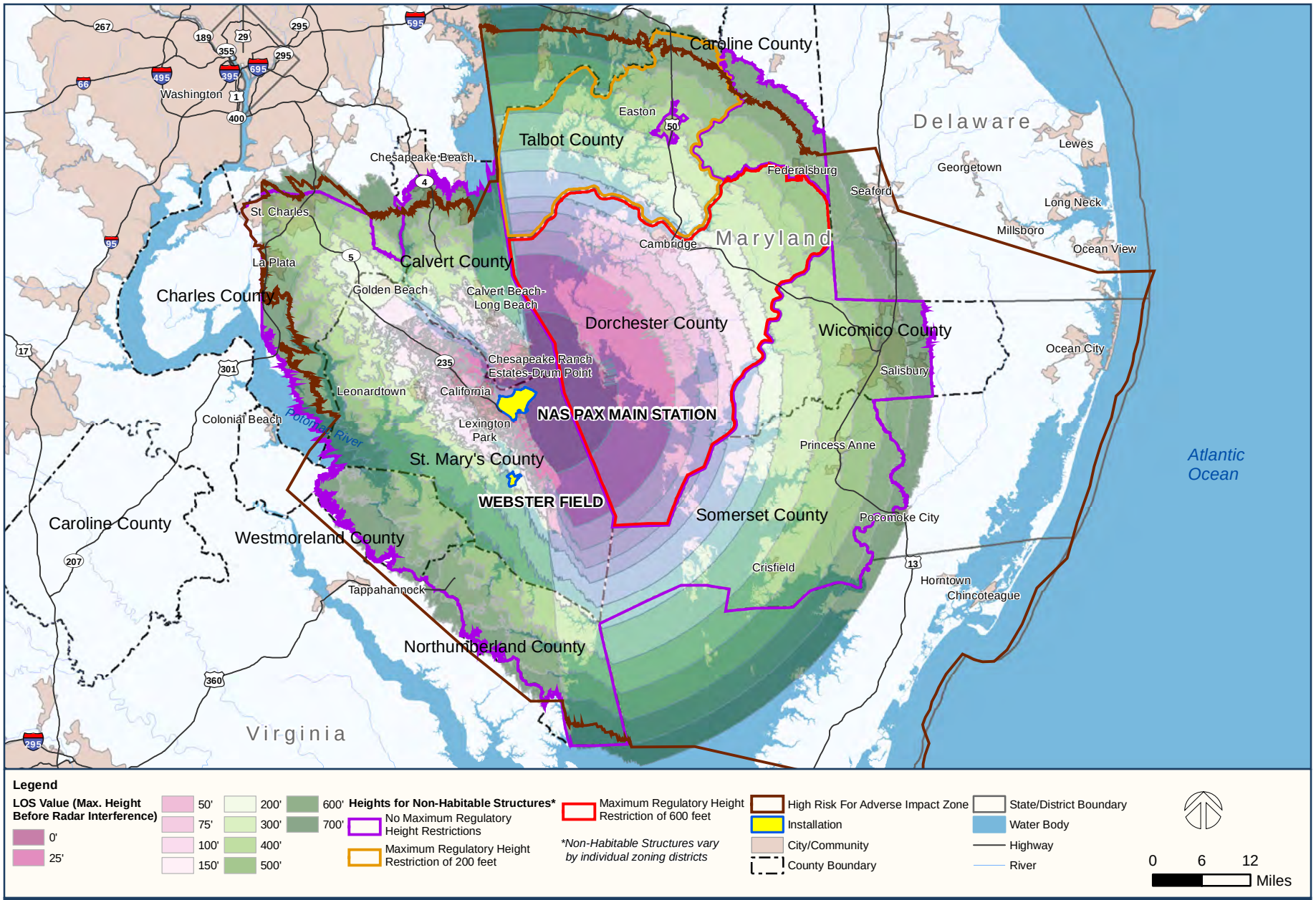
Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
City of Cambridge	■ 30 feet – Uses in Neighborhood Center, Neighborhood General, and Maryland Avenue Gateway Districts ■ 38 feet – Uses in Downtown Core District ■ 70 feet – Uses in Urban General District ■ 100 feet – Hospitals and clinics	■ No restrictions – Steeples, spires, belfries and cupolas, water towers, equipment for the operation of a building, chimneys, flag poles, radio towers, masts, aerials and other similar structures.	■ Communication towers and antennas permitted by special exception in R-1 (Single-Family Residential), R-2 (Mixed-Residential), R-3 (Multi-Family Residential), I-1 (Light Industrial), and I-2 (Heavy Industrial) Zoning Districts
Wicomico County	■ 35-50 feet – All uses, except, ■ 100 feet – Hospital	■ 150 feet – Small wind energy systems but cannot be an obstruction to navigable air space ■ No restriction – Communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, water towers, and similar items	■ Communication towers permitted as special exception in A-1 (Agricultural-Rural), C-2 (General Commercial) and, I-2 (Heavy Industrial) Zoning Districts
City of Salisbury	■ 35-50 feet – All uses, except, ■ 100 feet – Hospital	■ 150 feet – Small wind energy systems but cannot be an obstruction to navigable air space ■ No restriction – Communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, water towers, and similar items	■ Communication towers permitted as special exception in A-1 (Agricultural-Rural), C-2 (General Commercial) and, I-2 (Heavy Industrial) Zoning Districts

Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
Somerset County	■ 35-50 feet – All uses	■ 160 feet – Small wind energy systems ■ No restriction – Utility lines, poles and towers, towers, steeples, flagpoles, stacks, silos, tanks, antennae, and monuments	■ Small wind energy systems permitted in AR (Agricultural Residential), R-1 (Low Density Residential), R-2 (Medium Density Residential), R-3 (High Density Residential), and MRC (Maritime-Residential-Commercial) Zoning Districts ■ Commercial communications antennas permitted in C-2 (General Commercial) and O-C (Overlay-Commercial), I-1 (Light Industrial), and I-2 (General Industrial) Zoning Districts; permitted as special exception in AR (Agricultural Residential) and AP (Airport) Zoning Districts. Prohibited in A-2 (Airport Overlay) Zoning District
Westmoreland County	■ 45 feet – All uses	■ 125 feet – Rooftop antennas ■ 150 feet – Telecommunication monopoles and towers ■ No restriction – Agricultural structures, cupolas, chimneys, flag poles, water tanks, monuments and necessary mechanical appurtenances, and utility structures in industrial zone	■ Telecommunications towers permitted by special exception in AC (Agricultural Conservation), RC (Rural Conservation), RR (Rural Residential), RN (residential Neighborhood), PRD (Planned Residential Development), PVD (Planned Village Development), BN (Business Neighborhood), BG (Business General), IG (Industrial General), and PIP (Planned Industrial Park) Zoning Districts ■ Water tanks permitted by special exception in RR (Rural Residential), A-1 (Agriculture), C-1 (Conservation), R-1 (Residential General Uses), R-2 (Residential Limited Uses), B-1 (Business General), B-2 (Business Restricted), B-3 (Business Open Land), M-1 (Industrial General), S-1 (Seafood District), Zoning Districts

Jurisdiction	Maximum Habitable Structure Height Restrictions	Non-Habitable Structure Height Exemptions	Locations of Non-Habitable Structure Exemptions
Northumberland County	■ 45 feet – All uses, except ■ 60 feet – Public or semipublic building, such as a school, church, library or hospital	■ No restriction – Spires, chimneys, cooling towers, flagpoles, water towers, monuments, and radio or communication towers	■ High-speed internet antennas less than 100 feet permitted in C-1 (Conservation), A-1 (Agricultural), R-1 (Residential General), R-2 (Residential Waterfront), R-3 (Residential Restricted), R-4 (Residential Recreational), B-1 (Business General), M-1 (Industrial Light) ■ High-speed internet antennas greater than 100 feet permitted as special exception in C-1 (Conservation), A-1 (Agricultural), R-1 (Residential General), R-2 (Residential Waterfront), R-3 (Residential Restricted), B-1 (Business General), M-1 (Industrial Light) ■ Wind turbines permitted in all zoning districts subject to conditions of the governing body
Leonardtown	■ 45 feet – All uses, except ■ 60 feet – Public buildings, institutional uses and churches ■ 100 feet – Buildings in the Institutional- Office district, given additional setbacks are provided	■ No restriction – Communication towers, although extensive justification is required for a tower higher than 199 feet	■ None identified

Source: St. Mary's County Comprehensive Zoning Ordinance; Calvert County Zoning Ordinance; Charles County Zoning Ordinance; Zoning Ordinance for the Town of La Plata, Maryland; Talbot County Zoning Ordinance; Zoning Ordinance of the Town of Easton; Caroline County Zoning Ordinance; Dorchester County Zoning Ordinance; Zoning Ordinance of the City of Cambridge; Wicomico County Zoning Regulations (also applicable for the City of Salisbury); Somerset County Zoning Ordinance; Westmoreland County Zoning Ordinance; and the Zoning Ordinance of Northumberland County, Leonardtown Zoning Ordinance

Figure 5-1 identifies the generalized maximum regulated heights within the Study Area jurisdictions and the maximum heights for radar interference associated with the radar viewshed. It is important to note that the maximum regulated heights vary within each jurisdiction by zoning district and may not be applicable across an entire jurisdictional geography.



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig5-1_Pax_StructureHeight_20141211_CJM.pdf

Figure 5-1

Height Concerns within ADAMS Radar Viewshed

Existing Tools

St Mary's County

Structures beginning at 25 feet in height up to 600 feet can create radar interference within St. Mary's County.

Since the interference hazard height threshold is extensive across the county, the locations where structures are permitted and associated maximum heights are important. The following structure heights by zoning district apply throughout St. Mary's County:

- 40 feet – Residential districts except,
- 75 feet – Residential High District
- 60 feet – Commercial Marine District
- 100 feet – Mixed Use Commercial, Office Business, and Industrial Districts
- 150 feet – Small wind energy systems
- No restriction – Communication Towers

Structures which typically have the greatest height impact – small wind energy systems, antennas, and communication towers are permitted pursuant to the following zoning regulations:

- Small wind energy systems are permitted in all zoning districts accessory to a principal use
- Public and non-commercial communication towers are permitted in all zoning districts
- Amateur antennas and microwave equipment are permitted with limited standards in all zoning districts
- Commercial communication towers are permitted with conditional standards in RPD (Rural Preservation District), RCL (Rural Commercial Limited), RL-T (Residential, Low Density – Transitional), VMX (Village Center Mixed Use), TMX (Town Center Mixed Use), CMX (Corridor Mixed Use), CC (Community Commercial), I (Industrial), and OBP (Office and Business Park) Zoning Districts

Calvert County

Structures beginning at 25 feet in height up to 600 feet can create radar interference within Calvert County.

Since the interference hazard height threshold is extensive across the county, the locations where structures are permitted and associated maximum heights are important. The following structure heights by zoning district apply throughout Calvert County:

- 40-50 feet – All uses in all districts, except
  - 85 feet – Wind energy systems, roof-mounted
  - 150 feet – Wind energy systems, ground-mounted
- No restriction – Fire towers, hose towers, cooling towers, steeples, flag poles, silos, smokestacks, masts, transmission line poles and towers, water tanks, and monuments.

Structures which typically have the greatest height impact – small wind energy systems and communication towers are permitted pursuant to the following zoning regulations:

- Wind energy systems are permitted in all zoning districts except WL (Wetlands) and HD (Historic Districts) as special exception subject to a determination by the NAS PAX that the wind energy system will not cause interference with military activities.
- Communication antennas and towers are permitted as a special exception on government property in all zoning districts except WL (Wetlands), APD (Agricultural Preservation Districts), and HD (Historic Districts).
- Communication antennas are permitted as a special exception on private property in all zoning districts except APD (Agricultural Preservation Districts).
- Communication towers are permitted as a special exception on private property in all zoning districts except WL (Wetlands) and HD (Historic Districts).

Charles County

Structures greater than 200 feet in height can create radar interference depending on location in Charles County.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations – fire or parapet walls, towers, steeples, flagpoles, radio and television antennas, and silos. Of these structures, public utility towers and wireless communication antennas that are greater than 50 feet are permitted as a special exception in all zoning districts. None of the other exempted structures are identified as expressly permitted in the Charles County Zoning Ordinance. Charles County is expected to complete a comprehensive zoning ordinance update in 2014 which could act as a way for further tower height limitations to be considered.

Talbot County

Structures greater than 150 feet (in certain coastal areas) and beginning at 200 feet in coastal areas create radar interference in Talbot County. Structures greater than 400 feet in height can create radar interference in Easton.

Of the structures permitted by the Talbot County Zoning Ordinance, only communication towers and grain elevators could pose an interference hazard. Wireless communication towers greater than 100 feet are permitted as a special exception in all zoning districts except Rural Residential, Town Conservation, Town Residential, and Village Center.

Of the structures permitted in the town of Easton, only non-habitable structures and architectural features pose a radar interference concern. Examples include silos, steeples, stacks, flagpoles, water towers, windmills (excluding small wind energy systems which are limited to 199 feet), communication towers, smokestacks or vents, masts, antenna, and monuments.

With the exception of certain antenna, it is unlikely that the exempted structures would exceed 400 feet in height.

Caroline County

Structures greater than 400 feet in height can create radar interference in Caroline County.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations – silos, steeples, stacks, flagpoles, water towers, windmills (excluding small wind energy systems which are limited to 199 feet) except within the Airport Approach Zone, and communication towers. Of these uses, small wind energy systems are permitted in all zoning districts and communication towers are permitted as special exception in all zoning districts except the MH (Mobile Home District).

Dorchester County

Structures between surface elevations (in coastal island areas) up to 600 feet in height (inland areas) can create radar interference within Dorchester County.

Since the interference hazard height threshold is extensive across the county, the locations where structures are permitted and associated maximum heights are important. The following structure heights by zoning district apply throughout Dorchester County:

- 45 feet – All structures in all zoning uses except,
    - 50 feet – Structures within the Heavy Industrial District
    - Three additional feet for every one foot of setback for churches, schools, institutional and public buildings, public utility structures, farm buildings (not including residences), and buildings in an industrial zoning district
    - 65 feet – home television towers and private business towers
    - 200 feet – Small wind energy systems
    - 600 feet – Communication towers
    - No restrictions - chimneys, spires, stacks, flagpoles, and similar features

Structures which typically have the greatest height impact – small wind energy systems and communication towers – are permitted pursuant to the following zoning regulations:

- Communication antennas attached to a building are permitted in all zoning districts
- Communication towers permitted on government land for amateur radio operators or home television towers are permitted in all zoning districts
- Communication towers are permitted in B-2 (Neighborhood Business), I-1 (Light Industrial), and I-2 (Heavy Industrial) Zoning Districts; and as special exception in RC (Resource Conservation), RR-C (Rural Residential-Conservation), and A-C (Agricultural Conservation) Zoning Districts
- Small wind energy systems permitted as accessory uses to principal use in all zoning districts

City of Cambridge

Structures greater than 100 feet in height can create radar interference in the City of Cambridge.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations – steeples, spires, belfries and cupolas, water towers, equipment for the operation of a building, chimneys, flag poles, radio towers, masts, aerials, and other similar structures.

Of these, communication towers and antennas permitted by special exception in the R-1 (Single-Family Residential), R-2 (Mixed-Residential), R-3 (Multi-Family Residential), I-1 (Light Industrial), and I-2 (Heavy Industrial) Zoning Districts.

Wicomico County

There are several height interference zones traversing Wicomico County where structure heights can impact radar transmissions, beginning at 150 feet in coastal areas up to 600 feet inland.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations – communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, water towers, and similar items. Of these, only communication towers are permitted as a special exception in the A-1 (Agricultural-Rural), C-2 (General Commercial), and I-2 (Heavy Industrial) Zoning Districts.

City of Salisbury

There are three interference height zones traversing the City of Salisbury, the lowest being 400 feet. Structures greater than 400 feet in height can create radar interference depending on their location.

The only structures that pose a radar interference hazard are non-habitable structures exempted under the zoning regulations – communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, water towers, and similar items. Of these, only communication towers are cited as a permitted special exception within the A-1 (Agricultural-Rural), C-2 (General Commercial) and, I-2 (Heavy Industrial) Zoning Districts.

Somerset County

There are several height interference zones traversing Somerset County where structure heights can impact radar transmissions beginning at 100 feet for coastal islands, 150-400 feet in the majority of coastal areas, and 400-600 feet in coastal areas east of Crisfield and inland areas.

The only structures that pose a radar interference hazard are:

- Small wind energy systems which are permitted to up 160 feet in AR (Agricultural Residential), R-1 (Low Density Residential), R-2 (Medium Density Residential), R-3 (High Density Residential), and MRC (Maritime-Residential-Commercial) Zoning Districts.
- Exempted structures from the height regulations - Utility lines, poles, and towers, towers, steeples, flagpoles, stacks, silos, tanks, antennas, and monuments. Of these, commercial communication antennas are permitted in the C-2 (General Commercial) and O-C (Overlay-Commercial), I-1 (Light Industrial), and I-2 (General Industrial) Zoning Districts; and permitted as special exception in the AR (Agricultural Residential) and AP (Airport) Zoning Districts. Communication towers are prohibited in the A-2 (Airport Overlay) Zoning District.

Westmoreland County

Structures with a height of 500 feet can create radar interference in Westmoreland County.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations - agricultural structures, cupolas, chimneys, flag poles, water tanks, monuments and necessary mechanical appurtenances, and utility structures in industrial zoning districts. Of these structures, telecommunication towers are permitted by special exception in the AC (Agricultural Conservation), A1 (Agricultural), RC (Rural Conservation), RR (Rural Residential), RN (Residential Neighborhood), PRD (Planned Residential Development), PVD (Planned Village Development), BN (Business Neighborhood), BG (Business General), IG (Industrial General), and PIP (Planned Industrial Park) Zoning Districts.

Water tanks are permitted by special exception in the RR (Rural Residential, A-1 (Agriculture), C-1 (Conservation), R-1 (Residential General Uses), R-2 (Residential Limited Uses), B-1 (Business General), B-2 (Business Restricted), B-3 (Business Open Land), M-1 (Industrial General), and S-1 (Seafood District) Zoning Districts.

Northumberland County

Structures greater than 300 feet in height can create radar interference in Northumberland County.

The only structures that pose a radar interference hazard are non-habitable structures exempted from the height regulations – spires, chimneys, cooling towers, flagpoles, water towers, monuments, and radio or communication towers. Of these structures, high-speed internet antennas greater than 100 feet are permitted as special exception in the C-1 (Conservation), A-1 (Agricultural), R-1 (Residential General), R-2 (Residential Waterfront), R-3 (Residential Restricted), B-1 (Business General), and M-1 (Industrial Light) Zoning Districts.

Wind turbines are permitted in all zoning districts subject to conditions of the governing body.

ISSUE FS-5	***Competition for Frequency Spectrum.*** The existing frequency spectrum allotted by the Federal Communications Commission (FCC) for military use is under pressure and suffering encroachment from consumer electronics manufactured to use the Navy's spectrum.

The impacts on the FCC spectrum affect all testing and operations within the NAS PAX operating areas. The FCC has a finite supply of frequency spectrum it allocates, thus, loss of spectrum in any manner defines an encroachment on Navy operations. New and rapidly advancing technology used by NAS PAX require expended frequency spectrum for testing.

The entire useable RF spectrum has been allocated among the various users including the DOD and commercial industry. The DOD has a dedicated RF spectrum for the purpose of avoiding disruption to critical communications and mission functions that require the maintenance of security and uninterrupted operation. However since the 1990s, the federal government has auctioned off components of the radio spectrum that were previously dedicated for the DOD's sole use to the commercial industry for use in wireless telecommunications. This auction is administered across the entire U.S. and occurs by an act of Congress initiated by the FCC. The reason for this sell off of the radio spectrum to the commercial industry is largely due to increasing demand and use for internet accessibility. The continuation of sale and repurposing of RF spectrum by the federal government will impair the military's ability to conduct strategic mission critical activities.

Existing Tools

Part 15 Rules

The rules and technical specifications that apply to non-federal use of unlicensed devices are in Title 47 of the Code of Federal Regulations Part 15 (47 CFR 15). There are many parts to Title 47, each regulating a different type of radio operation. For example, Part 11 regulates the Emergency Alert System, Part 59 discusses infrastructure sharing, and Part 97 covers the Amateur Radio Service. Part 15 regulates radio frequency devices and contains language specifically regulating the operation of unlicensed devices.

FAA Spectrum Engineering Services Office

The Spectrum Engineering Services Office secures, manages, and protects all civil aviation radio frequency spectrum resources. Among other things, this Office is responsible for coordinating and negotiating with other government agencies, industries, and international partners to obtain appropriate spectrum resources for aviation usage and maintaining aviation spectrum resources free from interference from other services.

Spectrum management is conducted by assigning and engineering radio frequencies for the NAS systems, maintaining the aviation spectrum use database, analyzing new FAA systems requirements and certifying that spectrum resources will be providing the necessary technical engineering expertise. This process performs specific spectrum resources available assessments and tests new systems and electronics for compatibility with DOD equipment.

FCC Communication Security, Reliability, and Interoperability Council

The FCC maintains an active working group to address communications system reliability through its Communication Security, Reliability, and Interoperability Council (CSRIC). The CSRIC's mission is to provide recommendations to the FCC that attempt to "ensure…optimal security and reliability of communications systems, including telecommunications, media, and public safety. Although this program is not specific to NAS PAX or maintain a specific program with NAS PAX, it should be considered an important tool in the management of communications used for emergency response situations.

Federal Strategic Spectrum Plan (2008)

The 2008 Federal Strategic Spectrum Plan is a presidential initiative for U.S. spectrum policy in the 21st Century. The Plan's goals are to foster economic growth, ensure national and homeland security, maintain U.S. global leadership in communications technology and services, and satisfy other vital U.S. needs in areas such as public safety, scientific research, Federal transportation infrastructure, and law enforcement. The National Telecommunications and Information Administration (NTIA) is responsible for developing a strategy within the Plan to address the diverse needs of the spectrum. The document specifically calls out supporting Federal missions while "fostering the commercial systems that underpin the nation's economic growth and technological information."

The Plan sites the increasing spectrum needs of both the Federal Government and commercial users. The plan is oriented towards near and mid-term goals because the uncertainty of the future needs of the spectrum. The most relevant goals to this issue are as follows:

- **Use of Commercial Services Where Feasible.** Federal regulations require Federal agencies to use commercial communications and spectrum-dependent services where possible. Improvements in technology have made using commercial communications more reliable but certain emergency related Federal uses may be too complex for commercial networks. Federal agencies cannot control commercial capacity directly so a plan to balance commercial and federal use of satellites when needed is proposed.

- **Flexible Approach to Incentives.** Currently, regulatory hurdles prevent Federal and non-Federal spectrum uses from efficiently sharing spectrum. Sharing the spectrum could allow Federal agencies to make underutilized spectrum available to non-Federal entities. This would lead to a more efficient use of the spectrum for all parties involved.

- **Spectrum Valuation and Economic Efficiency.** The Office of Management and Budget has instructed the Federal agencies to consider the economic value of radio spectrum when developing justifications for new systems. The NTIA has also discussed identifying and establishing incentives to promote more efficient and effective use of the spectrum.

- **Technical Efficiency.** NTIA engineers are developing more precise methods to improve management of the spectrum. By increasing efficiency and effectiveness of the spectrum, there should be an increase in the amount of time frequency assignments are in use.
- **Forecasting Trends.** Development of new spectrum management tools will improve quantification of Federal spectrum use and refine estimates of future requirements.

Though long-term use of the spectrum is unclear, steps are being taken by the Federal government to ensure that use of the spectrum is available to all parties while maintaining national security and economic wellbeing.

Interagency Coordination / Communication

This discussion refers to the programs and plans that promote interagency coordination. Interagency communication serves the general welfare by promoting a more comprehensive planning process inclusive of all affected stakeholders. Interagency coordination also seeks to develop and include mutually beneficial policies for both communities and the military in local planning documents, such as comprehensive plans and regional planning efforts.

Compatibility Assessment

ISSUE COM-1	***Minimal Communication Amongst Agencies and Public about Military Operations.*** Local agencies and the public feel that efforts to communicate and coordinate with the Navy are dismissed or discouraged when addressing issues or concerns related to military installations and operations.

Due to the large geographical area and number of stakeholders affected by NAS PAX operations, communication to enhance awareness as well as address concerns is a constant and evolving challenge for both NAS PAX, its tenant commands, and community partners. There is currently limited formal coordination or communication between the various regional entities to address overlapping mission training areas or mutual interests and concerns.

NAS PAX conducts communication with the general public and other federal and state entities through various mediums such as the Public Affairs Offices (PAOs) for the installation and tenant commands including NAWCAD and NAVAIR, and the existing relationships with local government and non-profit agencies and organizations. Outreach tools used include various forms of media such as press releases, internet / social media, a designated phone hotline, and public forums on an as needed basis. Despite the use of these tools, stakeholders and the general public engaged during the JLUS process expressed concern about how comments and concerns were handled by NAS PAX and the level of communication that occurs.

The level of interaction and communication between PAOs and local jurisdictions varies widely based on proximity to the station. Communities such as those on Maryland's Eastern Shore and Virginia's Northern Neck reported to have little to no contact with military personnel. St. Mary's County is the only jurisdiction who has a formalized communication process and point of contact with NAS PAX. Communication with the remaining jurisdictions within the JLUS Study Area occurs through

informal means such as personal relationships, which is subject to disruption or termination as key points of contact change or move positions.

Several outreach methods, such as the NAS PAX Sustainability Office (SO) that handles noise complaints, are perceived by the public to be reactive and not proactive in the handling of community affairs. Additional concerns were expressed regarding the lack of information regarding a single point of contact that may direct questions to the right person / office within NAS PAX and lack of a general process that explains how to communicate with NAS PAX.

While St. Mary's County and the Station engage in verbal and electronic communication on certain matters, there is no formal agreement establishing delineated points-of-contact assigned to critical positions, associated contact information, or the roles and responsibilities for each affected agency within the JLUS Study Area. This can lead to confusion and duplication of resources or to inability to reach the intended audience in a timely manner.

While the release of public information was an initial stakeholder concern, the release of information is improving throughout this JLUS process. The SO has targeted a variety of different community organizations delivering nearly 1,500 brochures to libraries, community centers, NGO's, educational institutions, chambers of commerce, other military representatives and public offices. Distribution of information will continue into the foreseeable future and potential strategies will be identified regarding the procedures for information distribution from NAS PAX to local communities, and from those communities to the public.

ISSUE COM-2	***Community Awareness of Military Operations Varies by Geographic Separation from PAX Main Base.*** Communities located furthest from PAX are often unaware of planned exercises and military operations. As a result, residents may call their local government contacts with concerns, often resulting in inaccurate responses due to a lack of awareness of planned PAX activities and little communication between PAX and communities in the region.

The overall military footprint associated with the NAS PAX mission and operations extends well beyond the installation boundary, across three states. As St. Mary's County is host to NAS PAX, St. Mary's County's residents and business owners are much more familiar with NAS PAX operations and activities that those communities that are more geographically separate and distanced from NAS PAX such as those on Maryland's Eastern Shore and on Virginia's Northern Neck. The presence of other military installations in the region has added to the confusion and uncertainty of which military activities are originating at which installation in the area.

NAS PAX does not maintain or implement notification practices that would alert communities across the region of planned activities such as supersonic events. This issue is particularly apparent within the communities located in the eastern portion of the Study Area throughout Maryland's Eastern Shore. Military aircraft from NAS PAX routinely conduct supersonic flights offshore in an area called the Atlantic Test Track which parallels the entire coast of the Delmarva Peninsula. Test aircraft from the station execute supersonic flights almost daily in the Test Track. Most of the sonic booms that result from these operations are not felt on land; however, certain atmospheric conditions (temperature inversion and calm surface winds) are conducive to sound propagation that affects land areas. Without proper information or notification, the execution of such events can create widespread concern.

Residents and business owners across Maryland's Eastern Shore suffer from a lack of awareness of NAS PAX's mission and operations. Although a rare occurrence, sonic booms have caused widespread confusion as to the source of noise and vibration. An example attracted media attention on February 6, 2014 when two Navy fighter jets were executing supersonic flights approximately three miles offshore. The sonic booms resulting from military aircraft breaking the sound barrier were heard and felt by residents across Maryland's Eastern Shore and Virginia's Northern Neck. Unaware of the source of noise and vibration impacts, hundreds of residents contacted their local government officials with concern over an earthquake.

Although NAS PAX maintains a noise hotline where residents with questions or concern can call in to inquire about military operations and/or impacts such as sonic booms, many residents are not aware of either NAS PAX's presence in the region or their operations that could cause impacts to such a widespread area. Both knowledge of NAS PAX operations and the impacts associated with various training activities varies across the region. Through the JLUS process, it was observed that residents who are better equipped with an understanding of these operations and impacts know both who to contact at NAS PAX and don't find as much of a need to call as a result of their understanding of military operations. Those who reported that they do not know who to contact were also less knowledgeable of military operations and their associated impacts.

As reviewed above, St. Mary's County legislators have led successful efforts to pass a Maryland law requiring homebuyer notification of the potential for noise from nearby military installations and has an active AICUZ system with corresponding land-use ordinances. Despite this success, noise zones and safety zones are not delineated on maps contained within the County's GIS system for ease of public access. The availability of these maps showing safety zones, noise contours, and overall operating areas is also not easily found via an internet search. Maps that are available to the public do not clearly indicate or explain how that particular area within the region may be impacted by military operations. The disclaimer is general, simply indicating the potential presence of military activities in the area. These disclosures do not apply to communities on Maryland's Eastern Shore or Virginia's Northern Neck.

ISSUE COM-3	***No Local Point of Contact at PAX.*** Both residents and local leaders do not know who to contact at PAX when questions or concerns arise.

As described under Issue COM-1, the PAOs for NAS PAX and tenant commands are responsible for internal information, media relations, community relations and review of nontechnical material intended for public release.

Although the NAS PAX Public Affairs officer is the official spokesperson for NAS PAX and each tenant command's Public Affairs officer is the official spokesperson for their organization, these positions are not responsible for the other Navy bases within the NDW region. The Public Affairs Offices serve the Patuxent River complex with a variety of information media, including its station newspaper and station directory. The Public Affairs Offices are also responsible for releasing information to outside news media. Although the Public Affairs Offices are charged with maintaining an active presence in the community and providing timely information, no point of contact or method of inquiry is provided for the public to contact PAOs at NAS PAX. The primary focus of NAS PAX's efforts are providing information internal to the station through its newsletter and directory and releasing selected information to the public. The program does not currently identify a means of two-way communication and the multiple PAOs for NAS PAX and tenant commands may complicate communications since the public may not know which PAO is directly relevant to their concern.

Although the Public Affairs officers are responsible for community relations for activities conducted at NAS PAX, NAS PAX has recently staffed the position of Community Planning and Liaison Office (CPLO) to advance compatibility planning efforts between the installation and adjacent communities through coordination with community, local governments, and private stakeholders with regard to compatibility of development projects. Contact information for the CPLO is not readily available from the NAS PAX website.

ISSUE COM-4	***Coordination of Civilian / Military Airspace Interface.*** Civilian airports used by PAX do not have a Letter of Agreement that addresses all possible military users and activities at the airport.

The NAS PAX ATC provides radar air traffic control services for all controlled airspace delegated to NAS PAX by the FAA's Potomac Traffic Control as defined by letter of agreement. This area includes a large portion of the Chesapeake Bay in Southern Maryland and parts of Delaware and eastern Virginia. The NAS PAX ATC provides approach control services primarily to NAS PAX Main Station and Webster Field, and several small, uncontrolled, general aviation airports located within the ATC airspace. NAS PAX also provides traffic advisory services to aircraft operating within the operational area. These services include, but are not limited to, providing traffic advisories to aircraft operating within controlled airspace, providing Instrument Flight Rules (IFR) services to aircraft operating within restricted airspace, and providing exclusive use airspace monitoring and containment for participating aircraft. NAS PAX provides instrument services to aircraft operating to and from regional airports within controlled airspace. This service is provided to military, general aviation, and commercial aircraft.

While most NAS PAX use of civilian airports is for ATC coordination, NAS PAX does utilize some of the regional civilian airports for military training operations. The Navy and NAS PAX utilize the Salisbury-Ocean City Wicomico Regional Airport for ILS Instrument approaches, low approaches, and touch-and-go's, pattern work, and navigation system testing. The majority of Navy activity here involves C-12 and helicopter operations. The Navy also utilizes Easton Airport, which accommodates an estimated 48,700 annual flight operations, of which roughly 17,000 were Navy operations. The majority of Navy activity here also involves C-12 and helicopter operations. The Navy and NAS PAX utilizes the Ocean City Airport an average of three times per week for T-34, V-22 and H-60 training flights, low approaches, and touch-and-go's. Additionally, NAS PAX accesses Crisfield Airport as a divert field with an average of one operation occurring per week. The Navy also utilize Ridgely Airpark in Caroline County occasionally (once per week) for T-34s touch-and-go's. Lastly, NAS PAX also utilizes Cambridge-Dorchester Airport as a divert field, yet only on rare occasions.

Without a formal letter of agreement to provide services of mutual benefit, both the military's use of regional airports and the viability of these airports may be jeopardized. The loss of NAS PAX's ability to use these regional airports could result in a large economic deficit for the airports as well as a possible interference with the military mission and operations. Coordinated communication and planning to prevent encroachment to these areas should be undertaken to prevent the loss NAS PAX's use of these airports.

ISSUE COM-5	***Regional Coordination Does Not Address All Four Sub Areas.*** Although there are four regional planning organizations (Mid Shore Regional Council, Northern Neck Planning District, Tri-County Council for the Lower Eastern Shore and Tri-County Council for Southern Maryland), there is no effort to address common issues from a broader perspective.

Today's complex land use and growth management issues both extend beyond communities that serve as host to military installations and cross jurisdictional boundaries. As a result of NAS PAX's expansive operational area spanning multiple counties across three states, a variety of land use owners, decision-makers, and other stakeholders at the federal, state, regional, county, and local level are impacted by NAS PAX military operations and who have the potential to impact mission sustainment. Communication, outreach, and coordination are critical tools in building and maintaining relationships amongst stakeholders in order to avoid and / or resolve compatibility issues.

Land use planning that supports compatibility within NAS PAX's area of influence is the responsibility of many. These entities include the DOD, local planning and zoning agencies, real estate agencies, residents, developers, and builders. Military installations and local government agencies with planning and zoning authority share the responsibility for preserving land use compatibility near the military installation.

Cooperative action by all parties is essential to prevent land use incompatibility and hazards to neighboring communities.

There are several entities and regional organizations within the region that collaborate to promote military sustainment and community compatibility; however, there are currently no coordinated efforts that address the entire NAS PAX influence area.

ISSUE COM-6	***No Method for Navy Input into Development Review Process.*** NAS PAX has no formal development coordination with each jurisdiction affected by military operations. Oftentimes military officials are unaware of upcoming developments and rely on monitoring newspapers and periodicals for potential conflicts. Both the military and the public are typically unaware of potential conflicts prior to advancing development initiatives.

Because land use decisions, policies, and regulations are controlled and implemented by the local government, the Navy is somewhat constrained in its ability to control urban development and growth. Interagency coordination is already occurring at several governmental levels in the ATR Inner Test Range and overall NAS PAX influence area for varying purposes and subjects. However, the interests of the Navy are often not represented during negotiations or decisions by these parties even though such decisions could lead to long-term impacts on Navy operations. Understanding the partners, their corresponding interests, and roles is necessary to build relationships that are mutually beneficial to all parties, especially the Navy. Establishing relationships with key agency and organizational partners will provide a platform for the Navy to convey concern or support for actions that may impact operations at the Patuxent River Complex.

The impacts associated with a potential lack of interagency coordination could lead to reduced testing and operations. Coordination means more than just cooperation, and it ranges from informal information exchanges to proactive, formalized, joint relationships. Because the roles and responsibilities of groups working outside the fenceline are sometimes unclear, establishing and maintaining interagency relationships among key Navy personnel and outside contacts is the first step in creating processes that allow for input from NAS PAX.

Efforts that lead to improved coordination could have a positive effect by informing and educating local leaders, as well as the general public.

St. Mary's County

When it first anticipated potential growth in St. Mary's County, particularly in the immediate vicinity of NAS PAX Main Station and Webster Field, NAS PAX submitted an AICUZ plan to manage encroachment around these areas. The plan served to identify the Navy's expectations of the County regarding its missions and provided smart-growth land compatibility laws guidance that the County could adopt in order to simultaneously protect the base and minimize safety hazards to the public.

St. Mary's County has continued its relationship with NAS PAX and has been proactive in developing and adopting compatible land use policies and regulations, purchasing tracts of land to pre-empt encroachment, and establishing formal coordination channels with NAS PAX leadership for development proposal review. St. Mary's County developed and adopted an AICUZ overlay zone in 1979, which has since been updated and included in the St. Mary's County Zoning Code. The St. Mary's County Comprehensive Zoning Ordinance, effective May 13, 2002, recognizes a Clear Zone, APZ-1, and APZ-2 around airport environs (AE), as well as, noise level contour lines. Section 43.3 Land Use and Development Regulations specifies permitted uses in the AICUZ or AE districts, which are consistent with Navy standards.

The County participates in regular consultations with the Navy on development proposals. A representative from NAS PAX is a member of the St. Mary's Technical Evaluation Committee, which is responsible for advising the St. Mary's County Planning Director in the administrative review of site plans, conditional uses, planned developments, zoning amendments, subdivision applications, and any other application for a proposed activity requiring approval pursuant to the County Zoning Ordinance. In addition, the NAS PAX Commanding Officer is an advisory member of three of St. Mary's County committees: Economic Development Committee (EDC), Community Development Committee

(CDC), and Metropolitan Commission (water and sewer). NAS PAX has a designated liaison official to the community that consults regularly with St. Mary's County's Planning Department on pending development proposals. Despite this relationship and established method of review, NAS PAX is not typically engaged as part of the review of development proposals or planning efforts around Webster Field.

Currently, no other jurisdiction in the Study Area has established a means of communication, either formal or informal, that provides for feedback and a recommendation from the NAS PAX Commanding Officer or other leadership on any new, perceived, or real encroachment issues as they arise.

ISSUE COM-7	***Public Uninformed about Unmanned Aerial Systems (UASs).*** The general public does not understand military and civilian use of Unmanned Aerial Systems (UASs). The lack of information about the use and intent of UASs' has resulted in concern and decreased support by the public for these aircraft.

The increased use of unmanned aerial systems (UASs), a growing component of Naval Aviation, will bring different noise profiles and accident potentials. As described in Chapter 3, the UAS Operating Area extends from Webster Field over communities on the Northern Neck of Virginia.

Current domestic use of UAS is limited to academic institutions, federal, state, and local government organizations that receive a Certificate of Waiver or Authorization (COA) and private sector entities that receive special airworthiness certificates by the FAA.

The Federal Aviation Administration (FAA) Modernization and Reform Act of 2012, Public Law 112-95, directed the FAA, in coordination with the National Aeronautics and Space Administration and the U.S. Department of Defense, to develop test sites to research and test for safe integration of unmanned aircraft systems (UAS) into the national airspace system. On December 30, 2013, the FAA announced the six test site operators it selected to conduct the research and tests to inform the development of the certification and operational requirements needed to safely integrate UAS into the national airspace.

It is important to note test site selection within the JLUS Study Area. This process relies heavily upon the ability to inform the public about the civilian use of UASs. The six successful test site applicants were the University of Alaska, the State of Nevada, New York's Griffiss International Airport, the North Dakota Department of Commerce, Texas A&M University – Corpus Christi, and the Virginia Polytechnic Institute and State University (Virginia Tech).

While the FAA is working with the test site operators to define each site's operations, the FAA's goal for the test site operators is to address six research areas, including (1) system safety and data gathering; (2) aircraft certification; (3) command and control link issues; (4) control station layout and certification; (5) ground and airborne sense-and-avoid; and (6) environmental impacts. The FAA expects at least one of the operators to begin test operations in mid-2014. The site operators may continue the testing until February 13, 2017.

All of the test sites will permit access to entities interested in using the site. Each of the test site operators will develop processes for industry to utilize the test sites.

Existing Tools

Public Affairs Offices

There are multiple Public Affairs Offices (PAOs) at NAS PAX, each of which serves their respective organizations, e.g. NAS PAX, NAWCAD, NAVAIR, etc. Each Public Affairs Officer is the official spokespersons for their organization and responsible for internal information, media relations, community relations, and review of nontechnical material intended for public release. Any official contacts with off-station news media, speeches, or other types of presentations to community organizations or groups are coordinated with the PAO prior to public release.

Additional activities conducted by each PAO include managing an active station tour program for community groups and giving the general public an opportunity to see and hear about their mission firsthand. Citizens in the NAS PAX Study Area concerned or unaware of UAS usage can inquire to the PAOs.

NAS PAX Sustainability Office

NAS PAX's Sustainability Office (SO) is responsible for communicating with and educating parties external to NAS PAX and the overall range complex that could be impacted by range operation or could impact range activities. Through this effort, range complex leadership reaches out to external interests and the civilian communities to identify, discuss, and resolve matters of mutual interest.

Sustainability outreach is different from public affairs, although the two functions often support each other and work closely together. Sustainability outreach is also different from the corporate communications programs of the Navy, NAVAIR, and the NAVAIR Range Complex. The SO is responsible for a variety of efforts associated with environmental compliance and management of encroachment on test and evaluation operations conducted within the ATR Inner Test Range. The mission of the SO is to "support fleet readiness by ensuring access to ranges, facilities, and resources as well as public support for the Navy's test, training, evaluation, and experimentation mission."

NAS PAX SO engages in several core areas, including range management planning support, encroachment management, public outreach, comprehensive noise management, operational environmental planning, and information technology support.

Specific to the ATR Inner Test Range, the SO mission includes an emphasis on maintaining a quality noise management program. NAS PAX SO is responsible for tracking noise disturbances in all of the airspace used within the ATR Inner Test Range and beyond to the ATR Offshore Area that spans across part of Maryland, Delaware, and Virginia.

NAS PAX maintains a comprehensive noise management program to identify and mitigate noise impacts to the community by responding to noise disturbance reports. Citizens are encouraged to express their concerns regarding noise generated from the station by contacting the station's Noise Management Team by phone, email, or mail. The noise disturbance hotline was established in November 2001 to receive noise disturbance reports from the community. The noise disturbance hotline is typically manned from 8 a.m. to 4:30 p.m. In the event no one is available to receive the call in person, callers are instructed to leave their names, contact information, and a description of the event.

NAS PAX's policy requires a representative from NAS PAX to investigate phone and/or written inquiries related to a noise event within one business day and to follow-up with the person reporting the disturbance.

Although this noise disturbance line is an effective tool in addressing community concerns, the limited scope of the program focused on noise does not provide a tool for community inquiries related to other topics or military operations and schedules.

Additional information on this program is available at http://www.navair.navy.mil/ oep/index.html.

NAVAIR Public Release 10-730: Military Overview

NAS PAX has developed various educational and informational brochures that provide an overview of its military mission, operations, and operational areas. An easy to read, graphically rich pamphlet titled "Sustaining the Navy Mission at the Atlantic Test Ranges. The pamphlet includes a regional collaboration section that lists existing efforts to work with regional organizations and identifies of various outreach efforts and programs that NAS PAX is currently engaged, methods of information sharing, and noise abatement and land preservation tools that have been established and are utilized.

Overview including a brief history of NAS PAX and its ranges, the current mission, explanation of encroachment, and the Sustainability Office

Atlantic Test Ranges illustrating a map of the NAS PAX airspace's within the ATR Inner Test Range and the ATR Outer Range.

Test and Training Operations graphically depicting the range users and types of flight operations that occur and identifying typical flight operation hours.

Regional Collaboration including a list of various outreach efforts and programs that NAS PAX is currently engaged, methods of information sharing, and noise abatement and land preservation tools that have been established and are utilized.

Community Benefits outlining methods the Navy has employed to show its commitment to environmental protection and to protecting human health and safety while performing test and training operations effectively. A significant benefit realized by the community is also felt

through Maryland's economy. NAS PAX serves as an important economic engine providing billions of dollars to the Maryland economy through employment opportunities and infrastructure growth.

These brochures are distributed to the public; however, many people are unaware of the availability of these brochures. There is also a lack of knowledge of the different components that comprise the military footprint across the region. The brochures do not depict noise contours and accident potential zones (APZs) or the operational footprint that extends to Maryland's Eastern Shore or Northern Neck of Virginia.

This brochure is available in St. Mary's County offices; however, no other communities within the region possessed copies to make available to the public at the time of the JLUS data collection and interview process.

An internet search conducted by the JLUS team resulted in finding this public release pamphlet on one realtor's website; however, the search result was not tied to a particular parcel or area. The NAS PAX Main Station noise contour map was also found through this search but contained no indication of which parcels were affected. An explanation of the noise levels shown on the map was not found with this document.

The pamphlet states that the Navy maintains positive community relationships by, working with government organizations:

- Southern Maryland
- Eastern Shore of Maryland
- Northern Neck of Virginia
- Sharing information:
  - Public information ecxchanges
  - Press releases on test operations and programs
  - Stategic alliances with other military installations
- Communtiy involvement:
  - Environmental education
  - Mentoring and training programs in local schools
  - Air shows and other special events

The pamphlet acknowledges that flight operations in the ATR have the potential to create noise that may affect people living in the region and list the following as components of the Noise Abatement Program:

- Establishing a Real Estate Disclosure clause to notify prospective buyers of potential impacts from nearby military installations
- Working with planning and zoning commissions throughout the region to address development in areas that are likely to be impacted by operations
- Maintaining a toll-free Noise Disturbance Hotline to report noise disturbances

Real Estate Disclosure

Although NAS PAX has an active noise abatement program through their noise hotline, the use of real estate disclosures and establishment of working relationships with planning and zoning commissions has had limited success in areas outside of the Southern Maryland and Eastern Shore sub areas. St. Mary's County is the only jurisdiction within the Study Area that has a truly formalized relationship with NAS PAX that is utilized on a regular basis.

Real estate disclosures that address military activities or presence of an airport/aviation activities that occur in the area are currently used in Maryland; however, they are used on a discretionary basis and do not apply to communities in the State of Virginia that are affected by NAS PAX operations.

Maryland

House Bill 298 approved by the Maryland General Assembly in 2006 requires all contract of sale for residential real property in Maryland entered into after October 1, 2006 to contain a statement notifying the buyer that the property may be located near a military installation that conducts certain military operations or testing:

> *"Buyer is advised that the property may be located near a military installation that conducts flight operations, munitions testing, or military operations that may result in high noise levels."*

The term 'residential real property' is not clearly defined; however, it is noted that the law applies to more than only single family houses and, erring on the side of caution, the notice should be included in contracts for all residentially used property (including multi-family projects) and unimproved residentially zoned property. Whether or not there is such a military installation anywhere near the property has nothing to do with the requirement to give the notice. Vacant or unimproved land and commercially zoned land are not subject to the disclosure laws.

The Maryland Residential Contract of Sale most recently updated in October 2008 contains line items 49 specific to military installations and states"

> *49. MILITARY INSTALLATIONS: This Section does not apply in Allegany, Carroll, Frederick, Garrett, Howard, Montgomery, and Washington Counties. Buyer is advised that the Property may be located near a military installation that conducts flight operations, munitions testing, or military operations that may result in high noise levels."*

The sale of property in Southern Maryland communities (Calvert, Charles, Prince George's, and St. Mary's counties) is subject to the Southern Maryland Addendum to State Contract's (2008) provision regarding Military Aircraft Operations Disclosures. This provision specifies four military installations that may impact communities in the region by various military operations.

Section 12 of the Southern Maryland Addendum to State Contract is an addendum to the Maryland State Association of Realtors Standard Contract, the conditions of this which supersede state requirements when uncertainties arise.

> *MILITARY AIRCRAFT OPERATIONS. The Property may be located within or near several military aircraft operation centers located in Calvert County, Charles County, Prince George's County or St. Mary's County. Properties located within or near such military aircraft operation centers may be impacted by varying degrees of noise levels and potential military aircraft accidents as well as noise from gunfire or explosive testing. The following is a description of such military aircraft operation centers; however, the following list is not all-inclusive:*
>
> *(A) Naval Air Station, Patuxent River, MD., typically conducts flight operations seven days per week, between 8 a.m. and 11 p.m. However, infrequent flight operations occur outside these times. The effects from the Navy's flight operations extend beyond the boundaries of the naval facility. The present level and type of operations will continue for the foreseeable future. For additional information, contact the NAS Patuxent River Public Affairs Office.*
>
> *(B) Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA., typically conducts operations five days per week, between 8 a.m. and 4 p.m. However, infrequent operations occur outside these times. The present level and type of operations will continue for the foreseeable future. For additional information, contact the Naval Surface Warfare Center, Dahlgren Division, Public Affairs Office.*
>
> *(C) Naval Surface Warfare Center, Indian Head Division, (IHDIV), Indian Head, Md., and Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV), Indian Head, Md., typically conduct explosive testing, evaluation and training operations five to seven days per week, between 7 a.m., and 4 p.m. However, infrequent operations occur outside these times. Sound from the training and testing may result in sporadic noise from helicopters, traffic, construction and industrial operations, and extend beyond the boundaries of the facility. The IHDIV Goddard Power Plant operates 24 hours per day and steam releases can sometimes be heard outside the facility. The present level and type of operations will continue for the foreseeable future. For additional information, contact the IHDIV or NAVEODTECHDIV Public Affairs Office.*

(D) Andrews Air Force Base typically conducts flight operations seven days per week, twenty-four hours daily. The effects from Air Force, Army and civilian flight operations extend beyond the boundaries of the facility. The present level and type of operations will continue and may increase for the foreseeable future. For additional information, contact the Andrews Air Force Base Public Affairs Office.

Buyer acknowledges that Buyer, prior to the submission of a written offer to purchase the Property, is solely responsible to contact the military aircraft operation centers, as identified above, which may impact upon the Property in order to ascertain the potential noise levels and accident probabilities in relation to the location of the Property within or near one or more of the above military aircraft operation centers."

Virginia Real Estate Disclosure Law

In Virginia, a seller in a locality in which there is a military air installation must disclose to a buyer "whether the subject parcel is located in a noise zone or accident potential zone, or both, if so designated on the official zoning map by the locality in which the property is located on a form provided by the Real Estate Board.

Virginia, however, limits an owner's liability for failure to make a disclosure of noise for properties located outside of the noise contours defined as incompatible with residential use by the FAA. First, a purchaser in a designated noise zone having a DNL of less than 65 dB has no right to terminate a real estate purchase contract because the property owner failed "to timely provide any disclosure required by [Va.Code] § 55-519.1."

Second, a purchaser of residential property in a designated noise zone having a DNL of less than 65 dB has no right to claim damages pursuant to the foregoing section.

Source: CODE ANN. § 55-519.1; 55-520(c); 55-524(B)(2).

In Virginia, an "owner of residential real property located in any locality in which a military air installation is located shall disclose to the purchaser whether the subject parcel is located in a noise zone or accident potential zone, or both, if so designated on the official zoning map by the locality in which the property is located on a form provided by the Real Estate Board. An owner must disclose "the specific noise zone or accident potential zone, or both, in which the property is located according to the official zoning map."

Source: VA. CODE ANN. § 55-519.1

Vacant or unimproved land is not subject to the disclosure.

Environmental Partnerships

NAS PAX's Environmental Department is located within the Public Works Department. The Environmental Department provides comprehensive services in three broad areas: compliance, environmental planning, and conservation. Compliance programs focus on regulatory compliance review and tracking. Environmental planning staff reviews all proposed projects and considers alternatives in an attempt to minimize environmental impact, preparing Environmental Assessments (EA) or Environmental Impact Statements (EIS), following National Environmental Policy Act (NEPA) mandates as necessary. Conservation programs include both natural and cultural resources management such as archaeology, historic architecture, and preservation planning; fish and wildlife management; forestry management; and outdoor recreation program management.

The environmental office has established and maintained partnerships with a variety of private sector and government agencies that have resulted in the success of advancing environmental compliance and education. For examples, the station's environmental restoration program and community Restoration Advisory Board keeps the public aware of all restoration activities at NAS PAX.

NAS PAX AICUZ

NAS PAX maintains an AICUZ for its Main Station (most recently updated in 2009) and for Webster Field (most recently updated in 2006). The AICUZ studies analyze aircraft noise and safety based on current and projected operational conditions using the latest methodology for describing aircraft noise exposure. Although AICUZ's are intended to be public documents and to be used by neighboring and affected communities to use as reference or incorporation in their planning efforts, access to the AICUZ report is limited to those who are aware of the existence of such studies and by request. While the reports should be found in the St. Mary's library collections, they are not easily retrievable

or available online. Those who are unaware of the AICUZ program or uneducated about safety and noise zones may not be aware of the study or understand the implications of the report's findings and recommendations.

NAS PAX RAICUZ

The Most recent RAICUZ for the ATR Inner Test Range was completed in 2009. According to this most recent report, the purpose of this RAICUZ study is two-fold:

- To provide NAVAIR and NAWCAD with an analysis of current and future aircraft operations in the ATR Inner Test Range.
- To assess the impact of future research, development, acquisition, testing, and evaluation (RDAT&E) and training operations conducted within the ATR Inner Test Range on nearby development, uses, and natural resources in order to implement an effective RAICUZ program.

The office of the Chief of Naval Operations initiated the RAICUZ program to "protect the public's health, safety, and welfare and to prevent civilian encroachment from degrading the operational capacity of military ranges." The purpose of the RAICUZ program is to foster compatibility among air-to-ground ranges, land uses, and airspace in the vicinity of the range installation.

Roles and responsibilities for RAICUZ implementation as outlined in the study state that the Atlantic Test Range, the Commanding Officer at NAS PAX, NAVAIR and the local government agencies with planning and zoning authority (12 counties in Delaware, Maryland, and Virginia) share the responsibility for RAICUZ implementation. Real estate agencies, residents, developers, and builders also share this responsibility. Cooperative action by all parties is essential to prevent land use incompatibility and future encroachment of test and training operations conducted on the ATR Inner Test Range.

Despite the designation of local, regional, state, and federal community leaders as partners essential to the success of compatibility planning within the ATR Inner Test Range and affected lands, regional cooperation and established relationships has yet to yield significant results in terms of achieving regional partnerships that would assist in the coordination of and planning for compatibility solutions.

Although designated as a public document, the RAICUZ document is also not available publicly. Those with access or awareness of the RAICUZ document have reported the technical nature of the study as being difficult to comprehend for the purposes of community awareness and integration into local planning efforts. While the reports should be found in the St. Mary's library collections, they are not easily retrievable or available online. The lack of readily accessible informational publications in an easy-to-read format makes it difficult for the community to understand the NAS PAX mission and actively engage in community planning that supports the long-term viability of the mission. .

Organizations

The **Southern Maryland Navy Alliance** is a private organization whose mission is to support, promote, and enhance the intellectual capital and infrastructure at NAS PAX and Webster Field as an economic asset and resource to the Southern Maryland region. The Alliance focus includes educating and informing "the businesses, citizens, and governments of Southern Maryland about the economic and cultural benefits of a strong military presence in the region and the importance of supporting regional infrastructure"; however, their work is based in Southern Maryland and does not extend to Maryland's Eastern Shore or communities in the Northern Neck of Virginia.

The **South Potomac Civilian-Military Community Relations** (COMREL) Council was organized in 2008 to serve as a vehicle to implement a consistent and efficient communications avenue between the military at Naval Support Facility (NSF) Dahlgren in Virginia, NSF Indian Head in Maryland, and the civilian communities adjacent to these bases.

Although communities in Virginia are represented via the Community and Military Relations Council (COMREL), this group is focused on collaboration with NSA South Potomac's two installations - Naval Support Facility (NSF) Indian Head and NSF Dahlgren.

The **Eastern Shore Defense Alliance** (ESDA) is a "group of business people and other citizens interested in supporting the missions of the Defense related organizations on the Eastern Shore", primarily as they relate to Wallops Island. The ESDA is not currently involved in any

coordinated efforts with NAS PAX. Documentation regarding previous coordination has not been provided thus further assessment of this group and its potential to interface with NAS cannot be completed as this time.

This organization recognizes the presence of additional military organization detachments that work in the Eastern Shore area, including:

- Center for Surface Combat Systems, Dahlgren, VA
- Naval Surface Warfare Center (NSWC) Corona CA,
- NSWC Dahlgren VA,
- NSWC Port Hueneme, CA,
- Naval Air Warfare Center (NAWC) , and
- Air Force Space Command (AFSP) Det 12.

The **Tri-County Council of Southern Maryland** (TCCSMD) is the regional development and planning organization for Southern Maryland and is the NAS PAX JLUS sponsor. Created 50 years ago, the organization serves a wide variety of functions, including providing a forum for the discussion and resolution of regional goals associated with fostering the physical, economic and social development of the region (Calvert County, Charles County, and St. Mary's County). The mission of the TCCSMD is to serve as a forum for the discussion and resolution of issues affecting the Southern Maryland Region and select, advocate and advance those activities that will best serve the interests of all the people of Southern Maryland. The TCCSMD serves as an information and data source, engages in regional planning, serves as an advocate, for the region's interests and priorities at the federal and state levels, qualifies the region for federal and state assistance and develops programs to meet region-wide needs and goals. Activities are intended to promote the social and economic development and environmental protection of the region

The **Mid-Shore Regional Council** (MSRC) serves Caroline, Dorchester, and Talbot counties in Maryland. The MSRC operates as a cooperative regional planning and development agency within the three counties to foster physical, economic and social development. The Council initiates and coordinates plans and projects for the development of human and economic resources. The MSRC is a federally designated Economic Development District (an economically distressed area) that enables federal funding to the region through the US Department of Commerce's Economic Development Administration. The focus of MSRC's efforts is associated with the pursuit of economic development, including the facilitation of regional economic development strategies. One such effort is to assess the feasibility of establishing a regional technology school or utilizing Chesapeake College to offer regional technology programs.

The **Northern Neck Planning District Commission** (NNPDC) is the regional planning organization and economic development agency for Northumberland and Westmoreland counties in Virginia. It is a voluntary association of local governing bodies that serves to address local issues and to solve problems with regional significance and impact through mutual cooperation. These regional issues cannot be solved efficiently by each county alone. Regional programming includes intergovernmental coordination, review and assistance, economic development activities, transportation planning, grant program identification and applications, environmental planning, and local requests.

The **Tri-County Council for the Lower Eastern Shore of Maryland** was formed by an Act of the Maryland General Assembly in 2001. The Council facilitates regional planning and development in Somerset, Wicomico and Worcester Counties and works closely with the Economic Development Administration of the US Department of Commerce and US Department of Agriculture Rural Development and partners with the Maryland Department of Business and Economic Development.

St. Mary's County Board of County Commissioners Cooperative Agreement

A Cooperation Agreement was signed in April 2007 between St. Mary's County's Board of County Commissioners and the Navy to establish cooperative encroachment mitigation and prevention measures. As a result the County and the Navy have met twice yearly, identified encroachment threats, reviewed existing and proposed development in the AICUZ and nearby areas, and adopted changes to the AICUZ, Comprehensive Plan, and local zoning ordinances.

St. Mary's County Comprehensive Plan identifies goals and policies to support the continued function and contributions of the largest employer in the County, NAS Patuxent River. The County Commissioners have committed to minimizing encroachment, improving schools, ensuring adequate housing, improving transportation, revitalizing Lexington Park, promoting international marketing, encouraging technology transfer and other forms of economic diversification, and providing a range of lodging and conference facilities.

Chapter 4 of the Comprehensive Plan identifies "St. Mary's County Consolidated Priorities for Community Support of the Navy" stating:

Education. Provide programs and technology for life-long learning by supporting a continuum of educational excellence from pre-kindergarten through graduate level higher education.

Transportation. Support continuous improvement of transportation infrastructure within the County and regionally for access to the Patuxent River Naval Air Station and effective cross-county travel for residents

Housing. Continue to ensure an adequate supply of housing for all ranges of affordability that will serve new employees associated with emerging Navy programs and the existing County workforce. Support increased homeownership opportunities

Lexington Park Revitalization. Revitalize the physical and economic infrastructure of Lexington Park.

Quality of Life. Employ local government regulations and investment to preserve rural character, enhance development districts, increase cultural opportunities, and support economic growth and diversification

Encroachment Partnering. Work with the Navy to identify and mitigate all forms of encroachment that may potentially impact base operations

Charles County Comprehensive Plan

The Charles County Comprehensive Plan identifies the need for regional and inter-jurisdictional coordination that results in regional solutions for issues such as transportation, environmental issues, economic development, public safety, fire, and emergency services, and recreation.

According to the Comprehensive Plan:

> *"Charles County participates actively in numerous regional organizations including the Tri-County Council for Southern Maryland and its various committees and commissions, the Metropolitan Washington Council of Governments, the Chesapeake Bay tributary strategies teams, the Southern Maryland Travel and Tourism Commission and the Southern Maryland Agricultural Development Commission.*
>
> *The County coordinates closely with the Towns of Indian Head and La Plata especially in the areas of public safety, emergency management, housing and development policies as they relate to school capacity, and recreation. While agreement on all issues is not always forthcoming, there exists a good working relationship between the three jurisdictions."*

The Land Use Element lists the County's policies including 3.10 - Protect military installations from incompatible land uses.

The County acknowledges the impact of the strong military presence on the economic structure and employment growth (page 7-2); however, specific policies and regulations associated with the preservation of military facilities and presence are specific to the two installations located within the jurisdictional limits of Charles County – NSF Indian Head and Blossom Point Research Facility.

Although the plan recognizes the noise and vibration impacts on portions of southern Charles County from NSF Dahlgren (located in King George County, VA across the Potomac River), NAS PAX and its potential effect on county residents is not mentioned. All future changes to the Charles County Comprehensive Plan will be based on the planning and county commissioner's authorization.

As a result of the completion of a Blossom Point JLUS, the Comprehensive Plan identifies both a Military Review area and recommendations for compatibility planning within this area. Recommendations include:

- Establish a Military Review Area (MRA) on the Comprehensive Plan land use map, based on noise and frequency impacts.
- Develop a process for County staff and BPRF to review and comment on special exception applications within the MRA.
- Update Charles County real estate disclosures so that potential buyers are made aware of potential issues related to BPRF.
- Target priority properties near BPRF for acquisition and/or protection.

- Review the Zoning Ordinance to ensure that County zoning regulations adequately address concerns with development encroachment of BPRF.

Additional policies identified in the plan that relate to military presence in the region include:

- **Business Retention and Development 7.1**. Continue to foster a positive working relationship between the County and the Navy in order to capitalize on the role of the naval facilities as a major employer, and as a source of new commercial technology and local spending.
    - Protect the interests of the Naval Support Facility-Indian Head Division, including the Center for Energetics and other tenant commands on the Naval Support Facility-Indian Head, and promote on and off base expansion and the related public and private development.

Calvert County Comprehensive Plan

Calvert County's Inter-Jurisdictional Coordination Element acknowledges the need for coordination as a result of the county's "location next to the metropolitan areas of Washington and Annapolis" and the influence on the county "by the decisions of neighboring jurisdictions" and region.

The county's commercial and employment hubs can be found in its town centers and incorporated municipalities. Solomons Town Center is located just across the river from NAS PAX Main Station along the Route 2/4 corridor. Lusby Town Center is also located along the 2/4 corridor, just slightly north of Solomons Town Center. Both are identified in the plan as "well-suited for attracting high-technology defense contractors. In addition, Solomons will continue to be an attractive location for retired persons to locate, both in planned retirement communities and in existing neighborhoods".

Inter-jurisdiction objectives listed include:

- Ensure coordination and cooperation between Calvert County government and other public and quasi-public agencies, and elected officials.
- Make intergovernmental cooperation an integral part of planning by developing close working relationships between agencies.
- Work with the towns of North Beach and Chesapeake Beach, as well as the Tri-County Council of Southern Maryland, and Anne Arundel and Prince George's Counties to achieve consensus on regional issues and policies.
- Encourage long-term consistency between the towns' and the County's plans.

Specific actions that are identified for the promotion of these objectives include:

- Maintain close cooperation with all government agencies in establishing consistent, effective decisions relating to issues such as an improved environment, a better business climate, and higher quality of life.
- Evaluate the impact and cost of expansions of the Patuxent River Naval Air Station.
- Continue coordination of transportation planning and programs with all appropriate State, federal, and regional agencies.
- Cooperate with adjoining counties and regional agencies to ensure that zoning and subdivision regulations permit compatible development along boundaries and the Patuxent River.
- Continue regular communication between agency counterparts in local, regional, and State governments.

Caroline County

Coordination and communication with other jurisdictions in the region are addressed through the County's Comprehensive Plan through both broad objectives and specific actions.

The primary land use goal in Caroline County is to preserve agriculture, natural resources and the rural character of the County by continuing to direct future growth to existing population centers

The County's overall land use objectives to achieve this goal include the following:

- Providing adequate planning and regulatory mechanisms for rural land use and growth management;

- Maintaining the agricultural land-base to support the County's agriculture economy;
- Preserving valuable natural, historical, cultural, archeological and scenic resources;
- Improving County and Municipal coordination through the development of "Inter-Governmental Agreements" for land use, land preservation, growth management, and infrastructure and services.

The County's economic development initiatives identified the need for improved coordination between counties at the regional level, and between local, state, and federal governments; however, detailed efforts or existing relationships with federal entities, namely DOD partners and military installations in the region, are not mentioned in the plan.

Talbot County

Although one DOD facility (the Naval Research Lab) is located in Talbot County, specific objectives and actions are not identified within Talbot County's Comprehensive Plan. The plan does not mention NAS PAX or other military activities in the area; however, County policies associated with the protection of Easton Airport are identified, stating that the County should encourage the continued vitality of the Easton Airport by protecting the airport from encroachment from residential, retail, or commercial uses.

FAA Modernization and Reform Act

The Federal Aviation Administration (FAA) Modernization and Reform Act (FMRA) of 2012 authorized the integration of UAS into national airspace by December 2015. The intent of the integration of UASs is to serve in capacities such as search and rescue events, disaster relief, humanitarian efforts, and security purposes. An overall concern for the public relative to this initiative is the associated impacts on privacy and safety for UAS non-users.

According to the FAA UAS Fact Sheet, currently UAS are not permitted to operate in a Class B Airspace. This airspace is typically located over urban areas and contains the highest number of manned aircraft. Class B airspace is located over the busiest airports depending upon the IFR operations and passengers served. This airspace does require clearance from the air traffic control tower before entry can be made. Aircraft must be equipped with two-radio communications systems.

The FAA Modernization and Reform Act of 2012 (FMRA) contains provisions designed to promote and facilitate the use of civilian unmanned aircraft. These included mandates for the following:

- development of an integration plan that is to commence by the end of FY2015, if not sooner, along with a five-year roadmap for achieving integration objectives;
- selection of six test sites to study UAV integration into the National Airspace System (NAS);
- designation of certain permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for commercial and research purposes, including flights conducted beyond line-of-sight;
- a simplified process for issuing authorizations for entities seeking to operate public UAS in the NAS;
- incrementally expanding airspace access as technology matures and safety data and analysis become available;
- facilitate public agency access to UAS test ranges;
- and developing and implementing operational and certification requirements for public UAS by December 31, 2015; and
- an exemption from rules and regulations pertaining to the operation of unmanned aircraft for model aircraft weighing 55 pounds or less that are flown within visual line-of-sight strictly for hobby or recreation.

The FMRA stipulates that UASs are only allowed to operate if the user has been issued a certificate of authorization (COA) or wavier or a certificate of special airworthiness. This limits the users of these UAS to those who have gone through the FAA application process. COAs are issued to public agencies who utilize public aircraft for research, testing, and military training. Certificates of special airworthiness are issued to companies who are developing and testing civil UASs. Public agencies

that currently possess COAs for UASs include the U.S. Navy, the U.S. Air Force, the Department of Homeland Security, and some municipal governments.

Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap – First Edition 2013
The Integration of Civil Unmanned Aircraft Systems (UAS) in the (NAS) Roadmap intends to serve as a guiding framework for the safe integration of UASs into the NAS. This roadmap provides for the understanding of operational goals, aviation safety, and challenges associated with air traffic when considering future investments in UAS. This roadmap in no way sets policy or regulations for the efficient use of civil UAS in the NAS.

Relative to privacy and civil liberties associated with UASs and in compliance with the FMRA, the FAA is implementing a UAS Test Site Program in which to help the FAA better understand the operational opportunities and constraints associated with the use of UASs. The FAA does not develop policies relative to privacy and civil liberties, but the experience gained from the test sites will enhance information that can be shared to key agencies and interagency forums about such matters.

There are several resources available on the internet to learn, educate, and inform the public about the integration of UASs into the NAS. The resources include the law that authorized such actions, the process for public agencies and companies to apply to use and operate UASs, and other facts about UASs. Resources include the following:

- Code of Federal Regulations, Title 14 Part 91 (14 CFR 91), Aeronautics and Space: http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=3efaad1b0a259d4e48f1150a34d1aa77&rgn=div5&view=text&node=14:2.0.1.3.10&idno=14
- FAA Fact Sheet on Unmanned Aerial Systems: http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=14153
- FAA Modernization and Reform Act of 2012: http://www.gpo.gov/fdsys/pkg/CRPT-112hrpt381/pdf/CRPT-112hrpt381.pdf
- Federal Advisory Circular for Model Aircraft Operating Standards: http://www.faa.gov/documentLibrary/media/Advisory_Circular/91-57.pdf
- National Conference of State Legislatures, 2013 Unmanned Aerial Systems Legislation: http://www.ncsl.org/research/civil-and-criminal-justice/unmanned-aerial-vehicles.aspx

Land / Air / Sea Space Competition (LS)

The military manages or uses land and air space to accomplish testing, training, and operational missions. These resources must be available and of a sufficient size, cohesiveness, and quality to accommodate effective training and testing. Military and civilian air and sea operations can compete for limited air and sea space, especially when the usage areas are in close proximity to each other. Use of this shared resource can impact future growth in operations for all users.

The land, air, and sea spaces used by the military can be owned by the DOD, designated for DOD use by a federal or state agency, provided through easements or other agreements with public or private entities, or maintained as a historic usage right. Public and private requests to share or assume some of these resources may have a negative impact on military training and test objectives.

Technical Background

Air, sea, and land spaces all serve as the testing grounds for NAS PAX operations. Testing includes air flights, weapons separations aimed at water targets, and in facilities on land. Testing occurs nearly every day of the year across the entire ATR Inner Test Range. Airspace testing is concentrated primarily in the ATR Inner Test Range; however, any of the military operating areas described in Chapter 3 are available for such testing.

Flight operations occur at varying altitudes over the coastal areas of Maryland and Virginia. The military airspace is partitioned into separate pieces with unique allowable flight levels. The type of testing performed in these different areas depends on the unique requirements of the testing as well as availability of airspace. The permitted hours for air operations are determined through an analysis of ATC hours required and a regard for community impacts from potential operational noise.

While testing operations are the primary use of the airspace, other DOD services also utilize the space, requiring separate scheduling during times of low utilization.

The vertical extent in the operating area varies from surface level to more than 80,000 feet in altitude. NAS PAX Class D Airspace encompasses an area within a 4.5 mile radius of the center of the airfield that extends upward to 2,500 feet Mean Sea Level (MSL).

Compatibility Assessment

ISSUE LS-1	***Recreational Boaters and Fishermen in Range Area.*** There is competition for use of the water among recreational boaters and fishermen. Sea spaces need to be cleared near Webster Field and near the marine targets when active training and operations are occurring.

The Chesapeake Bay is the largest estuary in the United States and a prominent recreation area. Much of NAS PAX, Webster Field, and surrounding waters serve as home to numerous freshwater and saltwater species of fish indigenous to the eastern Maryland region. As a result, there are a number of fishing opportunities available on the Patuxent River in proximity to NAS PAX and Webster Field which can attract large numbers of recreational and commercial fishermen. Recreation boaters are also drawn to the area for its beaches and water trails.

While larger commercial vessels cannot sail near the ATR Inner Test Range targets, smaller vessels, such as fishing boats, tugboats, and recreational craft, are able to maneuver up to the limits of the prohibited areas and within most of the restricted area comprising the aerial and surface firing range.

The public is permitted to boat and fish within the designated Surface Danger Zone in the absence of warnings that the range is, or soon will become, active. Public access to the No Navigation Zone, the No Trespassing Zone, or the offshore Prohibited Area is prohibited at all times. The Maryland Department of Natural Resources (MDNR) Fisheries Service is responsible for managing commercial and recreational fishing off the shore of BIR.

NAS PAX missions include testing and training with aerial and seaborne targets conducted in and over ranges in the Chesapeake Bay and Patuxent and Potomac Rivers. When ranges are active, patrols are required to clear boaters from danger zones. These areas can be extensive and the abundance of boaters within these waterways affects efforts to maintain maritime safety.

The primary issues associated with competition for sea space is a result of the high levels of commercial fishing vessels, commercial shipping, and recreational boaters that access the waters proximate and within the ATR Inner Test Range, some of which are unaware of doing so. Clearing the range of these users occurs by different methods, with more communication resulting in more efficient operational results for Navy testing interests.

The Navy clears the weapons range over marine radio communications when operations are scheduled. The current process of using radio transmissions to alert fishermen, as well as NAVAIR Atlantic Targets and Marine Operations (ATMO) boats to clear any remaining vessels, work adequately with the mariners currently fishing the Bay. Delays in clearing mariners from the ATR Inner Test Range do occur; however, such occurrences are infrequent.

The Navy communicates to a lesser degree with recreational boaters and fishermen when they move into waters restricted by testing. Communication with these groups is the least comprehensive, as many are not professional mariners with access to radio channels with broadcast messages. Additionally, some boaters do not regularly consult charts that would indicate their presence in a restricted area. The Atlantic Targets and Marine Operations (ATMO) are tasked with clearing the waters during testing events, and can call upon the Coast Guard should law enforcement be necessary. When such clearing is required, the Navy typically modifies the testing schedule to achieve the greatest efficiencies possible for the remainder of the day.

If the Navy initiates a test or training exercise in the ATR Inner Test Range, commercial vessels traversing the aerial and surface firing range

within "established steamer lanes," are not required to halt and wait for the exercise to be completed. Instead, they are to "proceed on their normal course through the area with all practicable speed" (33 CFR 334.210(6)). The Navy may also contact commercial vessels to advise them of an upcoming exercise. Ferry routes avoid entering the boundaries of the prohibited and restricted areas surrounding the targets.

The weapons safety hazard footprints around Hooper Target Complex area are cleared of all recreational and commercial users before RDAT&E tests involving the release of test articles or ordnance stores can be conducted. In addition, Range Safety must be able to monitor the delivery aircraft to make sure that the aircraft is operating within the approved release limits. The release can be aborted should the delivery aircraft be outside release limits.

Bay communities are encouraging waterfront development in their land use plans and zoning regulations and promoting water-based recreation opportunities. While no specific proposed development has been identified that will potentially be impacted by ATR Inner Test Range operations aircraft activity, trends towards this type of regional development should be closely watched by both community planners and the Navy.

Land Use

The basis of land use planning and regulation relates to the government's role in protecting the public's health, safety, and welfare. Local jurisdictions' general plans and zoning ordinances can be the most effective tools for preventing or resolving land use compatibility issues. These tools ensure the separation of land uses that differ significantly in character. Land use separation also applies to properties where the use of one property may adversely impact the use of another. For instance, industrial uses are often separated from residential uses to avoid impacts from noise, odors, lighting.

Land use planning around military installations is similar to the process for evaluating other types of land uses. For instance, local jurisdictions consider compatibility factors such as noise when locating residential developments near commercial or industrial uses. As the land between local municipalities is developed – or the land between a local municipality and the perimeter of a military installation is developed both entities are affected. New residents, tenants, or building owners are typically not fully aware of the implications of locating in close proximity to an active military installation and / or training area.

Compatibility Assessment

ISSUE LU-1	***Military Compatibility Policy within the Comprehensive Plans.*** Compatibility with NAS PAX is not addressed in comprehensive plans, zoning codes, or other development ordinances throughout the region.

The Maryland Department of Planning specifies that comprehensive plans the determine manner of development within municipalities and counties throughout the state. State legislation requires certain elements which each comprehensive plan must contain, including transportation, water and sewer treatment, anticipated growth, and community facilities. Zoning ordinances are the formal rules which governments use to control the physical development of land and its uses. A subdivision ordinance outlines the procedures used to develop land into individual building lots and houses. Often these planning tools coincide to create the plans and policies which govern a jurisdiction's development; however, inconsistent uses or objectives may lead to incompatible uses, especially with regards to military installations. Many counties within the Study Area do not directly address compatibility with NAS PAX in their comprehensive plans, zoning ordinances, or subdivision regulations which can lead to incompatible development. These incompatibles may hinder mission capabilities at NAS PAX or increase risks to public safety or property. St. Mary's County, MD is the only county in the Study Area which includes specific military compatibility standards in its comprehensive plan and zoning ordinance through an AICUZ Overlay District. Since NAS PAX is located within St. Mary's County, this overlay district allows the County to regulate land uses around NAS PAX to reduce incompatible uses around landing zones and flight tracks.

While other jurisdictions may not require as stringent requirements to address issues associated with CZs and APZs, the inclusion of elements for military compatibility provide tools to mitigate potential safety

concerns through height, density, and noise requirements and may support economic development in conjunction with the installation. These requirements are necessary throughout all of the counties in the Study Area because the ATR Instrumentation Radar Viewshed, Special Use Airspace, Helicopter Operating Areas, and UAV Operating Areas extent over different counties throughout the Study Area.

Legislative Initiatives

Legislative initiatives are proposed changes in relevant policies, laws, regulations or programs which could potentially have a significant impact on one or more substantive areas of concern to both the facility and to the stakeholder communities. The focus of this compatibility issue is on initiatives with general and broad implications.

Compatibility Assessment

ISSUE LI-1	***Repurposing of 500 MHz of Spectrum.*** A 2010 Presidential directive to repurpose spectrum for private industry use could impair military mission sustainment.

Managing competition for available spectrum frequency has been an increasing challenge as additional technological advances are made and the use of devices that require RF channels proliferates. Since 1993, Congress has been selling federal spectrum bands for reallocation to the private sector to help reduce the Federal deficit, and promote the development of new telecommunications technologies, products, services and jobs. The expanding public and commercial use of the frequency spectrum from wireless transmitters of consumer electronics can encroach on the military's use of the frequency spectrum. Increasing community and DOD demands for this important resource can create conflicts for all users.

The entire useable RF spectrum has been allocated among the various users including the DOD and commercial industry. The DOD has use of some dedicated radio spectrum to ensure communications and missions that are meant to be secure and classified are kept as such to maintain our national security. However, most of the RF spectrum is already shared with commercial services. Further, since the 1990s, the federal government has taken the radio spectrum dedicated solely for DOD use and auctioned it off to the commercial industry for use in commercial wireless telecommunications. These auctions are administered across the entire U.S. and occur by acts of Congress initiated by the FCC. The reason for this most recent sell off initiative of the radio spectrum to the commercial industry is largely due to increasing Internet accessibility across the nation and expanding cellular telephone services (i.e. 4G).

Advances in telecommunication technology and related markets have turned what was once considered an almost limitless resource into a very precious commodity. Without sufficient access to that precious commodity, operations at NAS PAX could be seriously compromised, given its core mission and its reliance on aeronautical mobile telemetry (AMT) services, and several other capabilities threatened by commercial spectrum encroachment.

On occasion, frequencies are "repurposed." One such effort called the National Broadband Plan or NBP is currently underway based on a directive issued in 2010 and 2013 by President Obama to the US Commerce Secretary, directing the National Telecommunications and Information Administration (NTIA) to work in collaboration with the FCC in order to repurpose a total of 500 MHz of Federal and non-federal spectrum over the next ten years for private mobile and fixed wireless broadband users (6/28/10 "Unleashing the Wireless Broadband Revolution" and 6/14/13 "Expanding America's Leadership in Wireless Innovation") If fully implemented, President Obama's "Spectrum Initiative" would nearly double the amount of spectrum available to the private sector.

The AWS-3, or Advanced Wireless Services 3, spectrum auction will start on 13 November 2014, and will pair the Federal spectrum of 1755 – 1780 MHz band with 25 MHz of existing commercial spectrum to be auctioned for commercial 4G cellular use. Details of the AWS-3 auction, including impacts to Federal operations as well as the mitigation measures put in place to address these impacts to Federal operations

can be found at http://www.ntia.doc.gov/files/ntia/publications/fourth_interim_progress_report_final.pdf.

Under current FCC regulations, U-NII devices are authorized to use 555 megahertz of spectrum in the 5150-5350 MHz and the 5470-5825 MHz bands subject to specific technical and operational restrictions to enable sharing with protected radar and satellite operations. U-NII devices provide short-range, high-speed unlicensed wireless connections in the 5 GHz (500 MHz) band for, among other applications, Wi-Fi-enabled radio local area networks, cordless telephones, and fixed outdoor broadband transceivers used by wireless internet service providers. Unlicensed wireless broadband systems have become critical complements to licensed commercial mobile networks and to fixed wireline networks. For example, smart phones, tablets, net-books, and laptops typically have inexpensive embedded Wi-Fi capabilities that enable high-speed broadband connectivity in a wide array of locations.

Section 6406(b)(1) of the Middle Class Tax Relief and Job Creation Act of 2012 (Tax Relief Act) requires the Assistant Secretary of Commerce for Communications and Information (Assistant Secretary), in consultation with the DOD and other impacted agencies, to conduct a study evaluating known and proposed spectrum-sharing technologies and the risk to federal users if the FCC allowed Unlicensed-National Information Infrastructure (U-NII) devices to operate in the 5350-5470 MHz and 5850-5925 MHz bands.

The inverse is that this activity could substantially reduce the potential amount of spectrum exclusively available for governmental uses, such as the military. Several federal agencies currently use the two potential 5 GHz expansion bands that are the subject of this study. Federal systems in these bands include a variety of radar systems installed on airborne, ground-based, shipborne, and space-based platforms. In addition to radar operations, federal users operate a number of airborne RF communications systems at sites across the United States in these bands to conduct, for example, RDAT&E activities at ranges and testing and training of UAS data and command links for intelligence, surveillance, reconnaissance, and combat search and rescue missions.

Limited access to certain frequency bands reduces the amount of spectrum available for operations which could impose immediate impacts on telemetry systems and operations and bandwidth required to support UAS and datalink operations. These telemetry and datalink connections are essential to ATR's ability to schedule certain operations and activities. The Mid-Atlantic Area Frequency Coordination Office (MID-LANT AFC) works with the Test Resource Management Center's Range Spectrum Requirements Working Group, the Range Commanders Council, and the Spectrum Stewardship Senior Steering Group (S4G) to address spectrum-related issues. The rest of the heavily used 1755-1850 MHz (1780 – 1850 MHz) band will remain under threat of reallocation, the loss of which would involve costly and complex migration of NAS PAX's critical range test systems, assets, and capabilities.

The MID-LANT AFC supported five Commerce Spectrum Management Advisory Committee (CSMAC) Working Groups to consider ways to facilitate the sharing implementation of commercial wireless broadband in the 1755-1850 MHz bands while ensuring no interruption, interference, or impacts to existing and planned Federal operations. These working groups submitted reports to the CSMAC on their various topics in regards to the 1755-1850 MHz bands to assist the Advisory Committee in creating transition plans. The final NTIA transition plans on the 1755-1850 MHz band, as well as the DOD's 2013 Electromagnetic Spectrum Strategy have since been finalized and are available to the public here (http://www.ntia.doc.gov/category/aws-3-transition) and here (http://www.defense.gov/news/dodspectrumstrategy.pdf). While the NTIA transition plan details repurposing information and is not helpful to the public, the EMS Strategy presents a framework for how the DOD should adapt to the changing spectrum environment and to assess and / or respond to spectrum regulatory changes.

Existing Tools

500 Megahertz Repurposing Plan

To promote economic growth and unleash the potential of wireless broadband, President Obama unveiled an initiative to reform spectrum policy and improve America's wireless infrastructure. In June 2010, the President signed a memorandum calling for the NTIA, in collaboration with the FCC, to make 500 MHZ of spectrum available for fixed and mobile wireless broadband in the next ten years. The purpose of this plan is to improve America's economic competiveness, create jobs, and help maintain America's leadership role in technological innovation. This

report outlines the plans and milestones to achieve the 500 MHZ repurposing goal.

In general, the plan directed the Department of Commerce, through the NTIA, to complete a plan and timetable for making available 500 MHz over 10 years suitable for wireless broadband.

ISSUE LI-2	***Shared Use of Civilian Airports.*** The lack of formal agreements for military use of regional airports could result in reduced capacity for the Navy's use of these airfields.

Naval air facilities often use nearby private airfields for various purposes. At times these military uses can even constitute the "primary" use of the private facility, in terms of flight operations, square footage of a buildings area or other metrics. While these operations can create potential compatibility issues with surrounding land uses, they are also a source of significant revenue for the private facility and surrounding communities. In addition, private facilities can often "share" in the benefits of regulatory or other relief that would not otherwise be possible, absent the military use.

The lack of formal agreements and detailed economic impact assessments for military use of these regional airports could result in reduced capacity for the Navy's use of these airfields and a potential loss of revenue for these airfields. For more information, please see Issue COM-4.

ISSUE LI-3	***Renewable Energy Mandates.*** Maryland's goal of attaining 20 percent of its energy needs from renewable sources and the related promotion of wind powered turbines has the potential to create a variety of substantive conflicts

Both Maryland and Virginia are pursuing renewable energy options. Virginia's approach is voluntary and focuses on promotion, education, technology and facilitation. Maryland's approach includes all of these activities, but coupled with legal mandates. In addition, unlike Virginia, Maryland has elevated energy policy and made it a foundational element of its Renewable Energy Portfolio Standard. The distinctions between the two approaches are important in terms of how the issue is evaluated for purposes of compatibility.

With regard to Virginia, in addition to its more voluntary approach, Virginia has adopted statutory language that requires local land use agencies to consider the impacts of certain local actions (planning and development permitting) on proximal military facilities. This mandate would certainly apply to any such actions involving the siting of on shore wind energy turbine towers (for instance).

In contrast, the State of Maryland has aggressively pursued diversification of its energy portfolio, including leveraging marginal wind energy assets located in proximity to NAS PAX. These efforts not only seek to implement Federal and Maryland energy policy, but are also seen as a potential source of limited new employment in these relatively rural areas.

Promoting sustainability is a principle element of Maryland's governmental plans and state agency operations. Maryland has strong support at the federal level for promoting "green" energy, smart growth, and other complimentary policies and practices. Where applicable, these have also been incorporated in to regional and local plans, policies and practices. For example, farmland preservation is a major component of the state plan and many regional and county plans. Wind energy turbine leases are seen as a potential alternative income source for rural farmers.

However, what is being championed as a potential source of new jobs could actually be a threat to the area's largest current employer, NAS PAX. As a Naval flight operations and testing facility, NAS PAX relies heavily on the unencumbered use of airspace and telemetry to carry out its core mission. Uses or structures that interfere with these critical resources not only impact operations but can put lives and property at risk.

In 2012 a bill was signed into law by the Maryland Governor to create a special "zone" surrounding NAS PAX, within which certain wind based turbine systems would require a Certificate of Public Convenience and Necessity from the State's Public Service Commission.

A recently proposed moratorium bill passed the Maryland House (HB 1168) by a 112-22 vote in early 2014 and was then vetoed by the state government. The bill was intended to allow time for the Massachusetts Institute of Technology to complete a study of turbines on NAS PAX radar systems.

Light and Glare

This factor refers to man-made lighting (street lights, airfield lighting, building lights) and glare (direct or reflected light) that disrupts vision. Light sources from commercial, industrial, recreational, and residential uses at night can cause excessive glare and illumination, impacting the use of military night vision devices and air operations. Conversely, high intensity light sources generated from a military area (such as ramp lighting) may have a negative impact on the adjacent community.

Technical Background

Technology evolution and innovation has made it possible for warfare to excel at night. Night vision devices and other special tactical procedures are deployed to enable strategic nighttime warfare. Thus, nighttime warfare enables the military to execute a multi-faceted offensive strategy under the cover of darkness. To be successful in combat, the military must train under conditions and environments similar to what is found in combat theaters. Night vision devices allow military personnel to train in near-daylight conditions during nighttime hours.

Under dark sky conditions, the use of night vision goggles (NVG) allows military personnel to view objects up to a distance of nearly 1,000 feet (300 meters); however, light sources located outside of an installation can decrease the NVG effectiveness to a distance of more than 150 feet (50 meters). Lighting located outside of an installation can decrease NVG effectiveness to a distance of 164 feet (50 meters). Street lights or other elevated structures that are lit at night produce a halo effect around objects, which reduces visibility and resolution for air and ground personnel. The amount of ambient light experienced on the ground is a function of the following:

- intensity of nearby light sources (up to 20 miles away);
- distance from the sources;
- spectra of the light sources (blue light decays faster in the atmosphere);
- density of the cloud deck;
- height of the cloud; and
- relative humidity.

In measuring light pollution, the proximity to a community has a significant effect on the amount of light pollution that saturates the sky. Proximity twice as close to a community makes its sky glow appear approximately six times brighter.

Sky glow from communities typically diminishes in the later hours of the night when businesses close and some lights are turned off. As development continues to progress outward from a community, the area and amount of light pollution can increase. Increased light pollution can cause an increase in the amount of sky glow and ultimately create compatibility issues with military missions.

The impacts of the use of outdoor lighting on the dark skies over military installations are primarily determined by two principal factors – the amount of developed land (density) and the distance of the developed land from the installation. The relationship between density and distance is best demonstrated using an estimate of urban sky glow called Walker's Law. This formula was developed based on measurements of sky glow for a number of cities in California and used to estimate sky glow at an observing site looking at a zenith angle of 45 degrees toward an urban source:

I=C x P x R(n)

Where:

I = Percent increase of the night sky brightness above the natural background, at 45°down from directly overhead (facing the community, directly overhead is roughly ¼ of this value),

P = Population of the community,

R = Distance, in kilometers, from the observing site to the center of the community,

"C" = 0.01 for "R" values between 10 and 50 km, and

"n" = 2.5 for "R" values between 10 and 50 km

According to the National Oceanic and Atmospheric Administration (NOAA), the assumed radius of a community is a function of its population, ranging from 2.5 km to 24 km. Walker's law applies if the installation is outside the city radius. If located inside the community radius, the sky glow increases in a linear manner toward the center by an additional factor of 2.5.

The following scenarios illustrate the application of Walker's Law:

Scenario 1: A 100-acre development located two km from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by over 260 percent (nearly 663 percent with NOAA factor).

Scenario 2: A 100-acre development located 20 kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by approximately less than 1 percent (just over two percent with NOAA factor).

If the density was decreased to one unit per acre the resulting scenarios would result in the following increased sky glow:

Scenario 1: Approximately 44 percent (almost 111 percent with NOAA factor).

Scenario 2: Approximately less than 1 percent (still less than one percent with NOAA factor).

In general, the following trends can be concluded:

- The more dense the urban development, the greater the potential for light intrusion.
- The closer development is to the installation, the greater the potential for light intrusion.

Source: National Oceanic and Atmospheric Administration

It is important to note, while there is no NVG testing or development done at NAS PAX, testing for integration to platforms and pilot proficiencies within the ATR Inner Test Range sporadically take place.

Compatibility Assessment

ISSUE LG-1	***Light and Glare from Community Development.*** Lighting controls and standards are not codified by all jurisdictions in the region. Existing standards do not address compatibility with night operations that require Dark Sky conditions.

Night testing and training is an essential element of the military testing and training mission conducted at regional airports within the JLUS Study Area, including NAS PAX that conducts testing for integration to platforms and pilot proficiencies. Pilots conduct realistic night flight scenarios including field carrier landing practice, night precision runway approaches and landings, and low-visibility operational testing at airfields throughout the region. Though the frequency of these night testing and training activities is variable, ranging from a few times per year at NAS PAX and daily operations at Salisbury Ocean City Wicomico (SBY) Airport by the Maryland Air National Guard, night lighting associated with development impacts the effectiveness and ability to successfully conduct nighttime air missions.

Light pollution, the upward and outward distribution of light, either directly from fixtures, or from reflection off the ground or other surfaces can interfere with military installation mission activities such as night time

training activities, low level flight operations and training, aviator's vision (causing pilot confusion with landing approach flight patterns or with night vision instrumentation or equipment).

Street lights, building lights, and light associated with uses such as retail, commercial, outdoor storage, and outdoor sports fields may be contributors to light pollution if not properly regulated through either design standards or specifications on types of lighting permitted. Commercial and retail developments often require the most outdoor lighting of any urban land use due to the nature of the businesses and associated parking areas.

Commercial and retail development, particularly along thoroughfares and where there are aggregations of vehicles such as automobile sales dealerships and outdoor storage areas, can also cause unnecessary glare and affect pilot vision of pilots throughout the JLUS Study Area.

Unfortunately, not all jurisdictions within the Study Area codify lighting controls and standards. This lack of coordination can prove detrimental to NAS PAX operations because of the challenges associated with the failure to provide a consistency in regulation. Ensuring that all jurisdictions regulate lighting controls will provide increased compatibility between future community development and Navy development.

Existing Tools

Calvert County Zoning Ordinance

The Calvert County, Maryland outdoor lighting standards are codified in Article 6-6 of the Zoning Ordinance. Relevant purposes of the outdoor lighting regulations include the following:

- Providing lighting in outdoor public places where public health, safety and welfare are potential issues.
- Protecting drivers and pedestrians from the glare of non-vehicular light sources that shine into their eyes and thereby impair safe traverse.
- Protecting neighbors and the night sky from nuisance glare and stray light from poorly shielded, aimed, placed, applied, or maintained light sources.

The regulations address these purposes through specifications for lighting fixture design:

- For lighting horizontal tasks, such as roadways, sidewalks, paths, entrances, and parking areas, fixtures shall be aimed straight down, shall have flat lenses, and shall meet Illuminating Engineering Society of North America (IESNA) full cutoff criteria, or shall meet the design standards of the Town Center Zoning Ordinances.
- The use of floodlighting, spotlighting, wall-mounted fixtures, internally illuminated decorative globes and spheres and other fixtures not meeting IESNA full-cutoff criteria, shall be permitted only with the approval of the Planning Commission or its designee, on a case-by-case basis, based upon achievement of the purpose of the Outdoor Lighting Regulations stated in Section 6-6.01.A.1.a through e. Glare control may include, but is not limited to, refractive globes and internal cutoff refractors.
- Fixtures shall be equipped with light directing and/or shielding devices such as shields, visors, skirts or hoods to redirect offending light distribution and/or to reduce direct or reflected glare.

These regulations provide unification of lighting and fixture design throughout the county. Having compatibility within the county provides a preferable tool to ensure coordination with operations at NAS PAX.

Charles County Zoning Ordinance

The Charles County, Maryland lighting standards are codified in Section 297-306 of the Zoning Ordinance and state: "Site lighting shall be of low intensity from a concealed source, shall be of a clear white light which does not distort colors and shall not spill over into adjoining properties, buffers, roadways, or in any way interfere with the vision of oncoming motorists." This section does not apply to public street lighting.

However, the County permits both non-cut-off lighting and total cut-off lighting for all uses with the exception of street lighting and outdoor recreation uses.

Street lighting standards are included in Section 96 of the Subdivision Regulations and include requirements for the placement of streetlights. However, there are no provisions or specifications for the light fixtures

that can result in lighting that is not shielded to protect mission-critical aviation activities.

Outdoor recreational uses have a separate standard:

- Lighting for outdoor recreation uses may exceed a total cutoff angle of 90 degrees provided that the luminaire is shielded in either its orientation or by a landscaped buffer yard to prevent light and glare spill-over to adjacent residential property.

Overall, these standards provide limited protection for aviation activities from NAS PAX.

St Mary's County Comprehensive Zoning Code

The St. Mary's County, Maryland lighting standards are codified in Section 61.3 of the Comprehensive Zoning Code. The most relevant design standards for lighting consist of the following:

- Lighting roadways, sidewalks, paths, entrances, and parking areas fixtures shall be aimed straight down.
- Fixtures shall be equipped with light directing and or shielding devices such as shields, visors, skirts, or hoods to redirect offending light distribution and/or to reduce direct or reflected glare.
- Light sources must be concealed or shielded to the maximum extent feasible to minimize the potential for glare and unnecessary diffusion of adjacent properties and to eliminate to the maximum extent possible illumination of the night sky.
- Lighting systems should include timing devices to turn off unneeded lighting when the project is not in use.

These standards protect the night sky over St. Mary's County. Requiring shielded lighting and aiming light fixtures straight down, reduces incompatibility with NAS PAX aviation missions.

Northumberland County Zoning Regulations

The Northumberland County, Virginia outdoor lighting is codified in Section 148-144 of the Zoning Regulations. The regulations apply to all exterior lighting sources, including but not limited to lighting for parking, access drives, and walkways, gasoline canopy lighting, and internally and externally illuminated signs, including the following standards:

- All lighting shall be designed, located, fully shielded, and arranged so as not to direct glare on adjoining streets or properties. For Zoning Districts C-1, A-1 and all residential districts, the intensity at adjoining streets or residential properties shall not exceed 5.38 lux. For Zoning Districts B-1 and M-1, the intensity at adjoining streets or properties shall not exceed 16.15 lux. If the intensity on adjoining property lines does not exceed the lux previously mentioned, then lighting does not need to be shielded.
- Excepted from these requirements are roadway and airport lighting, lighting activated by motion-sensor devices, temporary circus, fair, carnival, or civic uses, construction or emergency lighting, temporary lighting, and lighting associated with agricultural pursuits. For the purpose of this chapter, a "fully shielded fixture" shall be defined as an outdoor lighting fixture that is shielded or constructed so that all light emitted is projected below a horizontal plane running through the lowest part of the fixture.

These regulations provide limited protection for aviation-related missions associated with NAS PAX excluding temporary uses which are more difficult to coordinate with the military.

Westmoreland County Zoning Ordinance

Westmoreland County, Virginia only regulates outdoor lighting as it relates to industrial uses in the Industrial General (IG) and Industrial Planned Unit Development District (IPUD) Zoning Districts.
Section 2-9.5.10 of the Zoning Ordinance states that for industrial uses in the IG District, "All lighting shall be diffused, down-cast, or hooded so as not to spread to adjacent properties."

Outdoor lighting standards for the Industrial Planned Unit Development District (IPUD) are included in Section 2-24.12.5 which states, "At no point on the boundary line of an individual lot or parcel or beyond shall glare nor light pollution resulting from any use, operation, or activity exceed 50 foot lamberts during daylight hours, nor exceed 20 foot lamberts during non-daylight hours."

There are no lighting standards for other uses and there are no overall design standards for lighting in the Zoning Ordinance. Westmoreland County's lack of extensive lighting control could lead to planning incompatibility with aviation missions at NAS PAX.

Noise

Sound is the mechanical energy transmitted by pressure waves in a compressible medium such as air. More simply stated, sound is what we hear. As sounds reach unwanted levels, this is referred to as noise.

The central issue of noise is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a significant impact on human activity, health, and safety.

Vibration is the oscillation or motion that alternates in opposite directions and may occur as a result of an impact, explosion, noise, mechanical operation, or other change in the environment and is expressed as a pressure wave when impacting a solid surface. There are two types of vibration associated with these types of sources. **Ground-borne vibration** travels through the ground and is more likely to cause structural shaking. **Airborne vibration** refers to vibration patterns that travel and are felt through the air. These vibrations travel further, have a stronger "feel" at greater distances than ground-borne vibration and their propagation is influenced by environmental factors including topography and atmospheric conditions such as wind speed and direction, humidity levels, and temperature.

The type of vibration that is generally felt in areas surrounding NAS PAX is airborne vibration. Although the majority of studies conducted on airborne vibration use sonic booms as the source of data, vibrations from the firing of ballistics and their associated impacts can produce a similar vibration effect. Vibrations can cause structural shaking and rattling of windows that can annoy or concern property owners and, in some cases, cause structural damage. Vibrations from low frequency pressure waves can also have an adverse impact on people.

Technical Background

Due to the technical nature of this resource topic and its importance to the JLUS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts. The following key terms are used to describe noise.

Ambient Noise. The total noise associated with an existing environment, which usually comprises sounds from many sources, both near and far.

Attenuation. Reduction in the level of sound resulting from absorption by the surrounding topography, the atmosphere, distance from the source, barriers, construction techniques and materials, and other factors.

A-Weighted Decibel (dBA). The dBA is the most commonly weighted sound filter used to measure perceived loudness versus actual sound intensity. The human ear responds differently to frequencies. For example, the human hearing system perceives mid-frequency sounds as louder than low and high frequency sounds. To accommodate this condition when measuring sound levels, filters need to be installed into sound meters. The results are a more accurate measurement of sound for the human hearing system.

Day-Night Average Sound Level (DNL). An average sound exposure over a 24-hour period. During the nighttime period (10:00 p.m. to 7:00 a.m.), averages are artificially increased by 10 (decibel) dB. This weighting reflects the added intrusiveness and the greater disturbance potential of nighttime noise events attributable to the fact that community background noise typically decreases by 10 dB at night.

Onset-Rate Adjusted Day-Night Average Sound Level (Ldnmr). The DNL metric adjusted to account for the "surprise" or "startle" effect of the onset-rate of aircraft noise on humans. Because military aircraft frequently operate in a sporadic fashion in designated low-altitude airspace and because of the sporadic occurrences of aircraft events, the number of average daily operations is determined from the number of flying days in the calendar month with the highest number of operations in the airspace of interest. This metric is designated as Ldnmr. It also includes weighting for nighttime operations.

Noise Contours. Connecting points of equal noise exposure. Typically expressed in five dBA increments (i.e., 60, 65, 70, 75, etc.).

The Chief of Navy Operations Instruction (OPNAVINST) 11010.36C defines noise zones based on noise contours: uses experiencing less than 64 dB DNL are classified as Zone I, uses experiencing between 65 dB and 74 dB DNL are classified as Noise Zone II, and uses experiencing greater than 75 dB DNL are classified as Noise Zone III.

Sensitive Receptors. Locations and uses typically more sensitive to noise, including residential areas, hospitals, convalescent homes, and facilities, schools, and other similar land uses.

Characteristics of Sound

It is important to understand that there is no single perfect way of measuring sound, due to variations used by different entities when conducting sound studies or sound modeling. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The dB scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale (i.e., dB scale) is used to present sound intensity levels in a convenient format.

Since the human ear is not equally sensitive to all frequencies within the entire spectrum, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called "A-weighting" written as dBA. In this document, all sound or noise levels are measured in A-weighted decibels (dBA), which are units of sound pressure adjusted to the range of human hearing with intensity greater than the ambient or background sound pressure. The threshold of human hearing is approximately 0 dBA and normal speech has a sound level of approximately 60 dBA. Sound levels above 120 dBA are typically when discomfort begins to be felt inside the human ear, and sound levels between 130 to 140 dBA and above are felt as pain and may cause permanent damage to the ear.

The human ear can detect changes in sound levels of approximately three dBA under normal conditions. Changes of one to three dBA are typically noticeable under controlled conditions, while changes of less than 1 dBA are only discernible under controlled, extremely quiet conditions. A change of 5 dBA is typically noticeable to the general public in an outdoor environment. Figure 5-2 summarizes typical A-weighted sound levels for a range of indoor and outdoor activities.

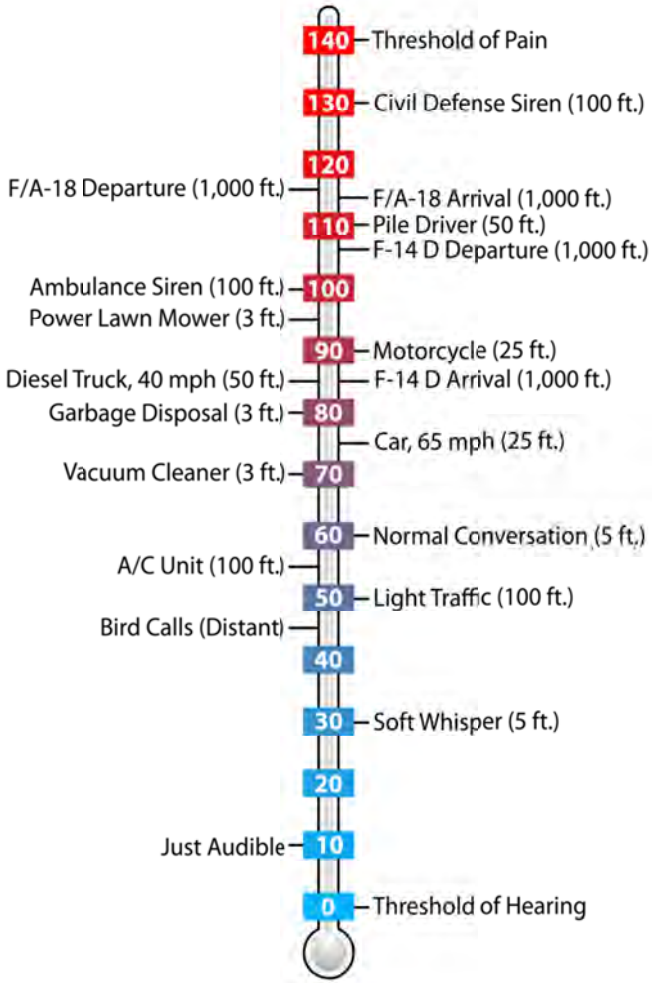


Figure 5-2. Sound Levels Comparison in dB

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be substantial. These fluctuations include regular and random patterns, how fast the noise fluctuates, and the amount of variation. Weather patterns can have a strong effect on how far sound travels and how loud it is. Certain weather events can change the consistency of the air and either cause sound to travel further and be louder or can reduce the distance at which it can be heard. Temperature and wind velocity are examples of factors that can affect sound travel. Sound tends to travel further in cold temperatures. Specific combinations of temperature and wind direction can create atmospheric refraction, which is when atmospheric conditions bend and/or focus sound waves towards some areas and away from others. When describing noise impacts, it is common to look at the average noise over an average day.

According to the DOD and the FAA, [Airport Noise Compatibility Planning (14 CFR Part 150)] 65 DNL is defined as the threshold for significant noise exposure. Noise exposure within the 55 to 65 DNL noise contours is regarded as moderate and land use controls such as the regulation of types of land uses permitted or the potential use of sound attenuation in buildings should be considered. Federal guidelines have been adopted to guide appropriate development and land use planning for noise contours greater than 65 DNL, and noise sensitive uses such as residential and schools should not be built under these areas without proper sound mitigation. It should be noted that the DNL contours represent an average sound level over a 24-hour period and that individual instances may be louder than the noise contour in which they are located. In addition, noise may still cause an annoyance if it is below 65 DNL.

It is important to recognize that noise contours as depicted on maps are intended as a planning tool and do not represent a clear change in noise threshold at each contour. Changes in noise levels may not be perceptible several hundred feet to either side of a particular contour line and can vary with temperature, humidity, wind, and other environmental factors.

Compatibility Assessment

ISSUE NO-1	***Lack of Community Noise Regulations Surrounding Airfields.*** Standards to address noise impacts from military operations near airfields do not exist in most jurisdictions. The standards that do exist require an update to noise standards in accordance with current noise level contour maps.

Noise from military operations can generate impacts on surrounding communities. Flight operations associated with NAS PAX can impact areas immediately surrounding the airfields from flight approach and departure activities at both NAS PAX Main Station and Webster Field, and are conducted by rotary-wing (helicopter), fixed-wing, tilt-rotor, and unmanned aerial system (UAS) aircraft.

According to the 2009 Air Installation Compatible Use Zones Study for the NAS PAX Main Station, Noise Zone III contours are entirely within the Main Station boundary or over the Chesapeake Bay. Noise Zone II contours extend off-installation to the southwest across State Route (SR) 235 and directly south of the installation into a residential neighborhood in Lexington Park, St. Mary's County. The tips of Solomon's Town Center and Drum Point subdivision in Calvert County are also within the Noise Zone II contours. Noise Zone I extends over areas of Lexington Park, portions of the coastline of St. Mary's County along the Patuxent River northwest of NAS PAX Main Station, and portions of the Chesapeake Ranch Estates subdivision in Calvert County. The zoning for these areas within St. Mary's and Calvert Counties in the noise zones is provided in Table 5-2a and Table 5-2b and illustrated on Figure 5-3. The table includes an assessment of compatibility for each zoning district by use as recommended by OPNAVINST 11010.36C.

Table 5-2a. Zoning Compatibility in St Mary's County Noise Zones Surrounding NAS PAX Main Station Part I

Zoning District	Commercial Marine (CM)	Corridor Mixed Use (CMX	Downtown Mixed-Use Care (DMX)			Residential Mixed Use (RMX)			Industrial (I)		
Noise Zone Noise Contours (dBA DNL)	I 60-64	I 60-64	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74
Residential Uses											
Bed and Breakfast/Hotel	COND[3]	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS
Dwelling Unit, Attached	N/A	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A
Dwelling Unit, Detached	COND[3]	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A
Dwelling Unit, Multifamily	N/A	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A
Group Home	COND[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Institutional Residences	N/A	N/A	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A
Mobile Homes/Park	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transient Residences	N/A	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A
Cultural, Entertainment and Recreational Uses											
Campground	COND[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clubs and Lodges	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	N/A	N/A	N/A
Conference Facility	COND[3]	N/A	N/A	COND[2]	COND[2]/DIS	N/A	COND[2]	COND[2]/DIS	N/A	N/A	N/A
Cultural Institutions	COND[3]	N/A	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	COND[2]	COND[1]	COND[1]
Equestrian Facility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Golf Course	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Public Recreation	COND[3]	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]
Recreation Facility	N/A	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]
Religious Assembly	N/A	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	N/A	N/A	N/A
Temporary Events, Indoor/Outdoor	COND[3]	COND[3]	COND[3]	COND[1]	COND[1]	COND[3]	COND[1]	COND[1]	COND[3]	COND[1]	COND[1]
Commercial, Office, Services Uses											
Adult Entertainment	N/A	N/A	COND[3]	COND[3]	COND[1]	N/A	N/A	N/A	N/A	N/A	N/A
Agritourism	N/A	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]
Animal Hospital/Sales/Service	N/A	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]
Burial Grounds	N/A	N/A	N/A	COND[5]	COND[5]	N/A	COND[5]	COND[5]	N/A	COND[5]	COND[5]

Zoning District	Commercial Marine (CM)	Corridor Mixed Use (CMX	Downtown Mixed-Use Care (DMX)			Residential Mixed Use (RMX)			Industrial (I)		
Noise Zone Noise Contours (dBA DNL)	I 60-64	I 60-64	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74
Daycare	N/A	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	COND[2]	COND[1]	COND[1]
Education Facility, College/School	N/A	N/A	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	COND[2]	COND[1]	COND[1]
Financial Institutions	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Funeral Services	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	N/A
Government Facility	COND[3]	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]
Hospital	N/A	N/A	COND[2]	COND[1]	COND[1]	N/A	N/A	N/A	N/A	N/A	N/A
Long-Term Care Facility	N/A	N/A	N/A	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A	N/A	N/A	N/A
Medical Facility/Outpatient	N/A	COND[3]	COND[2]	COND[1]	COND[1]	COND[2]	COND[1]	COND[1]	COND[2]	COND[1]	COND[1]
Personal Service	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	N/A
Office	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Restaurant/Tavern	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Retail	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Manufacturing Uses											
Industrial Production	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]	COND[5]
Laboratory	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Maintenance and Repair	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	N/A
Research and Development	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	COND[1]	N/A	N/A	COND[1]
Seafood Industry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Warehousing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]	COND[5]
Transportation, Communication, and Utility Uses											
Freight Terminal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]	COND[5]
Marine Terminal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]	COND[5]
Passenger Terminal	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	N/A	N/A	COND[5]	COND[5]
Resource Production and Extraction Uses											
Agriculture Industry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[4]	COND[4]
Crop Production	N/A	N/A	N/A	COND[4]	COND[4]	N/A	COND[4]	COND[4]	N/A	COND[4]	COND[4]
Silviculture	N/A	N/A	N/A	COND[4]	COND[4]	N/A	COND[4]	COND[4]	N/A	COND[4]	COND[4]

Table 5-2a. Zoning Compatibility in St Mary's County Noise Zones Surrounding NAS PAX Main Station Part II

Zoning District Noise Zone Noise Contours (dBA DNL)	Residential High Density (RH)			Residential Low Density (RL)			Residential Low Density – Transitional (RL)	Residential Neighborhood Conservation (RNC)			Rural Preservation District (RPD)	Office and Business Park – Zone I (OBP)
	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64
Residential Uses												
Bed and Breakfast/Hotel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]
Dwelling Unit, Attached	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	N/A	N/A	N/A	COND[3]	N/A
Dwelling Unit, Detached	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	N/A
Dwelling Unit, Multifamily	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A	N/A	N/A	N/A
Group Home	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Institutional Residences	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	N/A	N/A	N/A	COND[3]	N/A
Mobile Homes/Park	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	N/A
Transient Residences	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	COND[2]	COND[1]/DIS	COND[1]/DIS	COND[3]	N/A
Cultural, Entertainment and Recreational Uses												
Campground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A
Clubs and Lodges	N/A	N/A	N/A	COND[2]	COND[1]	COND[1]	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	N/A
Conference Facility	N/A	N/A	N/A	N/A	COND[2]	COND[2]/DIS	COND[3]	N/A	N/A	N/A	COND[3]	N/A
Cultural Institutions	COND[2]	COND[1]	COND[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[3]
Equestrian Facility	N/A	N/A	N/A	COND[3]	COND[3]	COND[1]	COND[3]	N/A	N/A	N/A	COND[3]	N/A
Golf Course	N/A	N/A	N/A	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]
Public Recreation	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]
Recreation Facility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]
Religious Assembly	COND[2]	COND[1]	COND[1]	COND[2]	COND[1]	COND[1]	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	N/A
Temporary Events, Indoor/Outdoor	COND[3]	COND[1]	COND[1]	COND[3]	COND[1]	COND[1]	COND[3]	COND[3]	COND[1]	COND[1]	COND[3]	COND[3]

Zoning District Noise Zone Noise Contours (dBA DNL)	Residential High Density (RH)			Residential Low Density (RL)			Residential Low Density – Transitional (RL)	Residential Neighborhood Conservation (RNC)			Rural Preservation District (RPD)	Office and Business Park – Zone I (OBP)
	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64
Commercial, Office, Services Uses												
Adult Entertainment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Agritourism	N/A	N/A	N/A	COND[3]	COND[3]	COND[1]	COND[3]	N/A	N/A	N/A	COND[3]	COND[3]
Animal Hospital/Sales/ Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Burial Grounds	N/A	COND[5]	COND[5]	N/A	COND[5]	COND[5]	N/A	N/A	COND[5]	COND[5]	COND	N/A
Daycare	COND[2]	COND[1]	COND[1]	COND[2]	COND[1]	COND[1]	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]
Education Facility, College/School	COND[2]	COND[1]	COND[1]	COND[2]	COND[1]	COND[1]	COND[3]	COND[2]	COND[1]	COND[1]	COND[3]	COND[3]
Financial Institutions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Funeral Services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Government Facility	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]	COND[3]	COND[1]	COND[3]	COND[3]
Hospital	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Long-Term Care Facility	N/A	COND[1]/DIS	COND[1]/DIS	N/A	COND[1]/DIS	COND[1]/DIS	N/A	N/A	N/A	N/A	N/A	N/A
Medical Facility/Outpatient	N/A	N/A	N/A	COND[2]	COND[1]	COND[1]	COND[3]	N/A	N/A	N/A	N/A	COND[3]
Personal Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Office	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Restaurant/Tavern	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Retail	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manufacturing Uses												
Industrial Production	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maintenance and Repair	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Research and Development	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Zoning District Noise Zone Noise Contours (dBA DNL)	Residential High Density (RH)			Residential Low Density (RL)			Residential Low Density – Transitional (RL)	Residential Neighborhood Conservation (RNC)			Rural Preservation District (RPD)	Office and Business Park – Zone I (OBP)
	I 60-64	II 65-69	II 70-74	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64	II 65-69	II 70-74	I 60-64	I 60-64
Seafood Industry	N/A	N/A	N/A	N/A	N/A	COND[1]	N/A	N/A	N/A	COND[1]	N/A	N/A
Warehousing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation, Communication, and Utility Uses												
Freight Terminal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marine Terminal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Passenger Terminal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resource Production and Extraction Uses												
Agriculture Industry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crop Production	N/A	N/A	N/A	N/A	COND[4]	COND[4]	N/A	N/A	COND[4]	COND[4]	N/A	N/A
Silviculture	N/A	COND[5]	N/A	N/A	COND[5]	COND[5]	N/A	N/A	COND[5]	COND[5]	N/A	N/A

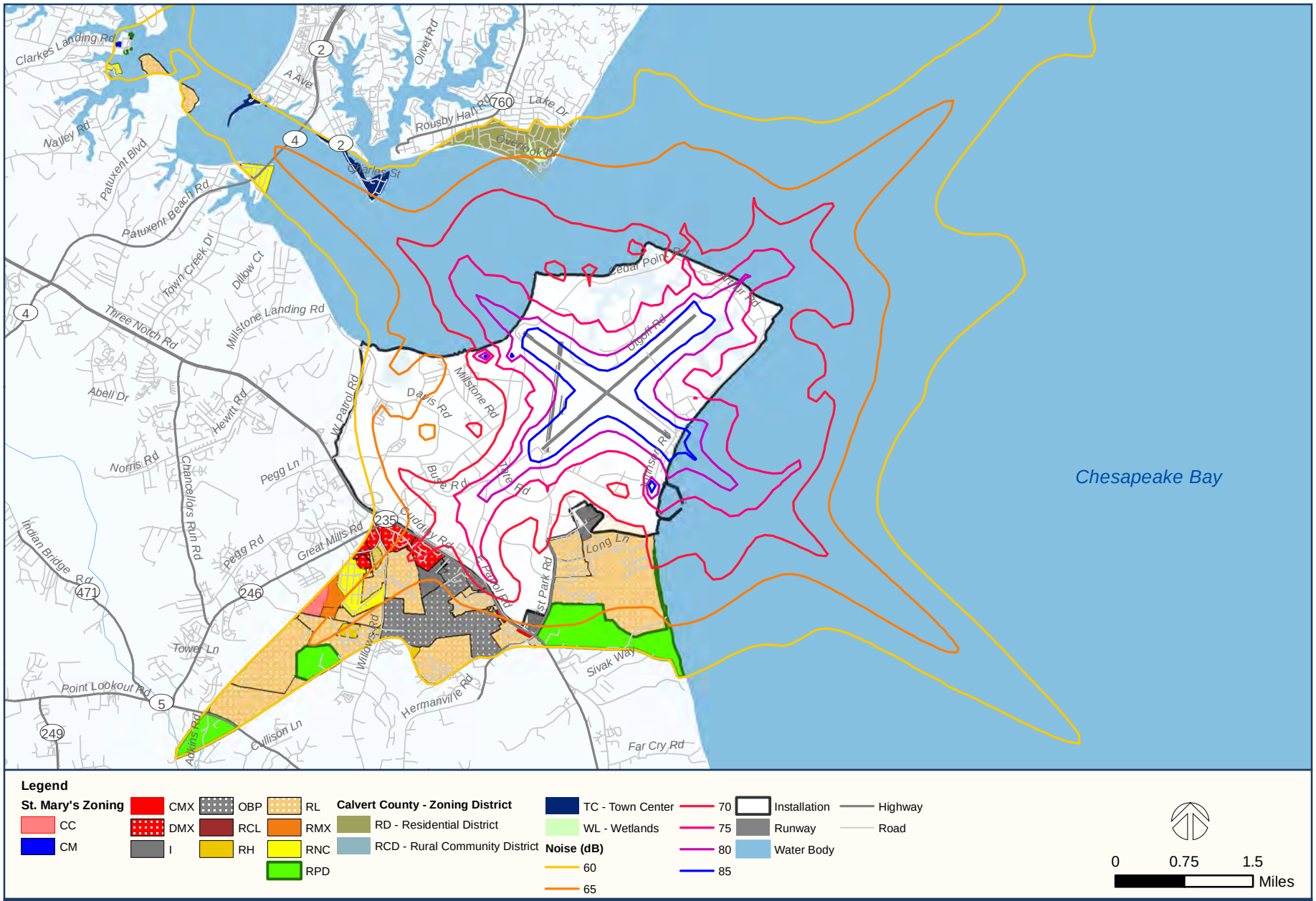
COND indicates use conditional compatibility
DISC indicates use is discouraged
N/A indicates the use is does not exist within this noise zone.
1- Providing a Noise Level Reduction (NLR) of 25-30 dB is achieved.
2- If sound attenuation measures are integrated into the construction.
3- If sound attenuation measures are integrated into the construction of Habitable structures.
4- If NLR of 25-30 Db IS achieved for associated residential structures.
5- If NLR of 25 is achieved in public spaces, offices, and noise sensitive areas.

Table 5-2b. Zoning Compatibility in Calvert County Noise Zones Surrounding NAS PAX Main Station

Zoning District Noise Zone Noise Contours (dBA DNL)	Solomons Town Center (B1)	Agricultural Preservation District (C5)		Form Based Code (C1)	Mixed Use (C3, C4)	Mixed Use Marinas (C7)	Mixed Use (B2, B3, B4)	Rural Community District (RCD)	Residential District (RD)		
	II 65-69	I 60-64	II 65-69	I 60-64	I 60-64	I 60-64	I 60-64	I 60-64	I 60-64	II 65-69	II 70-74
Residential Uses											
Bed and Breakfast/Hotel	N/A	COND[2]	COND/ DISC[1]	N/A	N/A	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Dwelling Unit, Detached	COND/ DISC[1]	COND[2]	COND/ DISC[1]	COND[3]	COND[3]	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Dwelling Unit, Multifamily-Attached	N/A	COND[2]	COND/ DISC[1]	COND[3]	N/A	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Liveaboards	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A	N/A	N/A
Manufactured Homes	COND/ DISC[1]	COND[2]	COND/ DISC[1]	N/A	COND[3]	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Assisted Living	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND/DISC[1]	COND/ DISC[1]
Transient Residences	COND/ DISC[1]	COND[2]	COND/ DISC[1]	N/A	COND[3]	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Cultural, Entertainment and Recreational Uses											
Campground	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A
Day Retreat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A
Museum/Library	N/A	COND[2]	COND[1]	N/A	COND[3]	COND[3]	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Golf Course	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[3]	COND[3]	COND[1]
Miniature Golf	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A	N/A	N/A
Government Building	N/A	COND[2]	COND[1]	N/A	COND[3]	N/A	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]
Outdoor Recreation/Park	N/A	COND[2]	COND[1]	COND[3]	N/A	N/A	COND[3]	COND[3]	COND[3]	COND[3]	COND[3]
Indoor Recreation	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[3]	N/A	N/A	N/A	N/A
Place of Worship	N/A	COND[2]	COND[1]	N/A	COND[3]	N/A	COND[3]	COND[3]	COND[2]	COND[1]	COND[1]

Zoning District Noise Zone Noise Contours (dBA DNL)	Solomons Town Center (B1)	Agricultural Preservation District (C5)		Form Based Code (C1)	Mixed Use (C3, C4)	Mixed Use Marinas (C7)	Mixed Use (B2, B3, B4)	Rural Community District (RCD)	Residential District (RD)		
	II 65-69	I 60-64	II 65-69	I 60-64	I 60-64	I 60-64	I 60-64	I 60-64	I 60-64	II 65-69	II 70-74
Brewery/Distillery/Winery	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[4]	COND[4]
Temporary Events, Outdoor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A
Commercial, Office, Services Uses											
Agritourism	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[3]	COND[3]	COND[1]
Daycare	COND[1]	COND[2]	COND[1]	N/A	N/A	N/A	COND[3]	COND[3]	N/A	COND[1]	COND[1]
Education Facility, College/School	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[2]	COND[1]	COND[1]
Commercial Trade/Business School	N/A	N/A	N/A	N/A	N/A	COND[3]	COND[3]	N/A	N/A	N/A	N/A
Banquet Hall	N/A	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	N/A	N/A	N/A
Manufacturing Uses											
Light Manufacturing/ Assembly	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]
Transportation, Communication, and Utility Uses											
Heliport	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[5]
Resource Production and Extraction Uses											
Farm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[4]	COND[4]
Greenhouse/Nursery	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	COND[1]
Ecotourism	N/A	N/A	N/A	N/A	N/A	COND[3]	N/A	COND[3]	COND[3]	COND[3]	COND[1]

Source: St Mary's County Comprehensive Zoning Ordinance, Article 5, Chapter 50; Calvert County Zoning Ordinance, Article 3; Calvert County, Article 3, Solomons Town Center Zoning Map; Calvert County, Article 3, Solomons Town Center Zoning Ordinance; NAS PAX River AICUZ 2009; OPNAVINST 11010.36C.



Legend

St. Mary's Zoning: CC, CM, CMX, DMX, I, OBP, RCL, RH, RL, RMX, RNC, RPD

Calvert County - Zoning District: RD - Residential District, RCD - Rural Community District, TC - Town Center, WL - Wetlands

Noise (dB): 60, 65, 70, 75, 80, 85

Installation, Runway, Water Body, Highway, Road

0 0.75 1.5 Miles

Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-3
Zoning in Noise Zones I and II Surrounding NAS PAX Main Station

NAS_PAX_Fig5-3_Pax_Zoning_Noise_20141211_CJM.pdf

The shoreline area of St. Mary's County, where Webster Field is located, is adjacent to the area where supersonic flight operations are conducted over the Chesapeake Bay. This area is zoned Rural Preservation District (RPD) and is intended to promote the following:

> *Foster agricultural, forestry, mineral resource extraction, and aquacultural uses and protect the land base necessary to support these activities. Low density residential development in this type of district is permitted subject to performance standards that maintain the rural character of the district in recognition of the fact that a full range of public facilities is not provided or planned. The farmer has the right to farm without being restricted by neighboring residential areas. Restricted hours of operation for farm equipment, restricted odor-producing fertilizers, or mandatory noise reductions may not be imposed on farmers in an RPD zoning district. The general intent of the district is to encourage farming without undue burden on the landowner.*

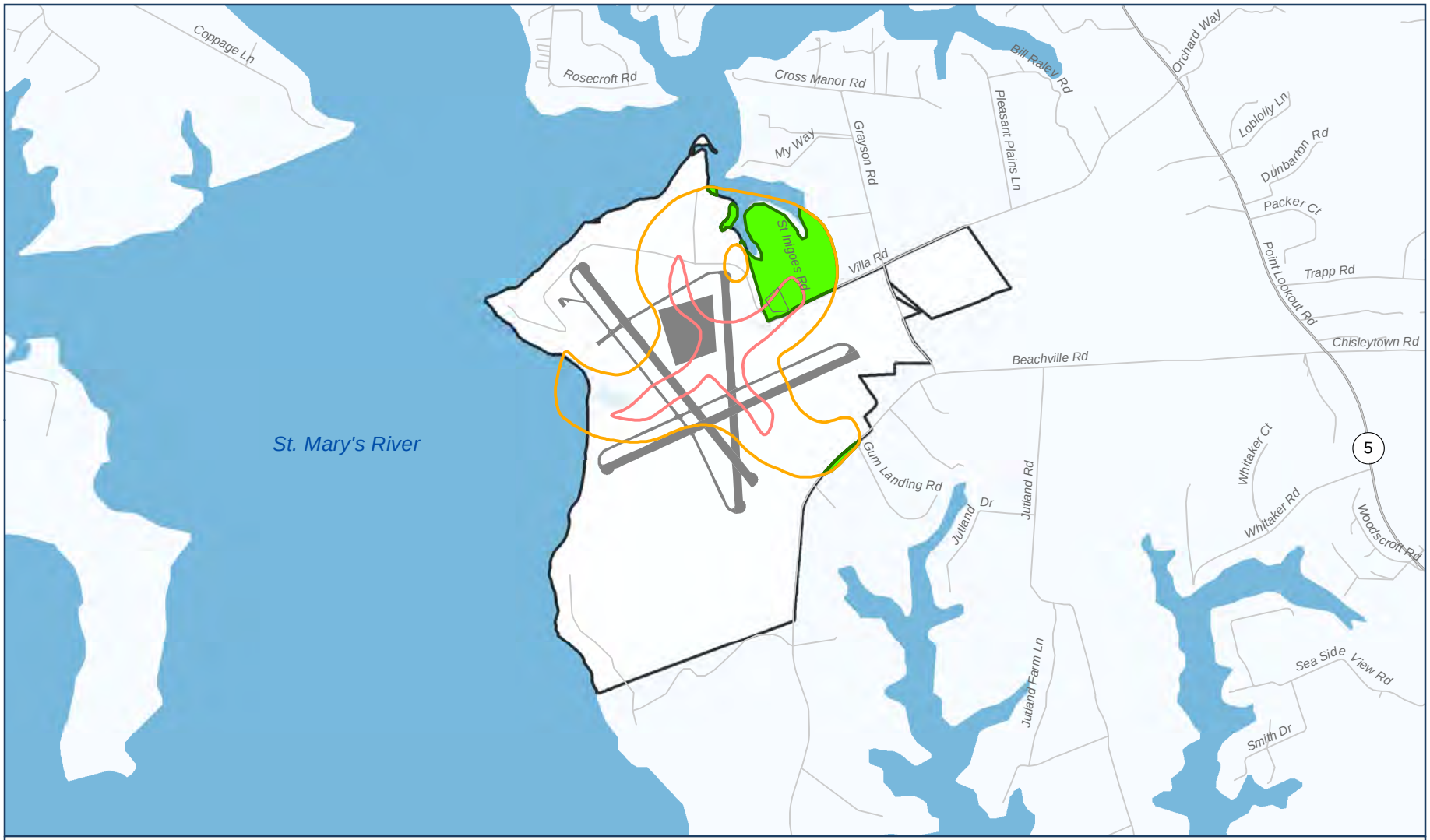
A compatibility assessment of compatible land uses within the noise contours for the RPD is provided in Table 5-3. According to the 2006 AICUZ Study for Webster Field, the noise contours are less pronounced since the primary aircraft using this facility are rotary-wing and UAS aircraft. No Noise Zone III areas have been recorded at Webster Field. A portion of Noise Zone II extends off-installation incorporating the St. Inigoes Church and several single-family residences in the St. Inigoes residential subdivision. A portion of Noise Zone I extends off-installation further into the St. Inigoes subdivision over single-family residences. The zoning for these areas is identified in Table 5-3 and illustrated on Figure 5-4. The table includes an assessment of compatibility for each zoning district by use as recommended by OPNAVINST 11010.36C.

Table 5-3. Zoning Compatibility in Noise Zones Surrounding Webster Field

Zoning District Noise Zone Noise Contours (dBA DNL)	I 60-64	II 65-69	II 70-74
Residential Uses			
Dwelling Unit, Attached	COND[2]	COND[1]/DISC	COND[1]/DISC
Dwelling Unit, Detached	COND[2]	COND[1]/DISC	COND[1]/DISC
Mobile Homes	COND[2]	COND[1]/DISC	COND[1]/DISC
Institutional Residences	COND[2]	COND[1]/DISC	COND[1]/DISC
Transient Residences	COND[2]	COND[1]/DISC	COND[1]/DISC
Cultural, Entertainment and Recreational Uses			
Campground	COND[3]	COND[3]	COND[3]
Equestrian Facility	COND[3]	COND[3]	COND[1]
Golf Course	COND[3]	COND[3]	COND[1]
Conference Facility	N/A	COND[1]	COND[1]
Government Facility	COND[3]	COND[3]	COND[1]
Public Recreation	COND[3]	COND[3]	COND[1]
Cultural Institutions	COND[2]	COND[1]	COND[1]
Religious Assembly	COND[2]	COND[1]	COND[1]
Temporary Events, Indoor/Outdoor	COND[3]	COND[1]	COND[1]
Commercial, Office, Services Uses			
Agritourism	COND[3]	COND[3]	COND[1]
Daycare	COND[2]	COND[1]	COND[1]
Animal Hospital/Sales/Service	COND[3]	COND[3]	COND[1]
Clubs and Lodges	COND[2]	COND[1]	COND[1]

COND indicates use conditional compatibility.
DISC indicates use is discouraged.
N/A indicates the use is does not exist within this noise zone.
[1] Providing a Noise Level Reduction (NLR) of 25-30 dB is achieved.
[2] If sound attenuation measures are integrated into the construction.
[3] If sound attenuation measures are integrated into the construction of habitable structures.

Source: St Mary's County Comprehensive Zoning Ordinance, Article 5, Chapter 50; NAS PAX River AICUZ 2009; OPNAVINST 11010.36C.



Legend

St. Mary's Zoning
- RPD

Noise Contour (dB)
- 60 dB
- 65 dB

- Installation
- Runway
- Water Body
- Highway
- Road

0 0.25 0.5 Mile

Matrix DESIGN GROUP

Sources:ESRI, 2010; NAS PAX, 2010

Figure 5-4
Zoning in Noise Zones I and II Surrounding Webster Field

NAS_PAX_Fig5-4_Webster_Zoning_Noise_20141211_CJM.pdf

In total, there are approximately 1,226 acres off-installation within Noise Zone II and 2,366 acres within the Noise Zone I contour surrounding NAS PAX Main Station.

There are approximately seven acres within Noise Zone II and 53 acres within the Noise Zone I contour surrounding Webster Field.

Existing Tools

NAS PAX Main Station and Webster Field Air Installation Compatible Use Zones Studies

The NAS PAX AICUZ Study (2009) and Webster Field AICUZ Study (2006) were developed by the Navy to identify compatibility guidelines for several factors around the installations, including noise. The AICUZ Studies identify areas outside of the installations where noise is heard and model various noise contours associated with typical aircraft operations. Noise is heard outside of these noise contours, but they are developed to provide a general location of where the average noise levels occur. The studies also provide compatibility guidelines for the local communities to use to determine what types of land uses and development is compatible within the different noise contours. For example, noise sensitive uses such as residential, schools, and churches are not recommended within the loudest noise contours, and may be compatible in certain noise contours if sound attenuation construction techniques or materials are used.

St. Mary's County Comprehensive Zoning Ordinance

The St. Mary's Comprehensive Zoning Ordinance contains an AICUZ Overlay district that includes a prescriptive set of compatible land uses within zoning districts and certain noise contours.

Section 40.3 of Article 4 of the zoning ordinance states that the purpose of the AICUZ Overlay is to ensure land use compatibility around federal airports in the county, including NAS PAX Main Station and Webster Field, but the zoning overlay established only includes land around NAS PAX and does not include an overlay around Webster Field. The standards and requirements are in part intended to minimize exposure to aircraft noise.

ISSUE NO-2	***Lack of Community Noise Regulations over Range Areas.*** Standards to address noise impacts from military operations within range areas do not exist in most jurisdictions. The standards that do exist require an update to noise standards in accordance with current noise level contour maps.

Flight operations associated with NAS PAX can impact areas under military training routes (MTRs) extending in and around the ATR Inner Test Range. Flight activities from NAS PAX include subsonic and supersonic flight operations.

The range areas associated with NAS PAX comprise a broad area including multiple states and several counties and communities both within and around the Chesapeake Test Range. According to the Range Air Installations Compatible Use Zones (RAICUZ) study for the ATR Inner Test Range prepared in 2009, noise is primarily generated within the range from flight operations. According to the RAICUZ, shoreline locations are most susceptible since they are closest to the Bay where testing operations often occur. Noise complaints on the Maryland Eastern Shore and Northern Neck of Virginia are frequently related to supersonic flight operations.

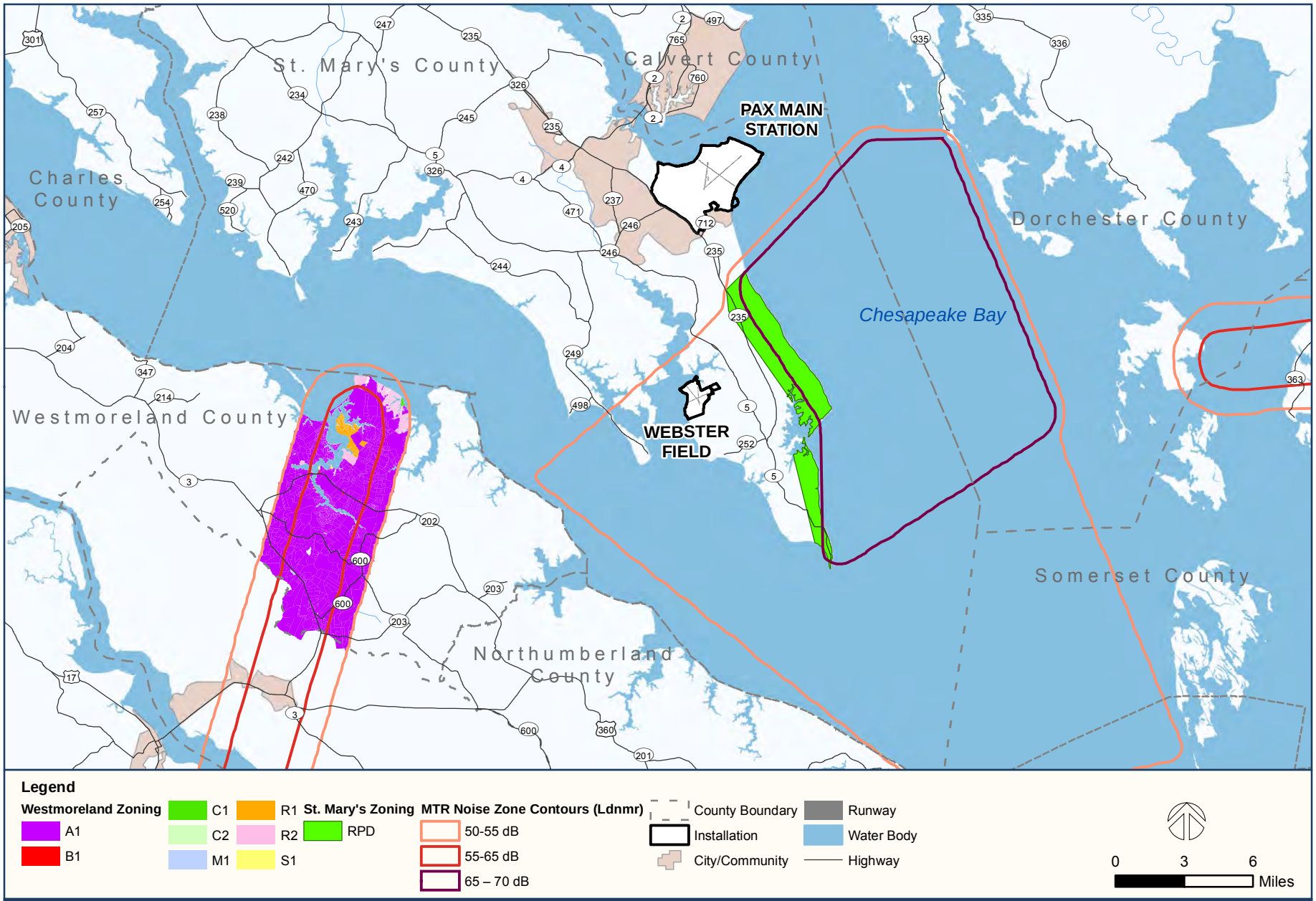
Since the contours straddle the shoreline and the magnitude of noise generated is variable depending on the position and altitude of the aircraft and environmental conditions, an assessment of appropriate land use compatibility based on noise contours is not possible. The flight operations area does not extend over land and the Navy uses predictive tools to estimate a sonic boom footprint based on existing conditions; however, there are instances when the impacts of a sonic boom experienced near or along the shoreline will be inevitable.

The MTR flight areas over Westmoreland County, VA include rural residential (Cabin Point subdivision), agricultural, forestry, and conservation uses. This MTR generates noise within the 60-64 db noise contours. Table 5-4 provides an assessment of zoning compatibility for zoning and uses within this MTR. Figure 5-5 depicts the zoning districts in Westmoreland County traversed by the MTR corridor.

Table 5-4. Zoning Compatibility in Noise Zones in Westmoreland County

Zoning District Noise Zone Noise Contours (dBA DNL)	Agricultural District (A-1) I 60-64	General Business District (B-1) I 60-64	Conservation District (C-1) I 60-64	Industrial General District (M-1) I 60-64	General Uses Residential District (R-1) I 60-64	Limited Uses Residential District (R-2) I 60-64	Seafood District (S-1) I 60-64
Residential Uses							
Bed and Breakfast/Hotel	COND[1]	COND[1]	N/A	N/A	COND[1]	N/A	N/A
Dwelling Unit, Detached	COND[1]	N/A	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Dwelling Unit, Multifamily-Attached	COND[1]	N/A	N/A	N/A	COND[1]	COND[1]	COND[1]
Tourist Homes	COND[1]	N/A	N/A	N/A	COND[1]	COND[1]	COND[1]
Dormitories	COND[1]	N/A	N/A	N/A	N/A	N/A	N/A
Boarding/Rooming Houses	COND[1]	COND[1]	N/A	N/A	COND[1]	COND[1]	COND[1]
Mobile Homes	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]
Cultural, Entertainment and Recreational Uses							
Clubs	COND[1]	COND[1]	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Museum/Library	COND[1]	COND[1]	COND[1L]	N/A	COND[1]	COND[1L]	COND[1M]
Golf Course	COND[1]	N/A	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Government Services	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]	COND[1]
Outdoor Recreation/Park/Playground	COND[1]	N/A	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Private Recreational Area	COND[1]	N/A	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Public Pools	COND[1]	COND[1]	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Churches	COND[1]	N/A	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Other Commercial Uses (Florists, Antiques, Restaurants, Other Retail and Personal Services	COND[1]	COND[1]	COND[1]	N/A	COND[1]	COND[1]	COND[1]
Commercial, Office, Services Uses							
Daycare/Child Care	COND[1]	COND[1]	N/A	N/A	COND[1]	COND[1]	COND[1]
Education Facility, College/School	COND[1]	COND[1]	N/A	N/A	COND[1]	COND[1]	COND[1]
Hospitals	COND[1]	COND[1]	N/A	N/A	N/A	N/A	N/A

COND indicates use conditional compatibility.
N/A indicates the use is does not exist within this noise zone.
[1]- If sound attenuation measures are integrated into the construction of habitable structures.
[F]- Just florists.
[L]- Just libraries
[M]- Just museums



Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-5

Zoning in Noise Zone I in MTR Over Westmoreland and St. Marys County

NAS_PAX_Fig5-5_MTR_Zoning_20141211_CJM.pdf

ISSUE NO-3	***Noise from Jet Holding Pattern.*** The jet holding pattern creates excessive levels of noise in areas where sensitive uses are located.

Jet holding patterns are required when flight arrivals are delayed due to active use of a runway. A holding pattern is a controlled predetermined flight course, oftentimes in a circular pattern, held by an aircraft at a specific location until it is cleared for landing. These patterns may extend outwards of 10 miles south of the airfield. The majority of aircraft testing at NAS PAX originates and ends at Runway 14/32 and Runway 6/24. Historic runway usage data for NAS PAX indicates that utilization has been constant over the last five years. This is important since simultaneous aircraft operations on runways 6/24 and 14/32 normally necessitates extending the aircraft pattern to the south and east of the airfield as much as three miles in order to safely sequence aircraft into the airfield. These extended patterns often occur continuously during the flying day and traverse populated areas of St. Mary's and Calvert counties. The noise associated with these holding patterns can vary depending on the type of aircraft, altitude, and environmental conditions.

Sensitive uses typically include facilities where people assemble - such as churches, schools, cultural facilities, hospitals, and all residential uses.

ISSUE NO-4	***Occasional Sonic Boom from Jets Flying Overhead.*** Sonic booms are problematic over shoreline communities. There are regular complaints called in to the NAS PAX hotline regarding sonic booms or noise from aircraft passing overhead. The Navy mitigates most noise complaints through awareness notification and testing in ways to minimize complaints; however, increased noise complaints could compromise operations through pressure to modify or discontinue specific operations. .

A sonic boom is an impulsive noise similar to thunder caused by an object moving faster than the speed of sound -- about 750 miles per hour at sea level. The sound heard on the ground as a sonic boom is the sudden onset and release of pressure after the buildup by a shock wave or "peak overpressure."

Sonic booms along Chesapeake Bay coast lines and other areas associated with NAS PAX flight operations are typically a result of weapons separation testing below FL300 within the Aerial Firing Range, and from mission essential training above FL300 within the ATR Inner Test Range; however, several supersonic flight "events" - designated flight tracks are also assigned throughout and beyond the ATR Inner Range in the Atlantic Ocean "Test Track", allowing for sonic booms to reach the eastern and western shores of the Chesapeake Bay.

According to the 2009 RAICUZ Study, a minority of the supersonic noise contours extend on land, although they do extend onto many of the shoreline areas within the Chesapeake Bay. The noise levels of these contours are not considered to require any land use controls. In addition, a majority of these areas are rural in character.

NAS PAX has been documenting and reporting received noise complaints on an annual basis for the last decade. Documenting vibration-related disturbances has been part of this reporting from the over-pressure of subsonic, supersonic, and ordnance blasting operations associated with NAS PAX activities since 2006. Important to note is the fact that not all complaints are associated with NAS PAX operations, some complaints are related to outside users of the airspace, as well as

visiting tenants to NAS PAX facilities. For the purposes of this issue analysis, only NAS PAX activity related complaints are expressed in the tables below, unless otherwise specified. For the period between 2006 and 2012, a total of 483 noise complaints were received by NAS PAX, 319 of which (or 66 percent) are attributable to NAS PAX operations, as shown in Table 5-5. Of the total complaints, 26 of these were results of vibration attributable to NAS PAX operations, accounting for roughly five percent of the total complaints. While the total number of vibration-related complaints between 2006 and 2012 was relatively low compared to the total number of noise complaints received, the incidence of vibration complaints indicates that vibration is a discrete issue from noise that has an impact on the community surrounding NAS PAX. It should also be noted that vibration is not mutually exclusive to supersonic and subsonic complaints.

Table 5-5. Subsonic and Supersonic Complaints to NAS PAX, 2006-2012

Complaint Type	2006	2007	2008	2009	2010	2011	2012	Total
All Noise Complaints	66	91	40	98	72	81	35	483
Noise Complaints Attributable to NAS PAX Operations	39	65	28	58	59	57‡	13†	319†‡
Subsonic Vibration	2	2	1†	0	1	2	1	9†
Supersonic Vibration	*	*	11	3	3	0	0	17
Total Vibration Attributable to NAS PAX Operations	2	2	12	3	4	2	1	26

† One Complaint from ordnance detonation at NAS PAX (non-aviation activity).
‡ Two complaints associated with the Giant Voice System.
** Supersonic data for these years were not collected.*

Source: NAS PAX Final Noise Summaries, 2006-2012

Sonic boom disturbances associated with NAS PAX flight operations can also create vibration issues. Supersonic operations taking place within the Atlantic Test Range restricted airspace occur at specified flight altitudes – typically above 30,000 feet, but sometimes activities such as supersonic weapons separation tests must be conducted below this altitude to satisfy test requirements. Though supersonic flight both above and below 30,000 feet can generate sonic booms and potential vibration from low frequency pressure waves, sonic booms from flight activity below 30,000 feet generally have greater impact on the land and communities below due to the closer proximity.

Based on available data, as shown in Table 5-6, there were a total of 1,330 NAS PAX supersonic events that occurred in and around the Atlantic Test Range between 2006 and 2012. During these years, 88 sonic boom complaints attributable to NAS PAX operations were received, which equates to roughly six percent of the supersonic operations resulting in PAX related noise complaints. Of the 88 complaints received that are attributable to NAS PAX operations, 18 (19 percent) were associated with flights below 30,000 feet, while 70 were (81 percent) associated with flights above 30,000 feet. Of the 319 total noise complaints between 2006 and 2012attributable to NAS PAX operations, the 88 complaints that were considered sonic boom complaints make up roughly 27 percent.

Table 5-6. Supersonic Events and Sonic Boom Complaints to NAS PAX, 2004-2012

Complaint Type	2006	2007	2008	2009	2010	2011	2012	Total
All NAS PAX Supersonic Events	166	201	238	189	188	201	147	1,330
Sonic Boom Complaint (flight above 30,000 feet) Attributable to NAS PAX Operations	15	29	7	12	3	1	3	70
Sonic Boom Complaint (flight below 30,000 feet) Attributable to NAS PAX Operations	6	5	6	1	0	0	0	18
Total Sonic Boom Complaints Attributable to NAS PAX Operations	**21**	**34**	**13**	**13**	**3**	**1**	**3**	**88**

Source: NAS PAX Final Noise Summaries, 2006-2012

Table 5-7 indicates the number and county location of sonic boom complaints for available data between 2006 and 2012. There was a large reduction in sonic boom complaints over this period largely attributable to better predictive sonic boom modeling, which allows for more accurate assessment of conditions and noise impacts resulting from supersonic flights, and efficiencies in information exchange, including the communication process between pilots, ATR, and Air Ops, and between the Naval Air Systems Command Range Sustainability Office (SO) Analyst at NAS PAX and the complainant callers.

Source: US Air Force Sonic Boom Fact Sheet 96-03; NAS PAX River RAICUZ 2009

A total of 101 sonic boom complaints were received from the counties listed in Table 5-7 between the years 2006-2012, 88 (or 87 percent) of which are attributable to NAS PAX operations. Few complaints are received from outlying counties such as Worcester County, MD and Lancaster County, VA. The majority of complaints received, 87 out of 101 (86 percent), are from localities more proximate to NAS PAX including Northumberland County, VA and St. Mary's and Wicomico Counties in Maryland.

Table 5-7. Sonic Boom Complaints to NAS PAX by County by Year

Complaint Area	2006	2007	2008	2009	2010	2011	2012	Total
All Supersonic Events	166	201	238	189	188	201	147	1,330
Dorchester County, MD	-	-	-	-	-	-	-	-
Lancaster County, VA‡	-	-	-	-	1	-	-	1
Northumberland County, VA	9	2	4	6	-	1	1	23
St. Mary's County, MD	10	10	3	3	-	1	1	28
Somerset County, MD	2	3	1	2	2	2	-	12
Wicomico County, MD	5	22	6	2	-	-	1	36
Worcester County, MD‡	1	-	-	-	-	-	-	1
Total Sonic Boom Complaints	**27**	**37**	**14**	**13**	**3**	**4**	**3**	**101**
Total Sonic Boom Complaints Attributable to NAS PAX Operations	**21**	**34**	**13**	**13**	**3**	**1**	**3**	**88**

‡ Jurisdictions are outside the NAS PAX JLUS Study Area.
Source: NAS PAX Final Noise Summaries, 2006-2012

ISSUE NO-5	***Noise and Vibration from Engines.*** Engine testing operations and low level flight cause noticeable vibrations and result in community complaints of sleep disturbance and property damage

The NAS PAX ranges cover an area traversing three states, eleven counties, and numerous cities, towns, and villages, elevating the possibility for vibration-related complaints across a broad area.

Low level flight is normally conducted along specified flight tracks throughout the range area to avoid populated areas while engine testing occurs at NAS PAX and affects an area immediately surrounding the installation. In either case, if civilian complaints become too numerous, NAS PAX mission critical activities and future operations could be jeopardized.

NAS PAX has been documenting and reporting received noise complaints on an annual basis for at least the past decade. Engine testing and low level flight complaints have been part of this reporting. NAS PAX has also documented vibration complaints, however, engine testing and low-level flight complaints are not necessarily exclusive – vibration and vibration complaints from these sources is an undetermined subset of the total engine testing and low level flight complaints.

The relationship between sound and vibration is inextricably linked since vibration is the pressure wave usually accompanied by sound (noise) and amplified in the lower frequency ranges. While numerous studies have been conducted to quantify the impacts of noise, very little research has been conducted to correlate vibration from low frequency sound and human response. One common conclusion across studies is that as the frequency decreases, the degree of annoyance or state of irritation from the noise and vibrations increases more rapidly with sound pressure level. A low-frequency signal can go from being audible, to annoying, to oppressive and vibrational with a relatively small change in level and it is not absorbed by the atmosphere or blocked by terrain and buildings as effectively as higher frequencies.

Health effects on children, particularly those with decreased cognitive abilities, mental disturbances, or other psychological stressors, and studies of pregnancy and low infant birth weights, all indicate either little correlation or conflicting results of relationships with aviation noise, however, low frequency noise is unique in that it may cause vibration that could lead to increased annoyance. Studies have proven to be inconclusive and ongoing research is attempting to address the impacts of low frequency noise on human health.

Recognizing the implications of noise and vibration on the future of NAS PAX operations, the Naval Air Systems Command (NAVAIR) Range Sustainability Office (SO) reported in their 2012 Final Noise Summary:

> *Future encroachment potential exists in the Southern Maryland's tri-county area, Maryland's Eastern Shore, and Virginia's Northern Neck. Continued population growth in these areas could cause encroachment concerns that may threaten the long-term sustainability of the Atlantic Test Range. The SO will continue to implement mitigation measures, conduct education, and engage in outreach initiatives to address these potential conflicts.*

Source: Partnership for Air Transportation Noise and Emissions Reduction, Low Frequency Noise Study, April 2007; Transportation Research Board of the National Academies, Effects of Aircraft Noise: Research Update on Selected Topics, 2008; NAS PAX Final Noise Summaries 2006-2012

Studies have been conducted regarding the potential for structural damage resulting from vibration. Homeowners typically become concerned about structural damage due to the rattling effect when sound that causes vibration exceeds 120 dBP (unweighted peak noise). However, structural damage is not likely to occur until a level of 150 dBP is achieved (a level far greater than identified at any private holdings surrounding NAS PAX). Due to the location of the open air engine test cell at NAS PAX directly across from high-density housing, the SO found that engine noise has the potential to reach substantial levels (up to 110 decibels) in these communities.

In response to these findings, operations are authorized only when wind direction and velocity avert the noise away from local communities, thereby significantly lowering noise impacts.

Source: Partnership for Air Transportation Noise and Emissions Reduction, A Review of the Literature Related to Potential Health Effects of Aircraft Noise, July 2010; Transportation Research Board of the National Academies, Effects of Aircraft Noise: Research Update on Selected Topics, 2008; NAS PAX Final Noise Summary 2012; Noise Management at PAX River Range Ensures Test & Evaluation Success, Currents, Spring 2012

ISSUE NO-6	***Sensitive Land Uses in Webster Field Noise Contours.***
	Sensitive land uses (residential and places of worship) exist within areas that experience noise greater than 60 dB Ldn. The AICUZ Overlay does not apply to areas around Webster Field, thus development around Webster Field does not require consideration for noise levels.

According to the 2006 AICUZ Study for Webster Field, the primary aircraft using this facility are rotary-wing and UAS aircraft which generate noise within the 60 to 65+ dB noise contours. A portion of 65 to 75 dB (Noise Zone II) extends off-installation incorporating the St. Inigoes Church and several single-family residences. A portion of Noise Zone I (60-65 dB) extends further into the St. Inigoes Shores residential subdivision affecting single-family residences. There are approximately 7 acres within Noise Zone II and 53 acres within the Noise Zone I contours.

Per OPNAVINST 3350.1A, places of worship and dwelling units are considered sensitive land uses which are conditionally compatible if sound attenuation is incorporated in the building construction. Dwelling units are discouraged in Noise Zone II.

The St. Mary's Comprehensive Zoning Ordinance contains an AICUZ Overlay district including a prescriptive set of compatible land uses within zoning districts and certain noise contours applicable to Webster Field. However, noise contours for Webster Field are not defined on the Official Zoning Map. The absence of noise contours or incorporation of a defined AICUZ boundary could lead to approval of noise sensitive uses without recommended sound attenuation measures which could result in additional noise complaints and ultimately affect future missions at Webster Field.

ISSUE NO-7	***Noise Associated with Military Aircraft at Regional Airports.***
	Occasional inquiries concerning noise from military aircraft at regional airports are received from residents and occupants of sensitive land uses such as schools and churches. Regional airport representatives are not always aware of planned military activity in the area and often unable to reach a Navy contact who can respond to noise complaints

NAS PAX conducts air missions that utilize civilian airfields in the region. According to Navy military usage documentation from 2014, the following public airports in the NAS PAX JLUS Study Area were used by aircraft at NAS PAX:

- **Salisbury-Ocean City-Wicomico Regional Airport in Wicomico County, MD.** NAS PAX has an MOU with Salisbury Airport for interfaciltiy coordination and control procedures and utilizes this airport for ILS Instrument approaches, low approaches, touch-and-go's, pattern work, and navigation system testing. The majority of Navy activity involves C-12 and helicopter operations. Other military aircraft that utilize the airport include T-34, T-6, MU-18, U-6, and V-22 aircraft.
- **Easton Field Airport in Talbot County, MD.** The majority of Navy activity involves C-12 and helicopter operations, but also includes touch-and-go operations, and instrument and low approaches for T-34, U-1, and U-6 aircraft. Easton is a general aviation municipal airport with 2 runways.
- **Crisfield Municipal Airport in Somerset County, MD.** This airport is occasionally used by NAS PAX for T-34 touch-and-go operations using fixed-wing aircraft and as a divert airfield for V-22 operations.

- **Ridgely Airpark in Caroline County, MD.** This airpark is occasionally used for T-34 and other fixed-wing aircraft touch-and-go operations.
- **Ocean City Municipal Airport in Worcester County, MD.** NAS PAX utilizes the Ocean City Airport an average of three times per week for T-34, C-12, V-22 and H-60 training flights, low approaches, and touch-and-go's.
- **Cambridge-Dorchester Regional Airport in Dorchester County, MD.** This airport is occasionally used as a divert airfield for tilt-rotor aircraft and for V-22 operations in R4006.

The majority of these airfields are in rural environments where there are relatively few sensitive receptors; however, airports such as Salisbury-Ocean City-Wicomico Regional Airport, Easton / Newman Field Airport and Ocean City Municipal Airport (outside the NAS PAX JLUS Study Area) are proximate to developed communities which can be affected by noise generated from air operations. Growth pressures surrounding airports coupled with airport growth could generate additional noise complaints that could potentially impact the future military use of these facilities.

Source: http://www.airnav.com/airports/

Existing Tools

NAS PAX Noise Abatement Procedures

The Air Operations department maintains a comprehensive noise management program to identify and mitigate noise impacts on the community, while the SO shepherds the investigation of this program along. The program identifies the noise abatement policy for NAS PAX and mandates airfield arrival and departure patterns, scheduling and use of special use airspace and targets, supersonic flight operations, and ordnance handling. These requirements are intended for the protection of both the public and military personnel.

The following operational noise abatement procedures per the NAS PAX Air Operations Manual have been adopted by NAS PAX:

- It is the policy of the NAS PAX Commanding Officer to conduct required test, evaluation, and operational flights with a minimum impact on the surrounding communities. All aircrew using NAS PAX, Webster Field, and the ATR Inner Test Range and surrounding airspace are responsible for the safe conduct of their mission while complying with published course rules and noise abatement procedures. Aircrews must be familiar with the noise profiles of their aircraft and must be committed to minimizing noise impacts without compromising operational and safety requirements.
- A toll-free hotline, 1-866-819-9028, supported by the Range Sustainability Office, has been established to handle all noise disturbance complaints from the local community. Aircraft disturbances are logged into the Noise Disturbance Database System and the NAS PAX Air Operations chain-of-command is notified for appropriate action.
- Other approved measures for mitigating noise impacts on the surrounding communities while still performing the mission and maintaining aircraft safety, include:
    - Restricting supersonic flights below 30,000 feet to supersonic test flights for weapons separation. Above 30,000 feet, supersonic flights are restricted to mission-critical flights only.
    - Sonic Boom Monitors: NAS PAX installed sonic boom monitors around the immediate Chesapeake Bay area. The monitors provide quantitative data on the sound pressure level of sonic booms. This data can be used to validate the occurrence of sonic booms, allowing NAS PAX to evaluate which communities are affected by supersonic events.
    - Pilot Awareness Briefs: NAS PAX expanded existing briefings on aircraft operation procedures to all users of the ATR Inner Test Range to ensure an understanding of noise mitigation measures and community concerns. An aircrew awareness video was developed to facilitate the briefings.

NAS PAX Sonic Boom Monitors and Analysis

In 2001, the ATR, with support from the SO, began installing sonic boom monitors throughout the ATR to detect and record the overpressure and noise levels resulting from supersonic flight test operations. The monitors have been installed at nine locations within the ATR Inner Test Range.

The SO developed and uses two software tools that estimate the noise impact of sonic booms generated in ATR Inner Test Range airspace for pre-flight and post-flight analysis. The tools use a sonic boom prediction model widely accepted as the Department of Defense standard for sonic boom footprint prediction. To mitigate the potential for noise disturbances or damage claims associated with sonic booms, the Range Safety team may recommend postponing flight tests if the sonic boom prediction indicates the boom may affect populated areas.

The SO archives flight data corresponding to aircraft that were likely sources for all noise disturbance reports. For noise disturbance reports that included sonic booms, the SO archives the corresponding sonic boom footprint prediction as a GIS layer for analysis and future flight planning. The SO generates and archives flight paths and sonic boom footprints identified via the Sonic Boom Monitor system.

NAS PAX Encroachment Management Group

The NAS PAX Encroachment Management Group is an interdisciplinary group of stakeholders from NAS PAX, the Naval Air Warfare Center Aircraft Division, and ATR that focus on encroachment issues to address the viability of NAS PAX and ATR in the future. The Encroachment Management Group provides a framework for stakeholders to coordinate strategies and efforts for sustained readiness of current testing and training capabilities.

NAS PAX Instruction 3710.14G Noise Disturbance Response System

The Noise Disturbance Response System allows concerned citizens to contact the base regarding noise and vibration concerns. The SO provides the overall management of the Noise Disturbance Response System. The SO operates and maintains the toll-free Noise Disturbance Hotline and records and maintains all correspondence in the Aircraft Events and Disturbance Tracking (AEDT) database, Noise Disturbance Form, and the Aircraft Information Form.

When an incoming vibration damage complaint is received by the SO, the following steps are conducted:

a. In the event that a complainant alleges damages as a result of a noise disturbance event, the SO will note such allegations in the AEDT and retain the Sound Focusing Report, weather data and, if available, SureTrak Flight Track maps for the date of the event. Additionally, the SO shall request that Air Ops retain flight data (e.g., strips, radar recordings) related to the noise disturbance event in question.

b. If a Complainant requests information on filing damage claims, the SO shall refer the Complainant to the Internet Universal Record Locator for reference (b) at http://www.jag.navy.mil/documents/SF95.pdf. If the complainant does not have Internet access or requires further assistance on filing a claim, the SO shall provide them with the Office Judge Advocate General (OJAG) Tort Claims Unit general telephone number (757.444.5341).

c. The SO shall notify the OJAG Tort Claims Unit if the Complainant reports damage from a noise disturbance event.

d. The OJAG Tort Claims Unit Handles all claims in accordance with reference (c).

e. NAVAIR Office of Counsel, NAS Public Safety Investigative Branch, and the SO assist the OJAG Tort Claims Unit, as requested.

NAS PAX Range Installation Compatible Use Zones Study

The NAS PAX Range Installation Compatible Use Zones (RAICUZ) Study was completed in 2009 and intended to protect the public's health, safety, and welfare and to prevent civilian encroachment from degrading the operational capacity of military ranges. The purpose of the RAICUZ program is to foster compatibility among air-to-ground ranges, land uses, and airspace in the vicinity of the range installation. The NAS PAX RAICUZ study contains two measures directly related to vibration issues when wind conditions carry sound towards communities:

- NAS PAX conducts ground-testing of jet engines that have been removed from aircraft, ranging from large thrust engines to shaft engines that turn airplane propellers or helicopter rotors. NAS PAX prohibits the testing of larger thrust engines when wind conditions would carry sound to communities on the opposite shore of the Patuxent River. The RAICUZ study indicates that the result is significantly reduced noise on affected communities.

NAS PAX has installed sonic boom monitors around the Chesapeake Bay area which capture sound pressure levels of sonic booms that can be used to evaluate which communities are affected by supersonic events. As sonic booms have the potential to cause vibration related damage issues, evaluating the area which is affected by a supersonic event helps to increase compatibility between the Navy and local communities.

St. Mary's County Comprehensive Zoning Ordinance – AICUZ Overlay

Section 40.3 of Article 4 of the Comprehensive Zoning Ordinance states that the purpose of the AICUZ Overlay is to ensure land use compatibility around federal airports in the county, including Webster Field.

Section 43.2 of Article 4 specifically addresses noise level contours and states:

> *Noise from concentrated numbers of low-flying aircraft is expected to produce discomfort, annoyance or a potentially unhealthy environment. Noise level contour lines based on anticipated day-night average sound level (ldn) in decibels (db) may be shown on the Official Zoning Maps, and additional sound deadening may be required…in new construction or renovation to assure adequate construction requirements for sound level reduction to produce an acceptable interior environment.*

Per the Minimum Sound Level Reduction Requirements for Structures in Section 43.2, churches and dwelling units are permitted provided they incorporate a 25 dB sound level reduction in the construction. There are no restrictions for development within the 60-65 dB noise contours of Noise Zone I as recommended by OPNAVINST 11010.36C. Since there are no noise contours for Webster Field on the Official Zoning Map pursuant to the AICUZ Overlay, there are no regulations to protect property owners and building occupants from noise associated with Webster Field aircraft operations.

NAS PAX Public Awareness Notification

The SO and PAO at NAS PAX prepare press releases for publishing in The Tester, local newspapers, and local radio stations to help manage public expectations by providing notice on upcoming operations that may generate greater-than-normal noise. Areas affected by military operations at civilian airports outside the immediate area are generally not notified of local operations due to their sporadic nature or because these operations fall within the limits of normal noise.

NAS PAX maintains a toll-free hotline, 1-866-819-9028, supported by the SO, to handle all noise disturbance complaints from the local community. Aircraft disturbances are logged into the Noise Disturbance Database System and the NAS PAX Air Operations chain-of command is notified for appropriate action.

Town of Easton Comprehensive Plan, Transportation Element

According to the Town of Easton Comprehensive Plan Transportation Element the Easton / Newman Field Airport is one of the three busiest airports in the State of Maryland. The Transportation Element states:

> *With the growth of Easton Airport there have increasingly come conflicts between the airport and its neighbors as a result of the increase in traffic, noise, etc. In response to this conflict, Talbot County has instituted special zoning requirements for County lands surrounding the airport. In addition, the County has obtained several avigation easements on properties adjacent to the facility that essentially prohibit any use or activity that would interfere with flight operations. The County plans to acquire more avigation easements as opportunities arise in the future.*

This element also states that much of land surrounding the airport is within the Easton corporate limits and the town has not adopted any special airport-related zoning requirements.

The element specifically references the noise impacts associated with increased operations at Easton / Newnam Field Airport, particularly in its desire to extend the runway for future growth:

In the residential areas of North Easton and County land surrounding the northern part of Easton, the conflict is not the potential for accidents as much as it is the inconvenience created by the increased air traffic. This calls for sacrifice on the part of both parties. Residents of these areas live in the proximity of an airport and that creates a certain amount of nuisance, including noise, fumes, and vibrations. On the other hand, the airport should do its part to minimize such impacts on these areas by channeling its growth and the associated nuisances towards the industrial and undeveloped neighboring properties as much as possible. The airport does not always have a say in terms of where it is going to grow as evidenced by the continuing struggle to find land for an extended or longer runway. The Airport does, however, have some decisions under its control, for example the length of the runway, and these decisions should be made with an eye toward minimizing impacts on residents as much as possible.

Talbot County Comprehensive Plan

The Talbot County Comprehensive Plan defines quality of life as including, "the relative absence of … excessive noise." The Comprehensive Plan helps to achieve this quality of life by establishing Land Use Policy C03.P.10. As part of the designated growth areas, Policy C03.P.10 states, "future residential subdivision development around the Easton Airport should be prohibited." While this helps to protect the area around Easton Airport from development that may be incompatible with military use of the airport, it does not fully prohibit incompatible development within the airport area.

The Draft 2014 Comprehensive Plan Land Use Plan also states that future residential development should be prohibited in the airport area; however, proposed actions include updating the airport overlay zone to reflect recent studies and FAA regulations regarding development near airfields.

Talbot County Code, Chapter 190

Though Talbot County does not regulate land uses within the corporate limits of Easton, noise from the Easton / Newnam Field Airport is not isolated to the town. Section 190-111 of the Talbot County Code establishes the Easton Airport Overlay District, a two-mile area measured from any point on the centerlines of the runway, to protect the operational areas of the airport and inform residents and businesses undertaking development activity about the presence of the airport.

Though the overlay district, which is shown on the Official Zoning Map, primarily addresses vertical obstructions and safety, it includes a provision that considers potential noise receptors resulting from new subdivisions stating that subdivision plats and site plans for land in the proximity of the airport shall be annotated to indicate the proximity to the airport.

This overlay does not directly address aircraft noise, specify permissible uses for noise levels associated with aircraft / runway operations or within noise contours, nor address noise level reducing mitigation for uses that may be sensitive receptors within the overlay district.

City of Salisbury Comprehensive Plan, Chapter 10

Though the Salisbury-Ocean City-Wicomico Regional Airport is outside the corporate limits of Salisbury, it serves the city and is referenced in Chapter 10, Transportation Element of the Comprehensive Plan. According to the Air Transportation subsection, during 2008, the airport averaged 108 operations per day with military operations comprising 16 percent.

The Transportation Section of Chapter 13, Plan Implementation includes the following policies suggesting potential growth and expansion for the airport:

- Coordinate with the Salisbury/Wicomico Metropolitan Planning Organization, Shore Transit, and the Airport Commission to conduct a study for the purpose of identifying potential sites to locate an intermodal transportation hub to support the economic, employment, and transportation goals of the City and the region.
- Encourage the continued expansion and improvement to the Salisbury-Ocean City-Wicomico Regional Airport as a primary facility serving a multi-county and tri-state region.

Wicomico County Comprehensive Plan

The Wicomico County Comprehensive Plan designates the Salisbury-Ocean City-Wicomico Regional Airport as an Urban Corridor growth area and includes the following policy:

> *The County recognizes the airport and related activities as the predominant land use determinant in a large area near the Salisbury-Wicomico Regional Airport. The County will protect the airport and nearby residents through development regulations, easements and land acquisition programs.*

The Suburban Areas section states that future growth in this area is, "to be constrained, but not prohibited" to, "minimize conflicts among urban, rural, and airport land uses."

The plan also includes policies regarding urban growth and airport expansion that might increase noise sensitive receptors and contribute to additional noise complaints that could affect continued military use of the airport:

- Encourage the continued expansion and improvement to the Salisbury-Ocean City-Wicomico Regional Airport as a primary facility serving a multi-county and tri-state region.
- Prevent the infringement of incompatible land uses in the vicinity of the airport.

Wicomico County Zoning Code Regulations – Airport Overlay

Section 225-43 of the County Code establishes an Airport Overlay (A-2) District to maintain and protect the public safety by preventing the establishment of hazards to aviation and property in the vicinity of the Salisbury-Ocean City-Wicomico Regional Airport. Subsection B(1) provides a list of specific prohibited uses within an 8,000-foot radius of the airport including certain noise sensitive receptors such as:

- elderly day care,
- day-care center,
- hospitals,
- apartment buildings and townhouses,
- places of assembly,
- sanitariums / sanatoriums, and
- schools, including nursery, general, and special instruction schools.

While this reduces the potential for future noise complaints associated with these uses, the list excludes other uses traditionally considered sensitive receptors. The base zoning district for the area surrounding the airport is Agriculture-Rural (A-1) which allows the following specific uses not prohibited in the overlay district:

- Residential uses including: single-family detached and two-family attached units; manufactured and modular homes; and transient lodging such as bed and breakfasts, country inns, and group homes. These uses are permitted in both low-density and cluster development configurations;
- Barber shops;
- Veterinary clinics;
- Stables; and
- Recreation and entertainment uses.

These uses are noteworthy because they are not prohibited but may be considered conditionally compatible or incompatible with airport operations depending on proximity to the runways. Since there are no noise-related restrictions or standards in the overlay district, these uses could potentially be approved in areas typically considered inappropriate based on established noise standards without any noise level reducing measures integrated in the construction. One such case is the existing single-family residential cluster development approximately 3,000 feet directly off the end of Runway 23.

This oversight could allow sensitive receptors to develop close to the airport and, coupled with desired airport growth, could generate additional noise complaints that can potentially impact the future military use of these facilities.

ISSUE NO-8	***Residential Development Pressures in Areas within Noise Contours.*** Increased noise levels up to 70 dB are experienced in the southern tip of Calvert County where Drum Point and the Chesapeake Ranch Estates (single-family residential), which are the most densely populated areas of Calvert County, are located and continue to develop.

Population estimates suggest that the population of Calvert County will increase into the future. The Drum Point and Chesapeake Ranch Estates areas of Calvert County north of NAS PAX are single–family residential subdivisions that continue to experience development. These areas are within the 60-70 dB noise contours where residential uses, considered sensitive receptors, are either conditionally compatible and require noise level reducing measures in the building construction or are not considered compatible and are discouraged.

This area comprises two zoning districts: the Rural Community District (RCD) - exclusively within the 65-70 dB contour range (characterized as Nosie Zone II), and the Residential District (RD) within the 60-70 dB contour range (characterized as Noise Zones I and II) per the 2009 AICUZ Study and OPNAVINST 11010.36C. Though primarily intended for low-density residential uses, there are a number of allowable uses within these districts that are considered conditionally compatible or discouraged.

Proximity of these uses to the NAS PAX Main Station is primarily a noise concern from flight operations. Increased development with additional sensitive receptors in these areas has the potential to inflate the number of noise complaints. NAS PAX regards noise complaints very seriously since they have the potential to affect current testing and training operations and potentially influence the acquisition of future missions.

Existing Tools

NAS Patuxent River Noise Abatement Procedures

The SO maintains a comprehensive noise management program to identify and mitigate noise impacts on the community. The program identifies the noise abatement policy for NAS PAX and mandates airfield arrival and departure patterns, scheduling and use of special use airspace and targets, supersonic flight operations, and ordnance handling. These requirements are intended for the protection of both the public and military personnel.

The following operational noise abatement procedures per the NAS Patuxent River Air Operations Manual have been adopted by NAS PAX:

- It is the policy of the Commanding Officer, NAS Patuxent River to conduct required test, evaluation, and operational flights with a minimum impact on the surrounding communities. All aircrew using NAS Patuxent River, OLF Webster, and the ATR Inner Range and surrounding airspace are responsible for the safe conduct of their mission while complying with published course rules and noise abatement procedures. Aircrews must be familiar with the noise profiles of their aircraft and must be committed to minimizing noise impacts without compromising operational and safety requirements.
- A toll-free hotline, 1-866-819-9028, supported by the Ranges Sustainability Office, has been established to handle all noise disturbance complaints from the local community. Aircraft disturbances are logged into the Noise Disturbance Database System and the NAS Air Operations chain-of command is notified for appropriate action.
- An Aircrew Awareness Video was prepared to provide guidance on noise disturbances, sensitive areas within the ATR Inner Range, supersonic flight operations, and other important information related to aircraft noise. The video is available in the squadron safety/training offices or the SO.

Other approved measures for mitigating noise impacts on the surrounding communities while still performing the mission and maintaining aircraft safety, include:

- Restricting supersonic flights below 30,000 feet to supersonic test flights for weapons separation. Above 30,000 feet, supersonic flights are restricted to mission-critical flights only.
- Sonic Boom Monitors. NAS Patuxent River installed sonic boom monitors around the immediate Chesapeake Bay area. The monitors provide quantitative data on the sound pressure level of sonic booms. This data can be used to validate the occurrence of sonic booms, allowing NAS Patuxent River to evaluate which communities are affected by supersonic events.
- Pilot Awareness Briefs. NAS Patuxent River expanded existing briefings on aircraft operation procedures to all users of the ATR Inner Range to ensure an understanding of noise mitigation measures and community concerns. An aircrew awareness video was developed to facilitate the briefings.

Calvert County

Comprehensive Plan

The Calvert County, Maryland Comprehensive Plan is intended as a tool for evaluation potential change and to maintain or improve the overall quality of life for its citizens through 10 visions and associated benchmarks.

The Comprehensive Plan does not reference uses and noise contours associated with the Drum Point or Chesapeake Ranch Estates subdivisions.

Calvert County Zoning Ordinance

The Calvert County Zoning Code was most recently updated in May 2012.

The zoning regulations do not reference the 2009 AICUZ study, noise contours or recommended land uses within the noise contours associated with NAS PAX Main Station flight operations.

Building Code

Calvert County has adopted a Building Code comprising the 2009 versions of the International Building Code and International Residential Code, and the 1988 Minimum Livability Code, among other national codes and local amendments in what is referred to as the Maryland Building Performance Standards. These codes do not address minimum sound transmission requirements from external airborne sources into interior structural spaces.

Section 12-504 of the Public Safety Article of the Annotated Code of Maryland permits local jurisdictions to adopt amendments to the Maryland Performance standards. Calvert County has not established sound attenuation performance standards directly tied to AICUZ study noise attenuation recommendations for land uses.

Roadway Capacity

Vehicular access to and from NAS PAX is essential for safe and efficient operations. PAX's somewhat unique location (at the end of a peninsula), the limited number of primary surface roads, the limited number of Main Station gates, security and operational needs, the level of civilian employment at the base, limited on base housing, and general growth in the area (both current and anticipated), all combine to exacerbate congestion on critical roads.

Compatibility Assessment

ISSUE RC-1	***Base Ingress/Egress.*** Route 235/Three Notch Road is at capacity due to high volumes approaching NAS PAX Main Station entry points. Additional development paired with the recent change of the main gate from Gate 2 to Gate 1 will likely lead to roadways and intersections with failing levels of service.

Maryland Highway 235 (MD 235), also known as Three Notch Road, begins in Washington, DC, as Branch Avenue. At the Maryland border Branch Avenue turns into Highway 5 (MD 5) until just outside of Mechanicsville where it turns into MD 235. For Maryland residents and

commuters, Highways 5 and 235 are the main routes when arriving and departing from NAS Patuxent River.

Maryland Highway 235 is of the highest volume roadway in the county and is the only roadway that funnels traffic from MD 5, MD 4, and other primary and secondary roads onto NAS PAX Main Station. All three controlled access points for NAS PAX are located off MD 235. This large influx of personnel and vehicles regularly cause large volumes of traffic along the three main corridors of the county. Other primary roads that feed into MD 235, and are part of the network of roadways that bring commuters to and from NAS PAX every day, include MD 237, Chancellors Run Road; MD 245, Hollywood Road; and MD 246, Great Mills Road. Secondary roads include Pegg Road, Willows Road, and Hermanville Road.

A large number of commuters enter the NAS PAX area, both to work on the installation and nearby as off-base contractors. NAVAIR loading projections estimate that 15,400 persons travel throughout St. Mary's County to work at NAS PAX, with an addition 6,000 personnel at contractor offices. From 2006 to 2007, there was an approximate 46 percent increase of installation population due to mission growth, heavily impacting traffic volumes. This has resulted in significant congestion along MD 235 and other previously mentioned roads that feed into MD 235. Lexington Park performed 2025 travel demand forecast in 2006, finding that traffic volumes are expected to grow to over 70,000 vehicles per day along MD 235.

Gate Access

There are three gates to enter into the installation, all accessible from MD 235. Gate 1 is open 24/7 and is located at the intersection of Pegg Road and MD 235. From 0530 to 0830, there are four inbound lanes and no outbound lane. Gate 2, located south of Gate 1, is open 0530 to 1830 and is closed on weekends and holidays. From 0600 to 0900, there are three inbound lanes and one outbound lane. The Welcome and Visitor Center is located near Gate 2, which also issues visitor passes. Queuing from Gates 1 and 2 during peak AM, mid-day and PM periods routinely spill out onto MD 235. Gate 3 is further south of Gate 2 off of Forest Park Road and is open inbound weekdays 0530 to 0900 and outbound from 1530 to 1730.

In June 2013, Gate 1 became the 24/7 gate to improve the base's Antiterrorism/Force Protection posture. Approach to Gate 1 is four times longer than approach to Gate 2, allowing the road to absorb traffic more effectively. Gate 1 also has a lane designated for truck inspection and is equipped with pop-up barriers to stop anyone who tries to pass the gate without showing credentials.

Processing rates in April 2008 were estimated at 500 vehicles per hour per lane at all three gates. It is unknown how the recent gate change has impacted this rate.

ISSUE RC-2	***Safety/Emergency Access Routes.*** Congestion on Route 2/4 affects traffic traveling from Calvert County into St. Mary's County. The Thomas Johnson Bridge is a vital link between the two counties, is critical to NAS PAX accessibility, and is part of an emergency access/egress route.

In May 2013, State Senators wrote to Maryland Governor Martin O'Malley explaining that the bridge has become a serious issue for NAS PAX commuters. Senators also pointed out that the bridge is an evacuation route for Calvert Cliffs Nuclear Facility and the Cove Point Natural Gas facility, if an incident were to occur. They encouraged the Governor to fund improvements as soon as possible.

Two options are available to improve the bridge; building an additional span or tearing the bridge down and building a larger bridge. Either way, it is desired that the bridge be tall enough for ships to pass under it. State official have said that 2020 would be the earliest estimated completion date.

According to the 2006 St. Mary's County Transportation Plan, failure to address volume/capacity issues on MD 4 and the Thomas Johnson Bridge will cause critical sections of this important artery to operate at LOS "F" by 2025. Adding a second span to the Thomas Johnson Bridge was estimated to cost $131 million (2006). Providing an additional lane to MD 4 from MD 5 to the Thomas Johnson Bridge was estimated to cost $41 million.

The 2008 Southern Maryland Transportation Needs Assessment" identified roughly $6 – $7 billion in necessary improvements, with about $2.5 billion for "top regional priorities" including the additional Thomas Johnson Memorial Bridge span. Unfortunately, MDOT estimates that only $700 million (10 percent of the total need and 30 percent of the "priority projects" costs) will be available from 2012-2030.

The Maryland State Highway Administration initiated a Planning Study for improvements along MD 4 between MD 2 and MD 235 including the Thomas Jefferson Bridge in 2007. The Planning Study includes several alternative concepts to improve existing capacity and traffic operations and to increase vehicular and pedestrian safety along MD 4, while supporting existing and planned development in the area.

The project involves widening MD 4 from a two-lane roadway to a four-lane divided roadway with two through lanes in each direction and a median from Patuxent Beach Road to just beyond Patuxent Boulevard in St. Mary's County. The project also includes the expansion of the Patuxent River crossing from a two-lane bridge to a four-lane, single-span or double-span bridge with two through lanes in each direction. A shared use pedestrian/bicycle path from Patuxent Beach Road in St. Mary's County to Solomons Cemetery in Calvert County is also included. The western portion of the project includes minor access improvements to MD 4 including median widening and improvements to the MD 4 / MD 235 intersection. The project may include short-term projects that can be completed independently and the State Highway Administration is coordinating with all agencies regarding the safety and evacuation of those who reside within Calvert County during emergency situations.

Gate access points and primary roadway capacity concerns are depicted on Figure 5-6.

Existing Tools

Consolidated Transportation Program – Project SM351_11

Providing a six-year capital budget, the 2015-2020 Consolidated Transportation Program includes new major and minor Maryland DOT projects. One of the projects to improve the PAX NAS commute is Project SM351_11 – a 3-mile upgrade to MD 4, including the Thomas Johnson Bridge and MD 235 intersection, between MD 2 and MD 235.

The Planning Study for this project began in 2007 with the Environmental Assessment completed in 2014. As of May 2014 the study team is drafting the final environmental document (Finding Of No Significant Impact) for the alternatives to move the project forward with location design and engineering phases.

Though project planning and engineering costs are estimated to be $20 million, right-of-way and construction costs have not been determined or funded and are not yet programmed.

Southern Maryland Commuter Rail Service Feasibility Study

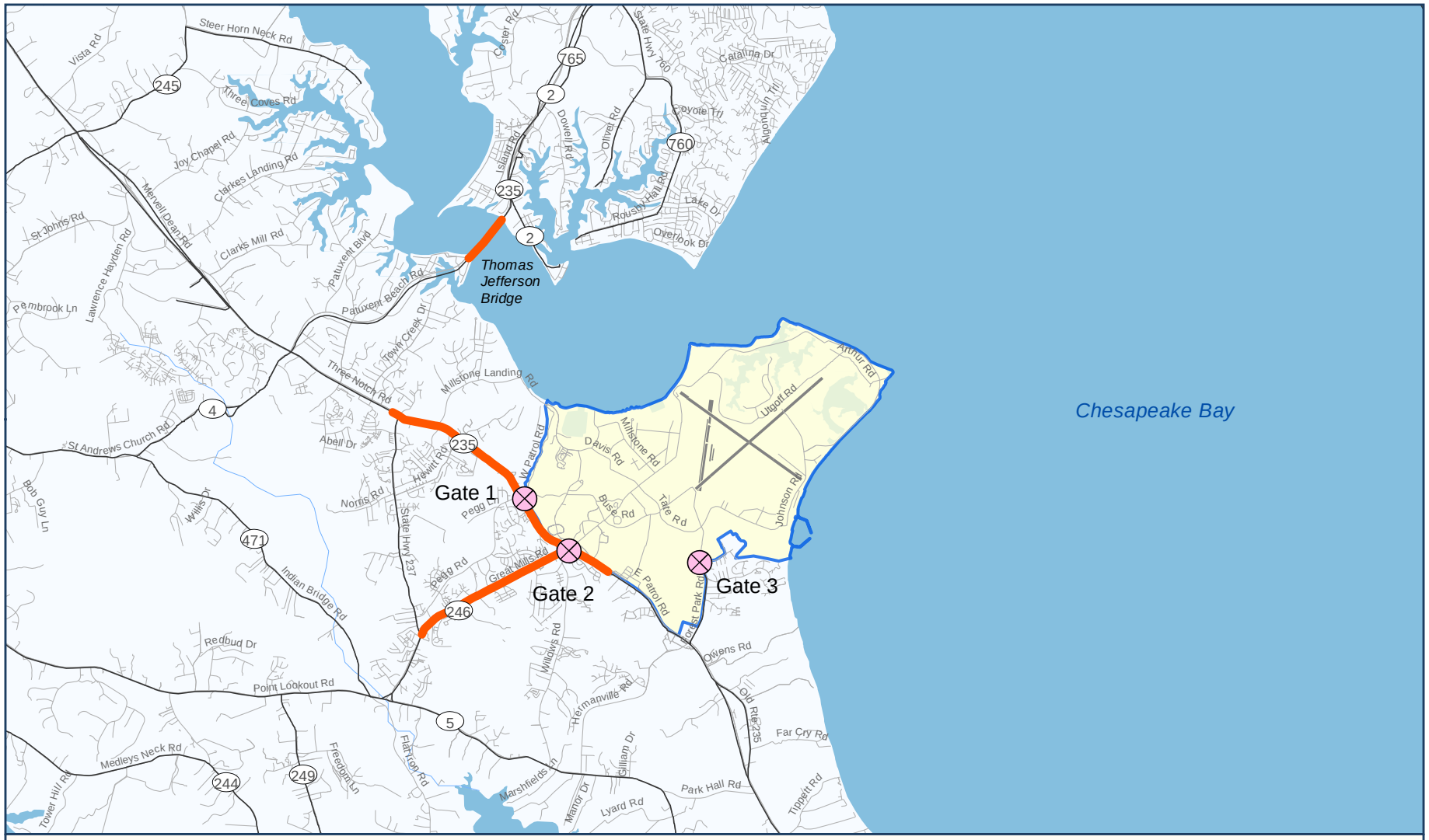
Although the focus of the 2009 Southern Maryland Commuter Rail Service Feasibility Study is connecting Washington DC to Southern Maryland, there is existing abandoned right-of-way that would serve NAS PAX. Termed "Segment 4", the 28 miles of rail runs from Hughesville Junction to down to Lexington Park, where NAS PAX is located. An analysis of the rail found numerous challenges to establishing rail service. Most of the rail has been removed or is in a dilapidated state. Also, the line was originally meant for speeds slower than that of the modern day locomotive. The study concludes that service is feasible, but costly.

St. Mary's County Transportation Plan

The 2006 St. Mary's County Transportation Plan expresses the need for improvements to the transportation infrastructure to support increased use due to NAS PAX expansion. Projects nearby NAS PAX include widening of MD 4 from MD 5 to the Thomas Johnson Bridge, widening of MD 712 from MD 235 to NAS PAX, expanding FDR Blvd, studying access management for the MD 235/MD 5, constructing a connector road, Bradly Boulevard, to provide better access to the south gate of NAS PAX, and constructing an urban diamond interchange at the MD 235/MD 4 intersection. The plan also includes sidewalk construction and repair in Lexington Park.

St. Mary's Comprehensive Plan

Chapter 11, Transportation of the2010 St. Mary's Comprehensive Plan involves a well-maintained, multimodal transportation system to fulfill future transportation needs in the area. This plan encompasses multiple goals and objectives to improve roadways, mass transit, and bicycle and pedestrian accommodations.



Legend

- Gate
- Areas of Concern
- Installation
- Runway
- Water Body
- Highway
- Roads

0 1 2 Miles

Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-6
NAS PAX Roadway Map

NAS_PAX_Fig5-6_Roadway_20141017_CJM.pdf

Southern Maryland Transportation Needs Assessment
The 2008 Needs Assessment encourages "smart growth" principles, including exploring and enhancing MD 235/MD 5 commuter bus services to NAS PAX. Additional exploration of on-base transit and shuttle service is also recommended. The Assessment also contains road expansion projects, involving MD 235, MD 5, MD 4, and MD237.

Building a second span of the Thomas Johnson Bridge is also considered a top regional priority. The Needs Assessment realized funding will be a challenge to replacing the bridge. Various revenue sources including federal funding options and other innovative arrangements will be studied before implementation of any bridge project will occur.

Lexington Park Development District Master Plan
The 2013 Lexington Park Development District Master Plan also recommends "smart growth" principles to be applied to the construction and improvement projects involving a multi-modal transportation system and a "complete streets" program to address transportation congestion in the area. Mixed use and high density development is encouraged for the area to provide the environment with a high functioning transit system to help release pressure on traffic. . The master plan also includes the goal of the previous St. Mary's County Transportation Plan to keep up with NAS expansion through continuous transportation infrastructure improvements.

Transportation Infrastructure Investment Act
In May 2013, Governor O'Malley increased the gasoline tax creating a $1.2 billion fund for transportation infrastructure projects. $20 million of that fund has been promised to be put toward designing a replacement Thomas Johnson Bridge. The project was recognized as costly and has been delayed several times in the past.

Safety Zones

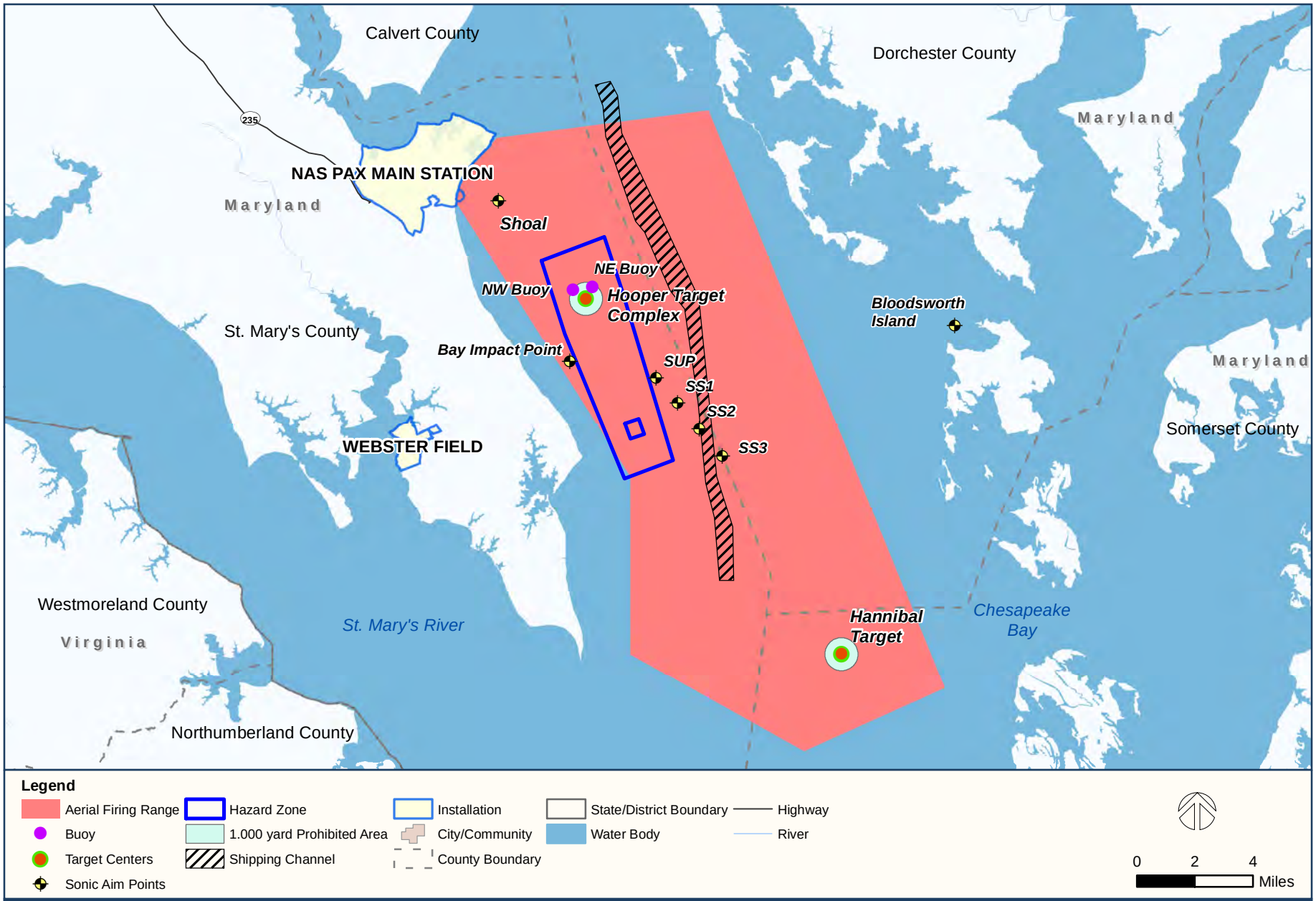
Safety zones are areas in which development should be more restrictive, in terms of use and concentrations of people, due to the higher risks to public safety. Issues to consider include aircraft accident potential zones, weapons firing range safety zones, and explosive safety zones.

Military installations often engage in activities or contain facilities that, due to public safety concerns, require special consideration by local jurisdictions when evaluating compatibility. It is important to regulate land use near military airfields in order to minimize damage from potential aircraft accidents and to reduce air navigation hazards. To help mitigate potential issues, the Department of Defense (DOD) has delineated Clear Zones (CZ) and Accident Potential Zones (APZ) in the vicinity of airfield runways. APZ are usually divided into APZ I and APZ II. Each zone was developed based on the statistical review of aircraft accidents. Studies show that most mishaps occur on or near the runway, predominately along its extended centerline.

Compatibility Assessment

ISSUE SA-1	***Military Operations over Recreational Waterways Used by Recreational Boaters.*** Watermen and recreational boaters often do not understand or are unaware of safety requirements or Navy activities that would affect public waterways. Clearing of the waterways to maintain safe clearance distances can cause delays in scheduled activities and training.

The ATR Inner Test Range is an inshore operating area, covering approximately 2,360 square miles over the Chesapeake Bay, Maryland, Virginia and Delaware. A majority of this area is over water. There is one inactive (Tangier Target) and two actively used (Hooper and Hannibal targets) water-based targets, aim points, and an aerial firing range located within the water portion of the ATR Inner Test Range. Figure 5-7



Sources: ESRI, 2010; NAS Pax, 2010

NAS_PAX_Fig5-7_CTR_Aerial_FiringRange_20141211_CJM.pdf

Figure 5-7
ATR Inner Range Aerial Firing Range

illustrates the location of the shipping channel in relation to the aerial firing range, the two active targets, and aim points. This shipping channel and the area around it within the aerial firing range are used for commercial and recreational uses. There are an average of approximately 10 commercial shipping vessels, which include cargo ships, barges, tug boats, and tankers, that arrive at and depart from the Port of Baltimore via the Chesapeake Bay each day. Numerous recreational craft, including cruise lines out of Baltimore, use the area daily.

There is a 1,000-yard-radius prohibited area around each of the three water-based targets that vessels may not enter unless authorized by NAS PAX. These areas are delineated on navigation charts and are relatively far away from the commercial shipping channel. The Hooper Target is 2.6 nautical miles from the shipping channel; the Hannibal Target is 2.2 nautical miles from the shipping channel; and the Tangier Target is 5.7 miles from the shipping channel.

Their locations in fairly shallow water keeps them out of the range of larger shipping vessels, but smaller vessels such as fishing boats and recreational craft are able to travel close to them.

The remainder of the aerial firing range is open to public and commercial users except during Navy exercises. The aerial firing range area must be cleared of all commercial and civilian boat traffic when weapons firing activities are taking place. The waters that fall within the aerial firing range are governed by regulations at the federal, state, and regional level to ensure shared use and safety of all users. If training or testing exercises are initiated by the Navy, commercial vessels are allowed to proceed on their normal course through the aerial firing range as long as they maintain practicable speeds and stay in the established shipping channel. There are a variety of safety measures in place to keep civilians out of the aerial firing ranges when they are active, including military spotter vessels to inform the public of the activity. Fisherman and commercial boaters who are local and accustomed to the area are generally aware of the process and know how to respond when the firing range is closed off. Confusion may arise for boaters who are unfamiliar with the area during firing activities.

ISSUE SA-2	***Bird Attractants near Runway.*** Runway (14/32) extends from the Patuxent River to the shore of the Chesapeake Bay. Numerous bird attractants such as fishing and clamming nets are located near the piers in the bay. Bird activity in close proximity to the runway is an aviation safety hazard and increases the potential for bird aircraft strikes.

In consideration of flight areas where aircraft tend to fly at slower speeds and lower altitudes, bird and wildlife air strike hazards (BASH) are more likely to occur in the APZs. Federal Aviation Administration (FAA) and Air Force statistics have shown that approximately 98 percent of bird and wildlife strikes associated with aircraft occur below 3,000 feet AGL and within five miles of the airfield. Approximately 50 percent of strikes between birds and aircraft occur at the airfield. Bird and wildlife strikes can potentially cost the U.S. Navy millions of dollars in damage to equipment and possible loss of life.

There are certain types of land and water uses that are more likely to attract birds, including landfills and waste disposal operations, golf courses, water treatment facilities, wetlands, fishing operations, and seafood processing plants. The FAA and the military recommend that such uses not be located within 10,000 feet of an airfield whenever possible. The nearby shoreline of the Chesapeake Bay and Patuxent River provides a greater prevalence of birds adjacent to NAS PAX. The use of the waterways and docks by fishermen increases bird activity when boats are active. NAS PAX has woody vegetation, wetlands, and food sources that attract birds and other wildlife that sometimes venture onto the runways and can cause safety concerns.

Data collected by the Navy in the NAS PAX Airfield Clear Zone Management Plan over a 10-year period identified that over 94 animal and aircraft collisions occurred with 22 species of birds and four species of other wildlife, including White-tailed Deer. The greatest concern seems to come from gulls and Red-winged Blackbirds as data indicated they had the largest frequency of collisions with aircraft.

Other larger species of birds such as ducks and geese are of concern due to their size, although strikes with them have not been as common. Geese have caused issues in the past during migration periods when they have been observed in large numbers foraging on grasses in the airfield.

ISSUE SA-3	***Webster Field Clear Zones Extends Off-Base (West).*** The Clear Zone associated with the runways at Webster Field extend off base to lands not owned by the Navy that are both currently developed and zoned for additional growth. Within St. Mary's Zoning Ordinance, land development tools do not address land use compatibility around Webster Field.

Webster Field has two active runways, Runway 08 / 26 and Runway 15 / 33, which are used for aircraft operations. Each of these runways is 5,000 feet long and 150 feet wide and is identified as Class A runways due to the smaller types of aircraft that use them. The associated CZs for each of the runways are 3,000 feet long and 1,000 feet wide, measured from the end of the runway and along the centerline of the runway.

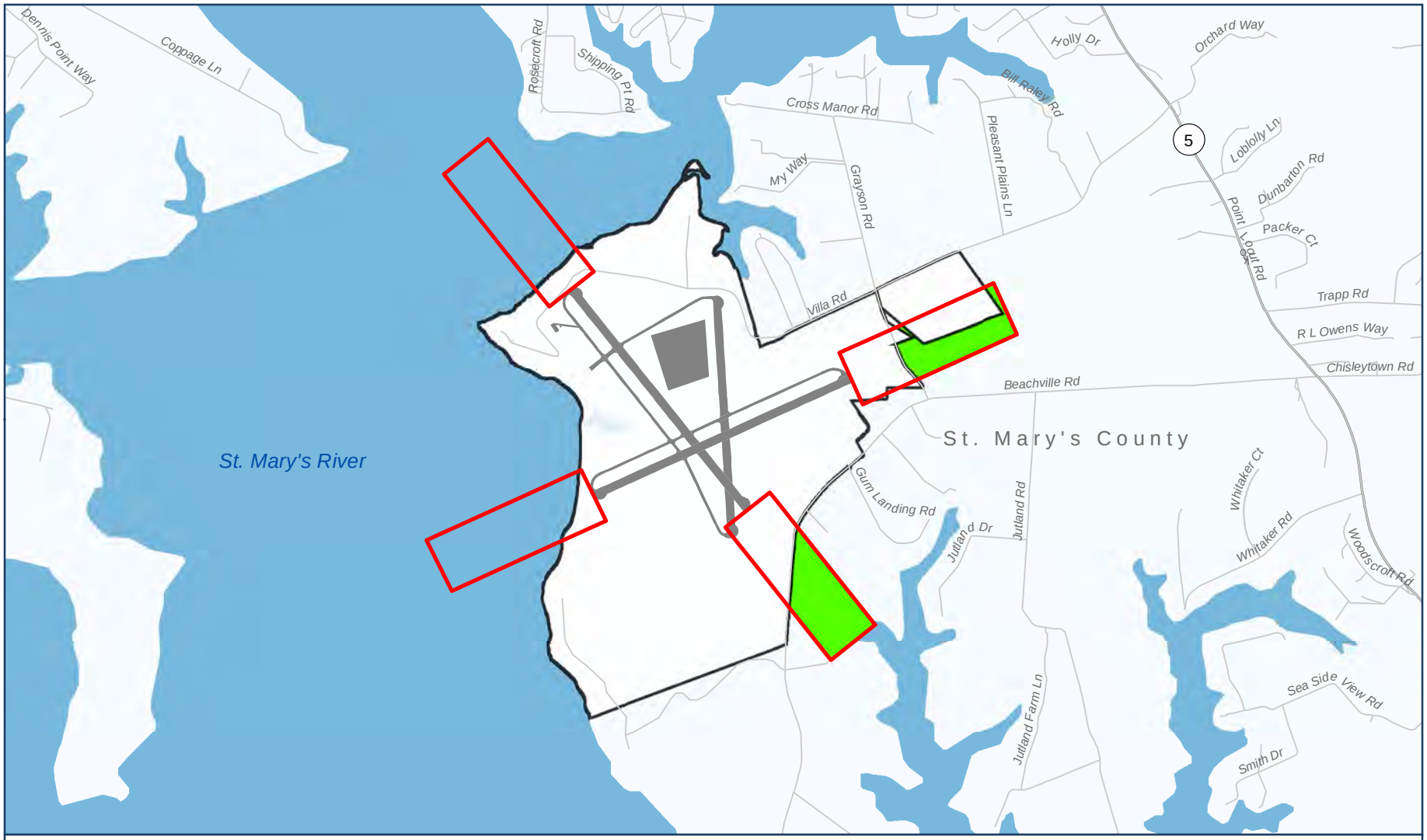
Each of the CZs associated with the runways extend past the boundaries of Webster Field. The two CZs on the western ends of the runways extend over open water and are not a concern for incompatible development. The two CZs on the eastern side of Webster Field extend over land and have the potential for incompatible development. Most of the land within these zones is currently a mix of cropland and mixed forest, but according to the Webster Field AICUZ Study, there is a small amount of land within Runway 08 / 26's eastern CZ that is currently used for low-density residential. The zoning within the eastern CZs, as shown on Figure 5-8, for Runway 08 / 26 and Runway 15 / 33 is Rural Preservation District, which does allow low density residential. The AICUZ Study identifies a total of 81 acres within the CZs that could potentially be developed with incompatible uses, while only 2.5 acres of land and an additional 125.5 acres of water) are currently slated to maintain compatible future use. While the AICUZ identifies these areas for potential future incompatible use, the majority of the land is currently undeveloped and is anticipated to remain as such for the near future.

There are several single-family residential homes within the CZs on the east side of Webster Field that are incompatible. Figure 5-9 illustrates the existing use within the CZs.

Recently, several parcels located within the eastern CZ of Runway 26 have been acquired by NAS PAX which gives the Navy land use control within the CZ and will help prevent encroachment and other potentially incompatible land uses proximate to Webster Field. Due to these acquisitions, the land will be protected from future development and no longer will be an issue. According to conversations with NAS PAX officials, the land within the eastern CZ for Runway 15 / 33 is state-owned and has been identified as unsuitable to be developed in the future due to critical area regulations.

ISSUE SA-4	***No Defined Accident Potential Zones Associated with Webster Field Clear Zones (West).*** Due to the low number of fixed-wing operations at Webster Field, Accident Potential Zones (APZs) are not imposed beyond Webster Field's Clear Zones. Based on the Clear Zones extending off base, the APZs would also extend into the community where development of uses that are incompatible in safety zones is currently permitted.

The Navy has not identified APZs for the runways at Webster Field because of the low number of fixed-wing operations that occur there. APZs are assigned to runways that have a minimum of 5,000 arrivals or departures per year. The direction and layout of APZs I and II associated with the runways at Webster Field is unknown without Navy input and development. Therefore, it is unclear exactly where the APZs would fall to determine if current development or potential future development would be incompatible. It can be assumed however, that the APZs would follow the flight tracks of the runways and possibly curve. The majority of the land that would likely fall under the theoretical APZ is currently undeveloped, but the zoning categories of the land may allow for potentially incompatible residential development.



Legend

St. Marys Zoning
- RPD

Safety Zones
- CZ

- Installation
- Runway
- Water Body
- Highway
- Road

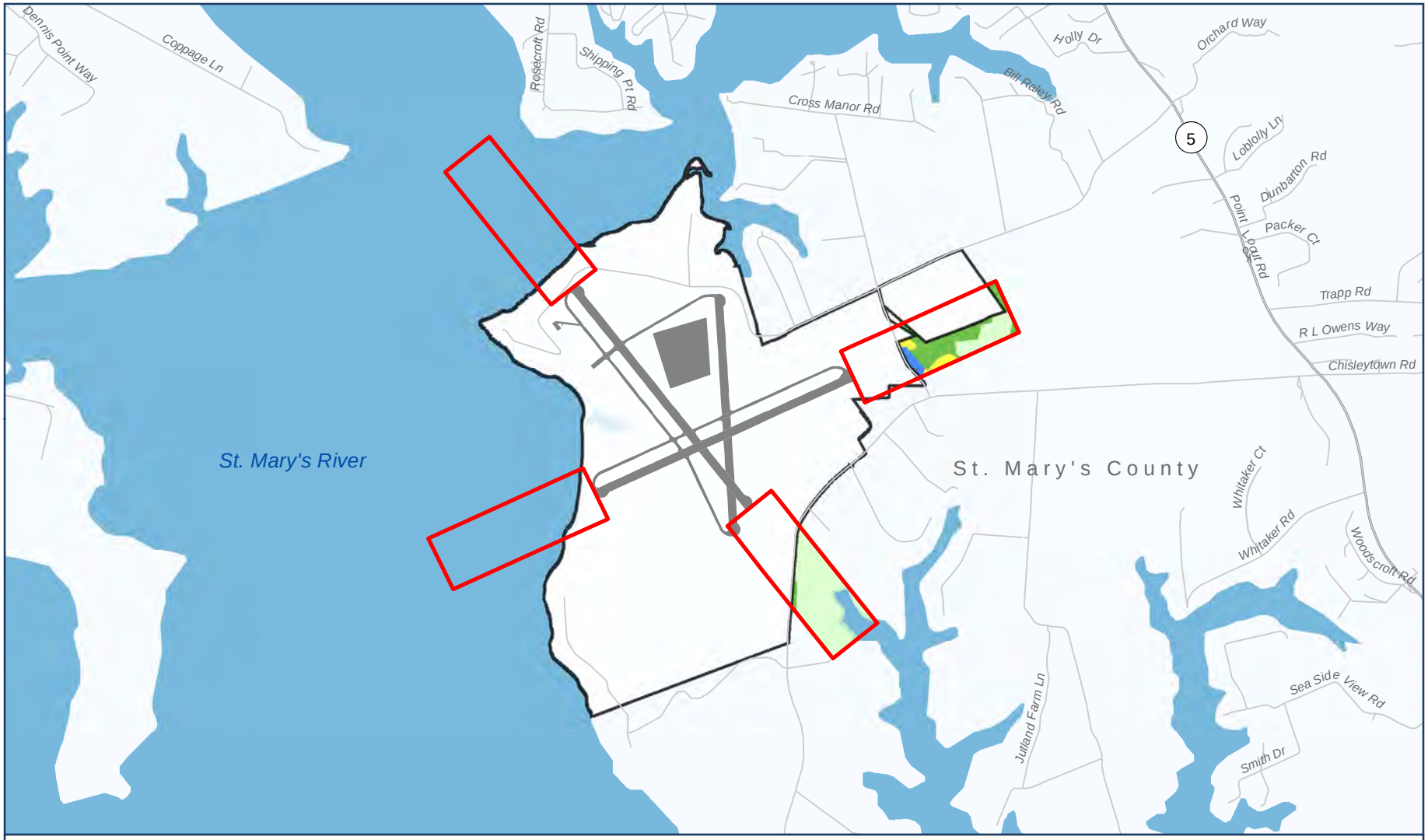
0 0.25 0.5 Mile

Matrix DESIGN GROUP

Sources:ESRI, 2010; NAS PAX, 2010

Figure 5-8
Zoning Within Webster Field Clear Zones

NAS_PAX_Fig5-8_WebsterSafety_Zoning_20141211_CJM.pdf



Legend

Webster Existing Land Use
- Low Density Residential
- Institutional
- Agriculture
- Forest

Safety Zones
- CZ
- Installation
- Runway
- Water Body
- Highway
- Road

0 0.25 0.5 Mile

Matrix DESIGN GROUP

Sources:ESRI, 2010; NAS PAX, 2010

Figure 5-9
Existing Land Use Within Webster Field Clear Zones

NAS_PAX_Fig5-9_WebsterSafety_ELU_20141211_CJM.pdf

Although the land areas within the Webster Field CZ's are zoned Rural Preservation District (RPD), the zoning classification allows for residential and other uses aside from Agricultural and Forest Lands. In the eastern CZ of runway 08 / 26, there are small amounts of Low Density Residential, as well as institutional uses present. Although the Navy has acquired several parcels within the eastern CZ of Runway 26, which will help mitigate future encroachment, the existing incompatible uses located there can be seen as a precursor for additional incompatible development that may extend past the CZ's into areas associated with any potential APZ's for Webster Field.

ISSUE SA-5	***Development within NAS PAX Main Station Safety Zones (West).*** Although no new residential development is permitted in the CZs or APZs associated with NAS PAX Main Station, residential uses are currently located in the safety zones. Residential areas are located to the southeast of the base in the Lexington Park, Southampton, Southgate Park, Cedar Cove, and Forest Park neighborhoods within or adjacent to APZ I and APZ II.

NAS PAX Main Station has two primary runways and one utility runway. The two primary runways, Runway 06 / 24 and Runway 14 / 32, are Class B runways and measure 11,809 feet long by 200 feet wide and 9,742 feet long by 200 feet wide, respectively. The utility runway, Runway 02 / 20, is a Class A runway and measures 5,007 feet long by 75 feet wide. Class B runways are able to accommodate heavier aircraft than Class A runways. Runway 14 / 32 is oriented so that each of its ends is located next to open water. The northern end of Runway 06 / 24 is near open water, while the southern end is oriented towards land located outside the boundaries of NAS PAX.

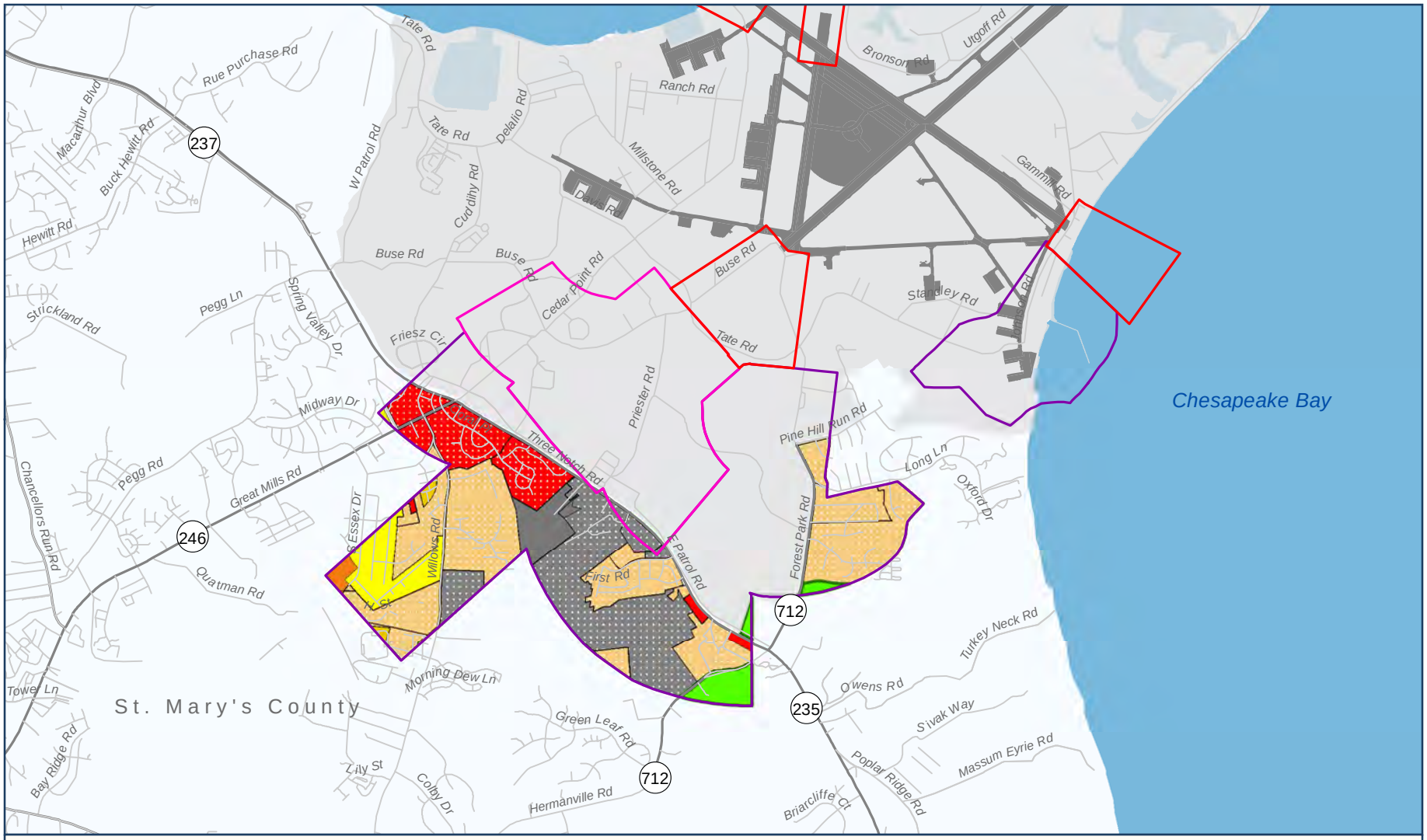
The CZs for the Class B runways measure 3,000 feet long from the end of the runway, and increase in width from 1,500 feet at the start to 2,284 at the outer edge. The CZs for each of the runways is either located within the boundaries of NAS PAX or located over open water and does not pose a concern for incompatible development. Runway 06 / 24 is the only runway that has an APZ I, which is located on the southern end of the runway. The APZ I fans out in multiple directions to follow typical flight patterns. The APZ I is almost entirely within the boundaries of NAS PAX, except for a small portion that crosses over State Route 235. An APZ II is designated whenever an APZ I is required (associated with flight tracks that have more than 5,000 operations per year), but may also exist for runways that do not have an APZ I, in which case, it would start at the end of the CZ. The southern end of Runway 14 / 32 has an APZ II that is either within the boundaries of NAS PAX or over open water. The southern end Runway 06 / 24 also has a fan-like APZ II associated with the various flight patterns, a large portion of which is located outside the boundaries of NAS PAX over residential and commercial land in the Lexington Park, Southampton, and Southgate Park neighborhoods. A master plan is being developed for Lexington Park, which will include possible guidance on compatibility with APZ's.

There has been growth in the communities around NAS PAX, including residential, hotel, office, and commercial development, particularly along State Route 235 and in Lexington Park. There has not been any recent residential development within the APZ II, but there are existing residential uses within the APZ II. This existing development was built before creation of the AICUZ Overlay Zoning District around NAS PAX. Figure 5-10 illustrates the zoning within the safety zones at NAS PAX, though the zoning is superseded by provisions of the AICUZ Overlay District which prohibits new incompatible development from occurring in the safety zones. Figure 5-11 shows the existing land use within the safety zones at NAS PAX.

Existing Tools

NAS Patuxent River BASH Reduction Program

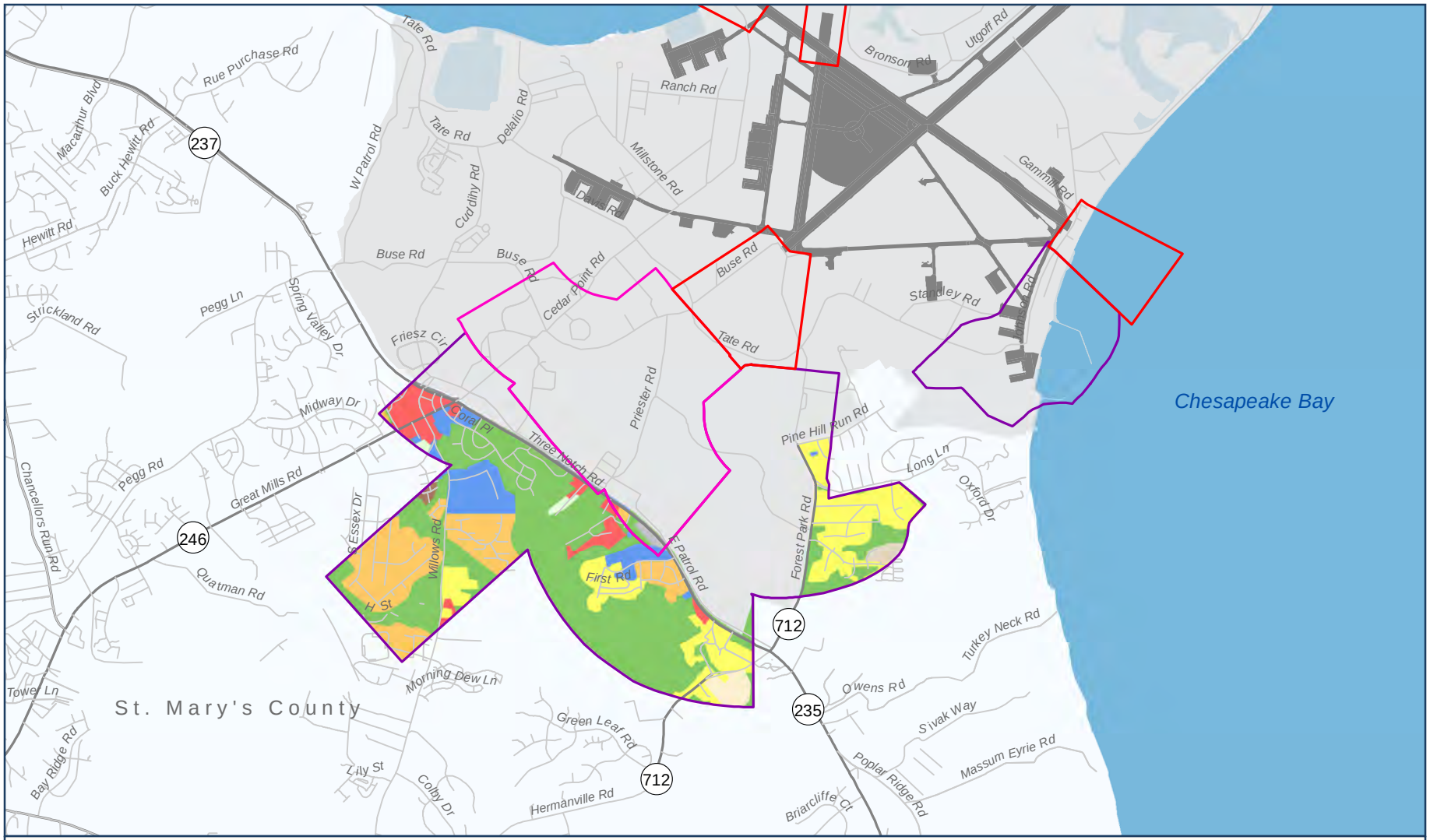
NAS PAX implemented a BASH Reduction Program to identify procedures to minimize wildlife and bird strike occurrences with aircraft. A BASH program is designed to control birds, alert aircrew and operations personnel, and provide increased levels of flight safety, especially during the critical phases of flight, take-off, and landing operations. Specifically, the program is designed to accomplish the following:



Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-10
Zoning Within NAS PAX Main Station Safety Zones

NAS_PAX_Fig5-10_NAS_PaxSafety_Zoning_20141021_CJM.pdf



Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-11

Existing Land Use Within NAS PAX Main Station Safety Zones

NAS_PAX_Fig5-11_NAS_PaxSafety_ELU_20141021_CJM.pdf

- Monitor bird and wildlife activity.
- Establish procedures to identify high hazard situations and establish aircraft and airfield operating procedures to avoid these situations.
- Ensure that all permanent and transient aircrews are aware of bird hazards and the procedures for avoidance.
- Develop guidelines to decrease the attractiveness of the airfield to birds and disperse the number of birds on the airfield.

This program includes an Animal / Bird Strike Report form that can be filled out to report collision incidents to obtain information and help reduce future incidents or address locations of bird activity.

AICUZ Study for Naval Air Station Patuxent River, Maryland, 2009

The 2009 AICUZ Study for NAS PAX identifies the CZs associated with the two primary runways and the utility runway at the installation. The study discusses the implications and concerns of structures being built in the runway safety zones and identifies the types of development that are compatible and incompatible within the CZs and APZs. Specifically, certain land uses that concentrate large amounts of people such as housing, churches, and schools should not be built in the CZs or APZs. The AICUZ Study includes a table that identifies the types of uses that are incompatible or compatible within each runway safety zone, as well as the aircraft noise contours, that can be used by local planners to guide future development.

AICUZ Study for Webster Field St. Inigoes, Maryland, October 2006

The 2006 AICUZ Study for Webster Field identifies the CZs associated with the two active runways at the installation. The study discusses the implications and concerns of structures being built in the runway safety zones and recommends that no development or structures should occur within the CZs. The study recommends that St. Mary's County adopt Webster Field AICUZ compatibility areas into its zoning and comprehensive plan to mitigate future incompatibilities.

Although an AICUZ was completed for Webster Field in 2006, no local tools such as St. Mary's County AICUZ Overlay applied to the areas around NAS PAX Main Station have been developed to date. The Navy and St. Mary's County are currently exploring the potential for the need and application of a similar overlay to the St. Inigoes Shores area.

St. Mary's County Comprehensive Plan

St. Mary's County's Comprehensive Plan recognizes the economic and social importance of NAS PAX to the local and regional communities. The plan outlines policies to support the continued missions and operations of NAS PAX, including supporting the purchase of property or easements to protect the Navy's missions from encroachment. The policies in the Comprehensive Plan have also been transferred into the Zoning Ordinance to develop an AICUZ Zoning Overlay to protect lands within the safety zones and noise from incompatible future development.

The 2010 St. Mary's County Comprehensive Plan does not specifically address compatibility policies with Webster Field, but it does state that the County should "collaborate with the Navy in a partnership to achieve full utilization of research, development, test and evaluation at Patuxent River and Webster Field."

St. Mary's County Zoning Ordinance

St. Mary's County's Zoning Ordinance addresses the safety zones by establishing an AICUZ and Airport Environs Overlay that provides provisions for the CZ, APZ I, and APZ II, as well as imaginary surfaces and noise zones. The overlays were established to ensure land use compatibility around the federal and municipal airports in the county and to protect the safety of the public and provide development and height regulations for the safe operation of aircraft. The AICUZ Overlay establishes guidelines within the CZ, APZ I, and APZ II to regulate any new residential and potentially incompatible development from occurring within these areas. The Zoning Ordinance establishes use types that are incompatible or compatible at differing levels based on the use and intensity to determine if they may be allowed in the zones.

Lexington Park Development District Master Plan

Lexington Park is adjacent to the southern boundary of NAS PAX Main Station. As such, development must be properly managed and coordinated to avoid incompatible development from occurring. The Lexington Park Development District addresses the needs and recommendations identified in the AICUZ to promote compatible development between the community and NAS PAX. The goals of the district include promoting development and redevelopment that respects the safety goals of the AICUZ and capturing the economic benefit

provided by personnel working at NAS PAX. The district builds off of the benefits of preserving land within the safety zones as green space to protect the future military missions and retain the rural environment of the area.

Section 2.2.1.B is directed to avoid encroachment on NAS PAX operations by directing development away from APZ. The plan also anticipates that parts of the proposed downtown area will be subject to development restrictions based on compatibility with the NAS PAX CZ and APZ zones. Objective A, Town Center 5, identifies the intention to, "make the town center a green oasis, taking advantage of AICUZ mandated open space." This in reinforced in Objective B, AICUZ, which encourages taking advantage of the, "high open space requirements within the AICUZ to create a town center with large amounts of attractive green space."

Real Estate Disclosures

The State of Maryland and St. Mary's County each have requirements for real estate disclosures with an acknowledgement by both the buyer and seller of a property that it is affected by military safety zones and / or noise. For the operational areas around Webster Field, this is referred to as the Military Aircraft Operations Disclosure Clause and was developed through the cooperation of Navy officials and the Southern Maryland Association of Realtors.

Vertical Obstructions

Vertical obstructions are created by buildings, trees, structures, or other features that may encroach into the navigable airspace or line of sight radar signal transmission pathways used by the military. These obstructions can be a safety hazard to both the public and military personnel and potentially impact military readiness.

Vertical obstructions can compromise the value of low-level flight training by limiting the areas where such training can occur. These obstructions can include a range of items from man-made, such as telephone poles, utility transmission towers, and radio antennas, to natural, such as tall trees and land features.

Vertical obstructions can also interfere with radar transmissions, compromising the integrity of data transmission between the transmitter and receiver. Though most critical near the transmitter, the geographic area impacting the transmissions, or radar viewshed, can be broad depending on the distance between the transmitter and receiver.

Compatibility Assessment

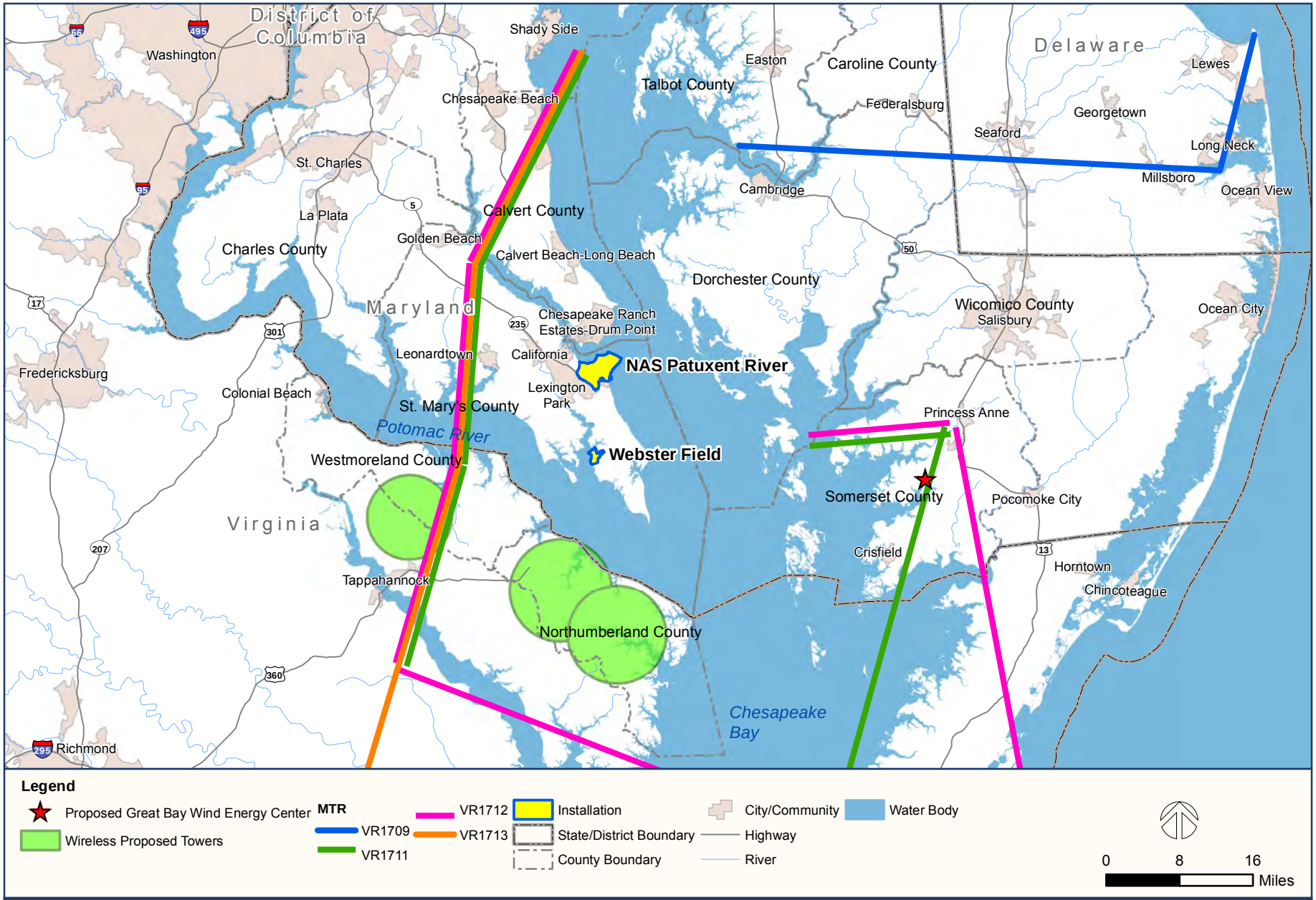
ISSUE VO-1	**Interference with Low Level Flight Activity.** Future development of wind turbines and cell towers are likely to create vertical obstruction issues, particularly for UASs and low level aircraft

Low level flight activity associated with NAS PAX occurs over both land and water, primarily within designated flight paths or training areas. Vertical obstructions can compromise the safety of low-level flight training and limit the areas where such training can occur. These obstructions include man-made structures and natural features, but most often take the form of utility poles, cellular communication towers, tall buildings (with or without roof mounted features) and wind energy turbine towers (including turbine blades).

Pursuant to Federal Regulation Title 14, Part 77, the application of height restrictions are more rigorous the closer the object is to an airfield, impacting the navigable airspace within the imaginary surfaces.

Some of these surfaces extend for several miles beyond the airfield into surrounding jurisdictions. The jurisdictions primarily impacted by these surfaces include St. Mary's and Calvert counties and small coastal portions of Westmoreland and Somerset counties.

The development of alternative energy facilities, such as wind turbines, has the potential to interfere with low-level flight critical to NAS PAX operations and affect future missions. Figure 5-12 shows two areas of potential concern – the Great Bay Wind Center and broadband tower target installation areas.



Matrix DESIGN GROUP

Figure 5-12

Wind Energy Project and Tower Considerations within Military Training Routes

Sources: The Northern Neck and Middle Peninsula Regions Community Broadband Planning Phase II—Network Implementation Plan FINAL REPORT July 29, 2009; NAS PAX, 2010

NAS_PAX_Fig5-12_Pax_WindEnergy_20141211_CJM.pdf

Wind Energy

Both Virginia and Maryland are actively pursuing the development of land-based and off-shore wind energy. Based on recent studies, there are particular locations with ideal prospects for economically viable wind power, primarily within coastal areas.

Virginia estimates 28,000 megawatts of potential wind power production is available statewide. The Virginia Coastal Energy Research Consortium estimates that the production of 3,000 megawatts of energy is possible in shallow near-shore waters close to NAS PAX, though current studies focus on the wind potential in the Atlantic Ocean or in southern Virginia, well outside the NAS PAX JLUS Study Area. There are no current or proposed leases in Virginia within the JLUS Study Area.

The proposed Great Bay Wind Center energy project is a potential 29 turbines / 150-megawatt wind farm project in Somerset County proximate to NAS PAX which is currently under federal review. NAS PAX and the wind project operator have entered into an agreement to alleviate the impacts that the turbines might have on Navy testing and training by shutting them down during these operations. Concerns have been raised that this would not be sufficient to protect the installation mission and could compromise the ability to test the stealth capability of aircraft and long-term mission at NAS PAX.

In addition, both states consider land-based wind turbine towers as a potential source of income for farmers to supplement and subsidize income from agricultural operations. While economic sustainability of farmland is a major policy objective in both states, towers located in low level flight paths could create safety hazards and impair operations.

Telecommunications

Telecommunication towers also present potential safety conflicts. Of particular concern is the fact that these largely rural areas are at present underserved by broadband and cellular services and economic development interests have been working with utilities to plan for and carry out system expansion.

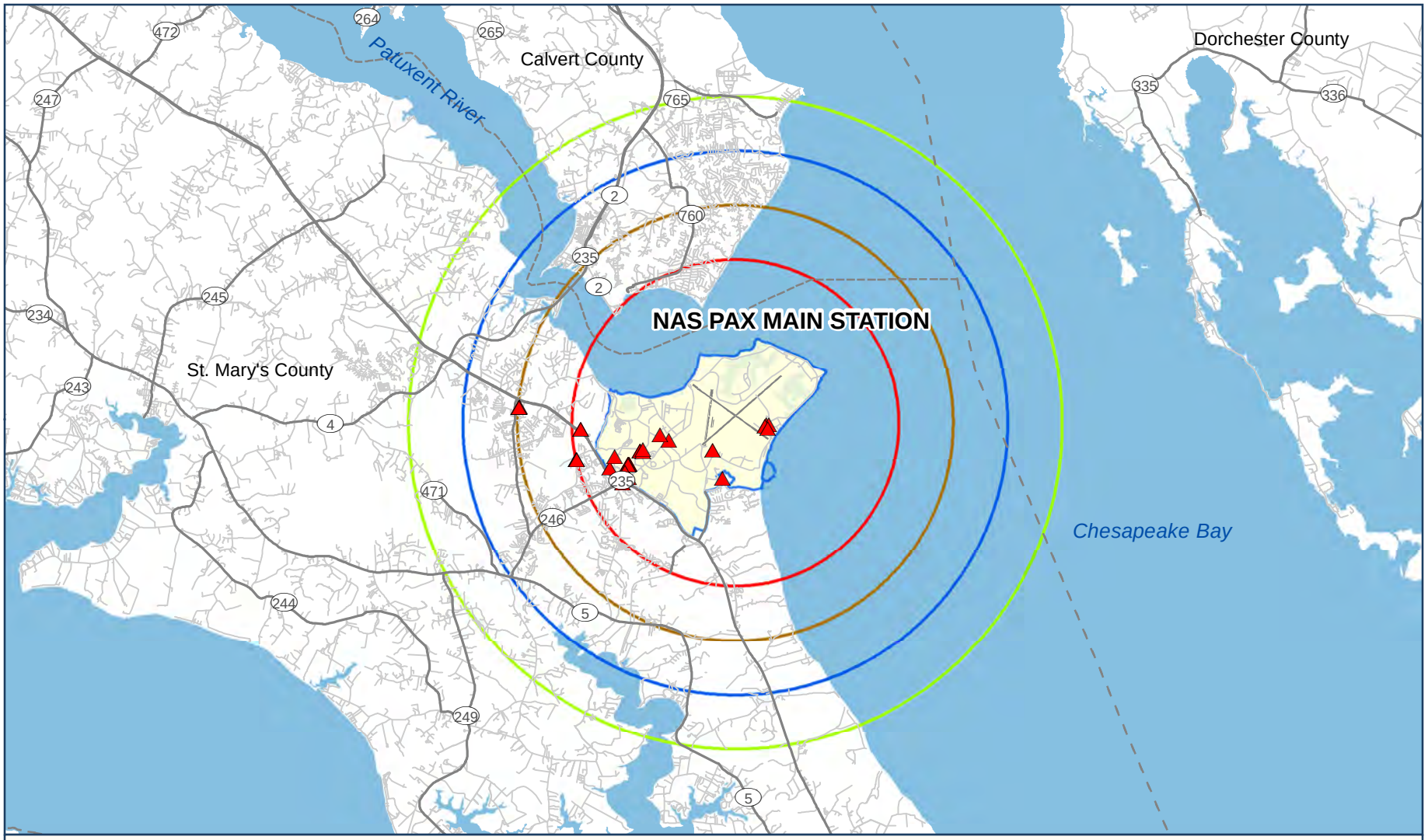
Military training routes (MTRs) traverse the areas that are proposed for broadband communication and infrastructure improvement. According to NAS PAX, the MTRs located within the NAS PAX JLUS Study Area typically have a minimum floor of 400-500 feet above ground level.

Given the rural nature of the area and the flight tracks of the MTRs, it is very unlikely that conventional buildings will approach these heights, i.e. 40 stories and above; however, wind and telecommunication towers may be developed that exceed these heights. Areas for proposed wireless towers proximate to the installation pose a threat to low level flying operations as well as aircraft safety zones present at NAS PAX. The Northern Neck Planning District Commission conducted an assessment of broadband need within the Northern Neck in 2009. The implementation element of the plan identified proposed areas for wireless towers in Westmoreland and Northumberland counties. The findings of this report were reinforced in the 2013 Broadband Study Recommendation for Virginia's Middle Peninsula prepared by the Center for Innovative Technology Broadband.

ISSUE VO-2	***Airfield Protection.*** Tall structures in proximity to the airfield have the potential to interfere with the safe operation of the airfield.

Airfield protection addresses obstructions in proximity to the airfields and applies to the height of all vertical structures that may pose a safety risk to pilots and aircraft. Vertical structures within these areas can create hazards to avigation. Since these areas may include property outside the installation perimeter, regulations or land acquisition may be employed to protect areas surrounding an airfield.

An Obstruction Evaluation identifying all structures and their heights in the area surrounding NAS PAX Main Station was conducted by the Federal Aviation Administration (FAA) pursuant to Part 77. Based on the evaluation analysis of FAA height criteria, five structures were identified off the installation that exceed the FAA structure height criteria for their location. Figure 5-13 identifies the locations of these structures based on the FAA criteria.



Legend

FAA Structure Height Criteria

- Exceeds
- Up to 200' @ 3NM
- Up to 300' @ 4NM
- Up to 400' @ 5NM
- Up to 500' @ 6NM
- Installation
- County Boundary
- Runway
- Water Body
- Highway
- Road

0 2 4 Miles

Matrix DESIGN GROUP

Sources: ESRI, 2010; NAS Pax, 2010

Figure 5-13
Vertical Obstructions Affecting Navigable Airspace Surrounding NAS PAX Main Station

NAS_PAX_Fig5-13_NAS_Pax_Vert_20141211_CJM.pdf

Pursuant to the St Mary's County Comprehensive Plan, the area surrounding the NAS PAX Main Station is intended to become the mixed-use Lexington Park Town Center with a residential development density in the area surrounding Gate 2 of the Main Station ranging from one dwelling unit per acre to 30 units per acre

However the Comprehensive Plan also recognizes the need for compatibility between the height of development and safety through Policy 4.1.3D.vi. which encourages "building heights that will make mixed use projects economically feasible, except where AICUZ and AE zoning dictates lower heights."

Comprehensive Plan Section 11.4.4 Air Facilities includes Policy A.i.a. which states, "Implement AICUZ and other zoning restrictions in support of non-encroachment policies relative to the Base Realignment and Closure (BRAC) decisions."

The St. Mary's Comprehensive Zoning Ordinance contains an AICUZ and AE Overlay including a prescriptive set of compatible land uses to ensure compatibility with Webster Field.

Per the development standards in Article 3 Schedule 32.1, the height of all structures is subject to site-by-site analysis for compliance with Chapter 43 of the Zoning Ordinance, AICUZ and AE height restrictions. The base height for structures surrounding Webster Field is 40 feet. However, small wind energy systems up to 150 feet in height are permitted accessory to a principal use and commercial communication towers are permitted with conditional standard. Based on the evaluation analysis of FAA height criteria, five structures were identified off Webster Field that exceed the FAA structure height criteria for their location. Figure 5-14 identifies the locations of these structures based on the FAA criteria.

It is important to note that the AICUZ study does not identify height limits, yet recommends height restrictions should be identified around airports. These height limits are actually identified in jurisdictional zoning codes and overlay district regulations. The absence of clear height regulations could lead to an arbitrary interpretation and application of the height provisions in the overlay resulting in incompatible structures posing an avigation hazard to pilots and aircraft. Although there is a potential for misinterpretation which could lead to possible incompatible development, it is expected that no new structures within the vicinity of NAS PAX will be approved without technical input from the Navy.

Existing Tools

St Mary's County Comprehensive Plan

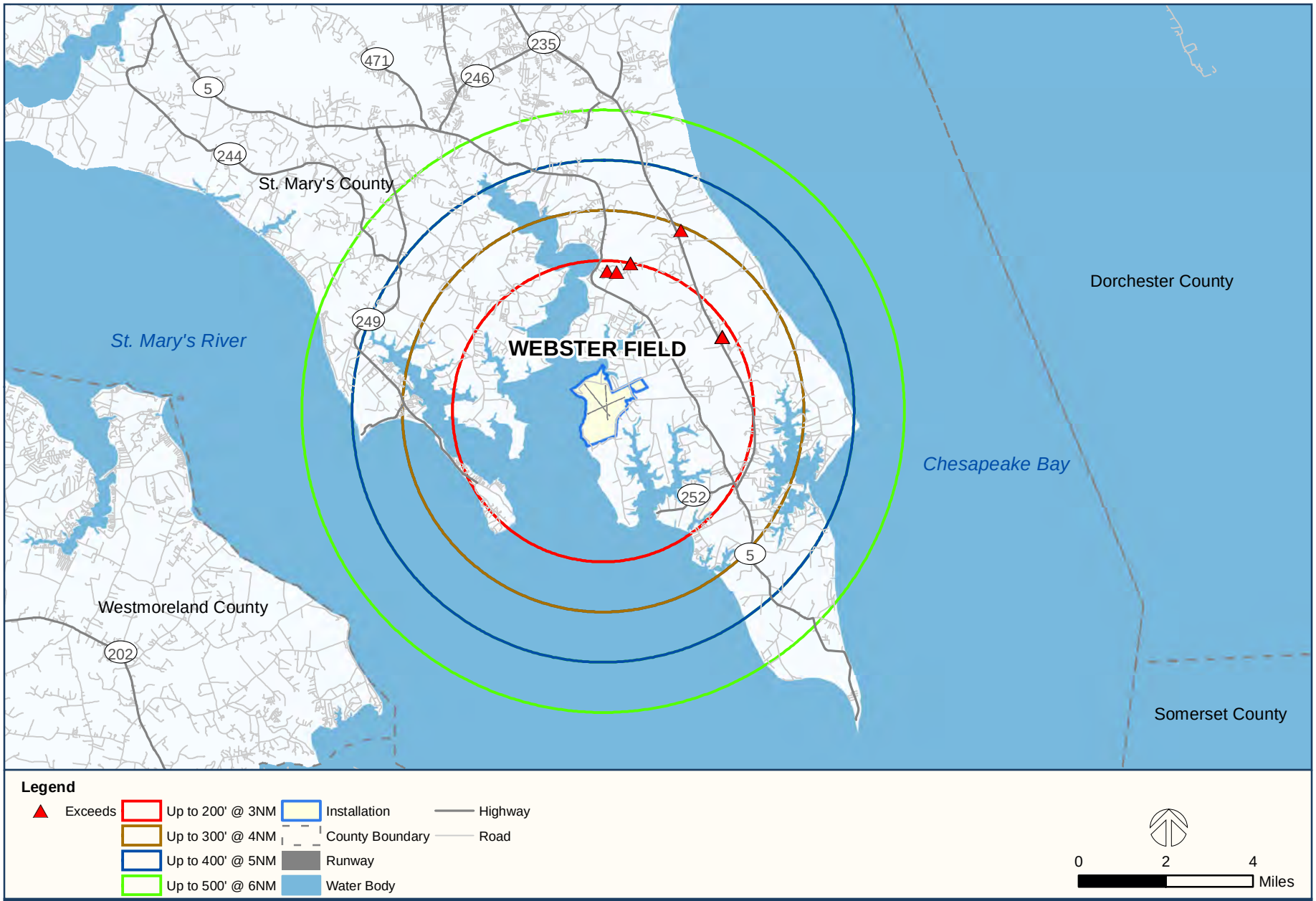
St. Mary's County adopted Comprehensive Plan policies, the Lexington Park Development District Master Plan, and an Air Installations Compatible Use Zone (AICUZ) and Airport Environs (AE) Zoning Overlay to address compatibility within the area surrounding NAS PAX Main Station. Although the Comprehensive Plan recognizes that height restrictions may be needed per the 2009 AICUZ Study, it does not identify height limits or recommend that limits be developed.

St. Mary's County Comprehensive Zoning Ordinance

The St. Mary's Comprehensive Zoning Ordinance contains an AICUZ and AE Overlay including a prescriptive set of compatible land uses to ensure compatibility with NAS PAX.

Per the development standards in Article 3 Schedule 32.1, the height of all structures is subject to site-by-site analysis for compliance with Chapter 43 AICUZ and AE height restrictions. The base permitted height within the Lexington Park Development District ranges from 40 feet in the Residential Preservation District to 100 feet in the mixed-use zoning districts. However, small wind energy systems up to 150 feet in height are permitted as accessory uses to a principal use within all zoning districts and commercial communication towers are permitted with conditional standards in the RPD (Rural Preservation District), RCL (Rural Commercial Limited), RL-T (Residential, Low Density – Transitional), VMX (Village Center Mixed Use), TMX (Town Center Mixed Use), CMX (Corridor Mixed Use), CC (Community Commercial), I (Industrial), and OBP (Office and Business Park) Zoning Districts.

The St. Mary's County Comprehensive Zoning Ordinance provides height exemptions for public communication towers in all zoning districts and for commercial communication towers in residential, mixed-use, and industrial/office park zoning districts with conditional use approval. The ordinance allows small wind energy systems up to 150 feet in all zoning districts as an accessory to a principal use.



Sources:ESRI, 2010; NAS PAX, 2010

Figure 5-14
Vertical Obstructions Affecting Navigable Airspace Surrounding Webster Field

NAS_PAX_Fig5-14_Webster_Vert_20141211_CJM.pdf

Section 43.1.2.b. of the AICUZ and AE Overlay states that sub-districts are designated on the Official Zoning Maps and describes the vertical aspects of each zone: Approach Surface, Conical Surface, Heliport Imaginary Surfaces, Horizontal Surface, Primary Surface, Transitional Surface, and Runway Protection Zone. The description of these zones is

very technical and does not identify actual permitted heights for structures, only the parameters of each surface area. Since these surfaces are also not identified on the Official Zoning Map, the absence of clear height regulations could lead to an arbitrary interpretation and application of the height provisions in the overlay resulting in incompatible structures posing an avigation hazard to pilots and aircraft.

Lexington Park Development District Master Plan

The Draft Lexington Park Development District Master Plan prepared in 2013 is intended to provide a framework for area growth into the future, placing emphasis on new and infill development.

Section 9.3.3.C.1 of the plan encourages increased densities allowing "an increase of up to 50 percent of floor area ration for each floor above the second (Project must be AICUZ and AE overlay compliant, total FAR not to exceed 200 percent of base FAR, and total height not to exceed allowed building height in the zone)."

The Lexington Park Development District Master Plan relies on the AICUZ and AE Overlay (and incorporated findings of the 2009 AICUZ Study) to define appropriate structure heights.

Calvert County Zoning Ordinance

A portion of Calvert County is within the imaginary surfaces associated with NAS PAX Main Station. Calvert County does not regulate structure heights relative to NAS PAX air operations. NAS PAX must determine that the wind energy system will not cause interference with military activities. The Calvert County Zoning Ordinance permits the following potentially incompatible structures within the NAS PAX imaginary surfaces and Part 77 vertical obstruction boundaries:

- Small wind energy systems up to 150 feet as an accessory to a principal use in all zoning districts except WL (Wetlands) and HD (Historic Districts).
- Communication antennas and towers of unlimited height permitted as special exception on government property in all zoning districts except WL (Wetlands), APD (Agricultural Preservation Districts) and HD (Historic Districts)
- Communication antennas of unlimited height permitted as special exception on private property in all zoning districts except APD (Agricultural Preservation Districts)
- Communication towers of unlimited height permitted as special exception on private property in all zoning districts except WL (Wetlands) and HD (Historic Districts)

Section 3-3.03L of the Zoning Ordinance stipulates that ground mounted energy systems are permitted provided that approval of the building permit application shall be subject to a determination by the Dept. of the Navy, Naval Air Station at Patuxent River, Maryland, that the wind energy system will not cause interference with military activities. This section limits the height of ground mounted energy systems measured from base to the highest point of a turbine blade to 85 feet for lots less than once acre and to 150 feet on lots of one acre or greater in area.

Charles County Zoning Ordinance

The Charles County Zoning Ordinance exempts public utility towers and wireless communication antennas from the height regulations and allows them as a special exception in all zoning districts.

Dorchester County Zoning Ordinance

The Dorchester County Zoning Ordinance exempts chimneys, spires, stacks, and flagpoles from the height regulations. Communication towers up to 65 feet in height are permitted on government land for amateur radio operators or home television towers in all zoning districts. Communication towers are permitted up to 600 feet in the I-1 (Light Industrial), I-2 (Heavy Industrial), and B-2 (Neighborhood Business) Zoning Districts and as a special exception in RC (Resource Conservation), RR-C (Rural Residential-Conservation), and A-C (Agricultural Conservation) Zoning Districts.

The zoning regulations permit small wind energy systems to a maximum height of 200 feet as an accessory to a principal use in all zoning districts.

The height exemptions could result in vertical obstructions in eastern Dorchester County.

City of Cambridge Zoning Ordinance

The City of Cambridge Zoning Ordinance allows hospitals up to 100 feet in height and exempts building elements, communication towers, and antennas from the height regulations. Communication towers and antennas are permitted by special exception in residential and industrial zoning districts.

Somerset County Zoning Ordinance

Airspace assets associated with NAS PAX located in or affecting Somerset County include restricted areas, military training routes, and UAS routes.

The Somerset County Zoning Ordinance exempts utility lines, poles, and towers; towers; steeples; flagpoles; stacks; silos; tanks; antennas; and monuments from the height regulations. Commercial communication antennas are permitted in commercial, industrial, and residential zoning districts and as a special exception in the AR (Agricultural Residential) and AP (Airport) Zoning Districts. They are prohibited in the A-2 (Airport Overlay) Zoning District.

Small wind energy systems are permitted up to 150 feet in residential zoning districts.

Wicomico County / City of Salisbury Zoning Regulations

The Wicomico County Zoning Regulations, used by both the county and the City of Salisbury, provide exemptions to the height regulations for communication towers, steeples, silos, flagpoles, monuments, observation towers, smoke stacks, farm structures, chimneys, storage tanks, bulk storage structures, and water towers.

Communication towers are permitted as special exception in A-1 (Agricultural-Rural), C-2 (General Commercial) and, I-2 (Heavy Industrial) Zoning Districts.

Small wind energy systems are permitted up to 150 feet provided they are not an obstruction to navigable airspace.

Talbot County Zoning Ordinance

Although the only Restricted Airspace associated with NAS PAX in Talbot County is VR-1709, which traverses the southern tip of the county between the town of Trappe and the Choptank River, various types of aircraft from NAS PAX occasionally use Easton / Newnam Field Airport in central Talbot County for touch-and-go, instrument approaches, and low approaches.

The Talbot County Zoning Ordinance establishes a general maximum structure height throughout the county of 40 feet with the following exceptions:

- 75 feet for steeples, chimneys, and private antennas permitted with conditions in all zoning districts;
- 100 feet for fire towers; hospitals permitted by special exception in the General Commercial Zoning District; silos permitted as an accessory to a principal use permitted in all districts except for Limited Commercial, General Commercial, and Limited Industrial; and monuments permitted in the General Commercial and Limited Industrial Zoning Districts; and
- 200 feet for communication towers and grain elevators permitted by special exception in all districts except for Rural Residential, Town Conservation, Town Residential, and Village Center.

Talbot County's Zoning Ordinance includes the Easton Airport Overlay District, created for the purpose of preventing hazards or obstructions to aircraft operating to, from, or in the vicinity of the Easton / Newnam Field Airport, and informing residents and businesses undertaking development activity about the presence of the airport.

In lieu of predetermining the allowable vertical heights of buildings within the Airport Overlay District, the Zoning Ordinance requires the Planning Director to consider input from the airport manager prior to approving any proposed construction activity in the overlay district. Heights that would constitute a hazard or obstruction to aircraft are identified on an "Airport Airspace Drawing" maintained by Easton / Newnam Field Airport.

Caroline County Zoning Ordinance

The Caroline County Zoning Ordinance exempts communication towers, silos, steeples, stacks, flagpoles, water towers, and windmills (except those for small wind energy systems) from the height regulations. Small wind energy systems have a maximum permitted height of 199 feet.

Small wind energy systems are permitted in all zoning districts and communication towers are permitted as special exception in all zoning districts except MH (Mobile Home District)**.**

The Ridgley Airport in central Caroline County is occasionally used by T-34s from NAS PAX for training purposes, but unlike most of the other Eastern Shore counties, Caroline County does not have an overlay zone associated with its airport.

Except within an area defined as an airport approach zone by the Federal Aviation Administration or other government agency, height regulations do not apply to certain structures such as public buildings and institutional uses. These height limits are consistent with Naval aviation because they are below the operational floors of military airspace over the county.

Northumberland County Zoning Ordinance

The Northumberland County Zoning Ordinance exempts spires, chimneys, cooling towers, flagpoles, water towers, monuments, and radio or communication towers from the height restrictions.

High-speed internet antennas less than 100 feet are permitted in the C-1 (Conservation), A-1 (Agricultural), R-1 (Residential General), R-2 (Residential Waterfront), R-3 (Residential Restricted), R-4 (Residential Recreational), B-1 (Business General), and M-1 (Industrial Light) Zoning Districts.

High-speed internet antennas greater than 100 feet are permitted as special exception in the C-1 (Conservation), A-1 (Agricultural), R-1 (Residential General), R-2 (Residential Waterfront), R-3 (Residential Restricted), B-1 (Business General), and M-1 (Industrial Light) Zoning Districts.

Wind turbines are permitted in all zoning districts subject to conditions of the governing body. The Zoning Ordinance does not go further in addressing what the conditions of the governing body must include. This could lead to oversight in the permitting of wind turbines that may encroach on military airspace.

Any permitted heights per each jurisdiction not identified in this section can be found in Table 5-1, under issue FS-4.

Water Quality / Quantity

Water quality / quantity concerns include the assurance that adequate water supplies of good quality are available for use by the installation and surrounding communities as the area develops. Water supply for agriculture and industrial use is also considered.

Compatibility Assessment

ISSUE WQ-1	***Salt Water Intrusion.*** Water quality / quantity concerns include the assurance that adequate water supplies of good quality are available for use by the installation and surrounding communities as the area develops. Water supply for agriculture and industrial use is also considered.

Increasing development around NAS PAX has resulted in water quantity and quality concerns as resources are depleted and salt water intrusion has occurred. Salt water intrusions occur generally when an aquifer near the coast is over pumped leaving room for salt water to fill into the vacuum. Continued development in St. Mary's County and the region will continue to compete with the installation's need for naturally limited resources such as groundwater. Water quantity and quality are going to be increasingly important with salt water intrusion already occurring in well water.

Coastal Maryland water supply is largely dependent on groundwater. As population increases in coastal Maryland, the need for groundwater also increases. Groundwater is a finite natural resource that sustains Maryland's natural ecosystems in addition to supporting significant and growing human water supply demands. Approximately one third of Maryland's population currently depends on groundwater for drinking water. As the population in Maryland continues to grow, the demand for groundwater for drinking, irrigation, industry, and other uses is increasing, while threats to groundwater quality related to that development also

increase. Programs to better understand and manage this critical resource must be strengthened to ensure that an adequate supply of groundwater is available for existing and future generations.

The USGS has made observations in groundwater levels since the 1970s and recorded significant declines in water levels. Water levels throughout Southern Maryland aquifers have declined during the last half of the 20th century. Water levels in certain confined aquifers in southern Maryland and the Aquia aquifer (underlying the JLUS Study Area) show long-term steady declines in areas of high use. Increased water demands from a growing population place new stresses on these aquifers.

Source: USGS; http://stateofthecoast.noaa.gov/water_use/groundwater.html; Maryland Department of the Environment, Groundwater Protection Program

Existing Tools

USGS Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System in Maryland

The United States Geological Survey in cooperation with the Maryland Geological Survey and the Maryland Department of the Environment conducted the Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System in Maryland. The comprehensive assessment has five goals that are meant to improve the current information and tools available to assess the state of groundwater aquifers. The five goals are as follows:

- Document the geological and hydrologic characteristics of the aquifer system in the Maryland Coastal Plain and adjacent areas of neighboring states.
- Construct a regional groundwater-flow model, incorporating detailed studies of water budgets in recharge areas and confining bed hydraulic characteristics.
- Improve documentation of patterns of water quality in all Coastal Plain aquifers including the distribution of saltwater.
- Enhance groundwater-level, streamflow, and water-quality-monitoring networks in the Maryland Coastal Plain.
- Develop science-based tools to facilitate sound management of the groundwater resources in the Maryland Coastal Plain.

Maryland's Comprehensive Groundwater Protection Program

The Maryland Comprehensive Groundwater Protection Program established groundwater protection goals and recommended ways to improve groundwater protection. The Maryland Groundwater Protection Strategy, originally developed in 1986, is guided by the following goal:

> *The State of Maryland is committed to protect the physical, chemical and biological integrity of the groundwater resource, in order to protect human health and the environment, to ensure that in the future an adequate supply of the resource is available, and in all situations, to manage that resource for the greatest beneficial use of the citizens of the State.*

State, federal, and local agencies continue to work cooperatively to achieve this goal with programs that educate business, industry, and the public about the importance of water protection and conservation, in concurrence with programs that enforce federal and State water protection laws. Maryland has become a leader in the implementation of land use practices that minimize the impacts of development on surface and groundwater with best management practices, sensitive area protection (forests, wetlands, groundwater recharge areas, etc.) and Smart Growth that promotes development in regional growth centers where transportation and other public infrastructure is already in place.

Please see the next page.

Please see the next page.

Comment #	Name	Concerns/Comments	Response
1	Anon	What is the purpose of the expanded buffer? Will it be as restrictive as the AICUZ Overlay Zone?	The expanded buffer was intended to provide a geography for additional awareness and coordination with NAS PAX, and consideration of land uses should mission changes at NAS PAX occur in the future. The buffer has been removed from the JLUS recommendations.
2	Anon	The Lexington Park and Great Mills development zones should be consistent with the Safety Military Compatibility Area per the JLUS. Why invest in an area that may be unsafe to the public?	The JLUS recommends incorporating the Safety MCA into local planning documents and updating zoning codes to address safety zones.
3	JP	Incorporating the safety buffer will have a detrimental impact on the value of my property. Please consider the implications of the recommended safety buffer as it applies to me and the shared burden it places on the greater community.	The buffer has been removed from the JLUS recommendations.
4	LC	Request that the proposed safety buffer is not included in the Final JLUS document. Letters to the Planning Commission regarding the AICUZ Overlay are attached which underscore the impact of the AICUZ and any further encumbrances by an added safety buffer.	The buffer has been removed from the JLUS recommendations.
5	SS	HHHunt Corporation is currently completing a 650 unit apartment community with the last phase to be completed in April 2015. The complex was funded through the HUD mortgage program. This property is currently outside the AICUZ but would be within the proposed safety buffer. If the property is within the safety buffer, neither this mortgage nor any financing would be available. HHHUnt would be unable to sell or refinance the property. Notifying current and potential residents would have an adverse marketing impact. This would also negatively impact our insurance rates. Please consider these issues when rendering a decision about this change.	The buffer has been removed from the JLUS recommendations.
6	EC	Concern over devaluation of property within the proposed safety and noise buffers. Recommend removing the buffer until there is way to adequately compensate landowners.	The buffers have been removed from the JLUS recommendations.
7	EC	Consider inter-parcel density transfers for properties bifurcated by the AICUZ boundary and inter-parcel density transfers from sender sites within the AICUZ to parcels outside the AICUZ.	The JLUS includes recommendations to address safety zones. Transfer of development rights could be one such tool that St. Mary's County may consider employing.

Comments

Your comments are VERY IMPORTANT to the development of this Plan and will be taken into consideration throughout the project duration.

What is the purpose of the expanded buffer?

Will the expanded buffer be as restrictive as the current AICUZ overlay zone?

Please return this comment form to the registration table or to a project representative.

Comments

Your comments are VERY IMPORTANT to the development of this Plan and will be taken into consideration throughout the project duration.

Based upon the Safety Military Compatibility Area - it would seem that the Lexington Park & Great Mills Rd Development Zones (areas) be modified to be compatible w/ the mission of Pax River NAS

why invest in an area that in the future may be "unsafe" to the public.

Please return this comment form to the registration table or to a project representative.

Pembrooke, LLC
30069 Business Center Drive
Charlotte Hall, Maryland 20622

November 17, 2014

Mr. George Clark
JLUS Project Manager
Tri-County Council for Southern Maryland
PO Box 745
Hughesville, Maryland 20637

Re: Naval Air Station Patuxent Joint Land Use Study

Gentlemen:

I am writing you today regarding the above referenced study as it relates to the recommendation of adding a one half mile wide Safety Buffer beyond the current APZ II zone. I recognize and agree with the need to protect the Navy's mission at Pax River, but we need to recognize that the protection being proposed comes at a price, and in my circumstance, a significant price.

I own several properties on Willows Road that are outside the current APZ II boundary, the Pembrooke subdivision, Abberly Crest Apartments, and the proposed Bradley Boulevard residential community. I have spent the last 14 years developing these properties for residential use with over 940 units currently completed. The properties that have yet to be developed have a by-right residential zoning density of 5 units per acre.

If the proposed Safety Buffer recommendations are accepted by the County, and the densities are reduced to the DOD APZ II guidelines (2 units per acre), the reduction in allowable density on my undeveloped property will be significant, and will result in a huge monetary loss. The undeveloped and unapproved portions of my property, over 105 acres, presently allow for the construction of 526 dwelling units, at the current 5 units per acre density. At 2 units per acre (per DOD APZ II guidelines) my density decreases to 210 units, a loss of 316 dwelling units. If the County adopts its current APZ II guidelines for this new safety buffer, my allowable density would go from 526 dwelling units to zero (0), as there is no residential density allowed in the County's APZ II zone.

The economic losses would be devastating to Pembrooke, LLC. The undeveloped (raw) value in today's dollars is $26,000 per unit. This translates to a loss of income/profit to Pembrooke, LLC in the amount of $8,216,000, if the density is reduce to two units per acre, and loss of $13,767,000 if the density is reduced to zero (0). The potential retail value of the finished townhouses is currently estimated at $240,000 per unit which implies a gross retail loss in sales of between $75,840,000 and $126,240,000.

As you can see these numbers are mind boggling, and deserve significant thought. I would appreciate your consideration, as this process moves forward to protect the interests at Pax River, but please not at my sole expense. If the JLUS recommendations are good for the entire community then the entire community should bear the costs.

Thank you for your consideration and please feel free to contact me for any additional information you may require. I can be reached at my office at 301-884-4133 or by email at johnp@cmigc.com.

Sincerely,

John K. Parlett, Jr.
Pembrooke, LLC

Cc: St. Mary's Board of County Commissioners

NOV 18 2014

November 18, 2014

Mr. George Clark
Tri County Council
P.O. Box 745
Hughesville, MD 20637

RE: October 2014 Draft Joint Land Use Study (JLUS)

Dear Mr. Clark,

Please accept this letter and enclosures as part of the open record period for the DRAFT JLUS currently under review.

The October 2014 Draft JLUS recommends an additional Safety Buffer that appears to encompass as much or more land than what is already in the AICUZ. On page 6-5 of the JLUS Study, under heading NAS PAX Main Station Military Compatibility Areas (MCAs), Safety MCA, third paragraph, last sentence it states the Safety Buffer should follow the APZ II DOD Compatibility Guidelines. I assume this means now we have many more landowners who could be encumbered by the 50 persons per acre or 1 person per 500 square feet in the APZ 2, as well as all the other restrictions. The proposed Safety Buffer area encompasses existing commercial development, major residential developments, as well as new commercial and residential projects currently in the development review process. I believe this Safety Buffer, if implemented by the County, would result in a taking of property value. The County should not adopt this Safety Buffer without just compensation to property owners. Compensation could be to purchase property out right or create a transferable development rights program to preserve undeveloped land and move offending uses outside of the Safety Buffer and AICUZ.

It is my understanding that the JLUS process did not specifically include reaching out to property owners affected by the proposed Safety Buffer. I am very concerned that such an established process was undertaken without consideration for property rights of affected landowners.

I respectfully ask that the final JLUS document NOT include the proposed Safety Buffer. I have enclosed a letter from Jim Nicholson of HH Hunt Corporation, owner of a 650 unit apartment complex on Willows Road located within the proposed Safety Buffer. I have also enclosed three letters submitted to the Planning Commission regarding the AICUZ overlay zone as part of the Lexington Park Master Plan process. These letters further illustrate the impacts of the AICUZ and impact of any further encumbrances by an added Safety Buffer.

Respectfully,

Laura Clarke

Laura Clarke
Clarke Consulting
301-997-6878

(26) 9-12-13 Introduced at P.C. hearing.

LAW OFFICES OF
TALKIN & OH, LLP
COLUMBIA OFFICE
5100 DORSEY HALL DRIVE
ELLICOTT CITY, MARYLAND 21043-7870

(410) 964-0300
(301) 596-5580
Fax (410) 964-2008

September 12, 2013

James Howard Thompson
St. Mary's County Planning Commission
P.O. Box 653
Patuxent Building
23150 Leonard Hall Drive
Leonardtown, Maryland 20650

Re: **Lexington Park Development District**
Master Plan – Staff Draft

Dear Mr. Chairman:

This office represents Patuxent Development Co., Inc. ("Patuxent or Millison"), the owner of certain properties (collectively, the "Property") located within the Lexington Park Development District. I am writing to you to provide comments on the Lexington Park Development District Master Plan – Staff Draft (the "Plan") as it pertains to redevelopment plans for the downtown area ("Downtown") of Lexington Park.

Millison's Property is currently developed and operating with long term commercial uses. The Plan has designated the Property to be converted into a proposed Park Square Green and a new roadway running north and south between FDR Boulevard and North Shangri La Drive. The Development Strategy for Downtown Map on Page 13 of the Plan proposes that this area of Downtown be redeveloped as an "AICUZ Compliant Employment Campus." On Page 15 of the Plan, this employment campus is described as follows:

> This "Park Square" campus is organized around a new "Park Square Green" in the heart of downtown. Floor area is proposed at approximately 70,000 square feet in an AICUZ compatible arrangement of 7 buildings. Office, personal services, and low volume food services are anticipated with no building exceeding 50 occupants and patrons."

The Plan's proposal to convert Millison's Property into a public roadway and public open space, combined with the suggested limitations on building size and

(58)

occupancy, is not a workable, economically-feasible plan. Effectively, the Plan's proposal would result in a severe downzoning on the Millison Property. Instead of achieving the desired result of revitalizing the Downtown area, the Plan would deprive property owners such as Millison of any realistic possibility to redevelop. Ultimately, given the disincentive for property owners to redevelop and the reluctance of financial institutions to extend financing if the Plan is enacted, existing structures will fall into disrepair. Contrary to its goals of modernizing Downtown, the Plan will instead serve as a barrier to reinvestment.

With the proximity of Downtown to the Patuxent River Naval Air Station ("NAS") and NAS' importance to the County, it is an understandable goal of the Plan to address the Department of Defense's Air Installations Compatible Use Zones ("AICUZ") guidelines and NAS' concerns about encroachment. The Plan, however, proposes to replace Downtown development that has coexisted with NAS for decades with redevelopment that directly contravenes Navy policy on encroachment.

There has been no indication from NAS or the Department of Defense that NAS will be forced to close or will have its operations impeded without this proposed downzoning of the Property. There has likewise been no claim that maintaining the current commercial development on the Property contravenes AICUZ policy or constitutes an encroachment. To the contrary, in the Southern Maryland Navy Alliance Encroachment Study Committee's Key Findings & Recommendations issued in February 2007 (the "ESC Study," a copy of which is enclosed herewith), the Committee wrote that the AICUZ plan in place in St. Mary's County has worked well to manage encroachment.

Additionally, the ESC Study recognized that the County allows "a wide variety of industrial, manufacturing, commercial, and transportation" uses within APZ-2, "all consistent with Navy guidance." ESC Study, p. 7. Indeed, the uses occurring on the Property are compatible with the APZ-2 in which the Property is located. A 2011 Department of Defense AICUZ Instruction Packet ("2011 Instructions," a copy of which is enclosed herewith) provides a chart of land uses that are compatible with APZs. The Department of Defense recommends numerous retail trade uses as being compatible in APZ-2, including shopping centers, discount clubs, home improvement stores, electronics superstores, food stores, apparel and accessories stores, furniture stores, and other retail trade shops. 2011 Instructions, p. 18. The County's present zoning ordinance also identifies many commercial and retail trade uses as being "clearly compatible" or "normally compatible" with the APZ-2. St. Mary's County Zoning Ordinance, Amended Feb. 5, 2013, p. 43-7.

Instead of recommending the continuation of such compatible development, the Plan recommends redevelopment that is in direct contravention of AICUZ policy on encroachment. The Plan proposes a new retail core immediately north of the AICUZ, across from Nicolet Park. On Page 14, this retail core is described as an "intensive midrise mixed-use development with a total floor area of approximately 500,000 square feet." The retail core would feature regional and neighborhood commercial establishments as well as up to 100 residential units.

One of the recommendations of the ESC Study on how to upgrade encroachment protection was the creation of a buffer zone outside of the AICUZ. "The Encroachment Study Committee finds that any new residential construction within APZ-2 or on the edges of APZ-2 represents an encroachment threat and believes it would establish a new trend of housing construction within and near the AICUZ." ESC Study, p. 8 Additionally, a memorandum from the Chief of Naval Operations dated October 9, 2008 (the "2008 Memorandum," a copy of which is enclosed herewith) provides that it is a prudent course of action to seek a buffer around the AICUZ. "Development up to the AICUZ footprint boundary will make it difficult to expand missions or accept new missions at the installation." 2008 Memorandum, p. 6-2.

The Plan's proposed "intensive midrise mixed-use development" with up to 100 residential units is an encroachment threat that the ESC Study and 2008 Memorandum specifically recommend against. The AICUZ borderline is not a sacrosanct boundary. Accident potential is not significantly reduced immediately outside of AICUZ. Intensive redevelopment on the AICUZ border could limit future operations at NAS and could factor into decisions on base closures and staffing levels. On page 8, the ESC Study provides that "any new residential construction within APZ-2 or on the edges of APZ-2 represents an encroachment threat . . ." When weighing the benefits and burdens of the current Downtown development with those of an intensive mixed-use development on the border of AICUZ, the proposed redevelopment is not the better option.

Regarding the Plan's proposal to limit the size and occupancy of buildings on the Property, these suggested limitations appear to be derived from Department of Defense policy recommendations. "In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to . 50 an acre in APZ II are considered to be low density." 2011 Instructions, p. 20.

The Department of Defense's AICUZ guidelines, however, are merely suggested recommendations. "AICUZ land-use compatibility guidance is not binding and they serve as guidelines only. "Land use controls outside the air installation . . . are under the exclusive control of State and local governments . . . ." 2008 Memorandum, p. 1-2.

Local governments alone are responsible for regulating land use." BSC Study, p. 7. The exercise of such discretion should be employed prudently and strike a balance between the AICUZ guidelines and existing conditions. The maximum [floor area ratio] recommendations . . . are provided as an aid to local officials and installation personnel considering restrictions on the density/intensity of non-residential development in APZ. *However, it is not realistic to state that one numerical density is safe while another is not. The objective is to maximize the degree of safety that can reasonably be attained within local land use considerations.*" 2008 Memorandum, p. 3-9 (emphasis added).

Department of Defense and Navy policies recognize that local considerations, such as preexisting development, may require alternative solutions other than a draconian downzoning to floor area ratios or building occupant limitations. A 1995 letter from the Department of the Navy, the first page of which is enclosed herewith, evidences this approach. In commenting on a previous Lexington Park Master Plan, the Navy agreed "with a recommendation in the Plan to allow existing developed non-residential sites to redevelop with the same use category provided the existing intensity is not increased." A reasonable plan, allowing for commercial redevelopment at the same level of intensity as original development, was satisfactory to both Navy and County officials.

Instead of continuing with this approach, the current Plan proposes to adopt as a binding requirement the general guidelines of AICUZ policy. In none of the AICUZ guidelines, however, is such a severe downzoning required to be implemented or even recommended.

If the current use of property is ever construed to be an impediment to future operations at NAS, either the County or federal government can purchase property rights to alleviate encroachment concerns. *See* BSC Study, p. 1 ("St. Mary's County . . . purchased tracts of land to pre-empt encroachment . . . ."); 2011 Instructions, pp. 11-12 ("When local development regulations do not provide sufficient protection for aircraft operations (e.g., preventing incompatible development or airspace obstructions), the DoD Component shall consider the acquisition of necessary real property interests. . . Acquisition of interests in land may also be pursued in such circumstances where long-term land use controls are considered to be ineffective and the DoD Component determines all possibilities of achieving compatible use zoning, or similar protection, have been exhausted."). Given that current land use controls have, indeed, been regarded as being effective, the Plan's proposed downzoning of Downtown properties is not justifiable on the basis of AICUZ concerns. While the County may have a desire to revitalize the Downtown and express a certain vision for Lexington Park, bootstrapping such goals on AICUZ concerns is neither warranted nor supportable.

Moreover, incorporating such ideas into a comprehensive plan is fraught with unintended consequences. Pursuant to the Smart, Green, and Growing – Smart and Sustainable Growth Act of 2009 (as codified in the Land Use Article of the Annotated Code of Maryland), local jurisdictions such as the County are required to periodically review and revise the jurisdiction's comprehensive plan and any comprehensive plans for geographical divisions.

The Land Use Article further requires that a local jurisdiction implement the policies of its comprehensive plan by enacting zoning laws and other land use ordinances that are "consistent with" the comprehensive plan. "Consistency with" a comprehensive plan is defined as taking actions that will further, and not be contrary to, items in the plan such as policies and development patterns. In effect, a comprehensive plan becomes binding legislation to which all subsequent regulations and plans must adhere.

The Plan proposed is far too detailed and specific to serve its purpose as a planning document. For example, many of the maps in the Plan show "future development" indicating the precise locations for buildings and structures, roadways, and open space. Many of these proposed features, however, are on privately owned property. In order for future zoning regulations to be "consistent with" the Plan, the County will essentially have to legislate development plans for private property, regardless of whether the property owners consent. Furthermore, the Plan's proposal on Page 12 to "make the Downtown a green oasis by *preserving* natural features" within the AICUZ may be a reasonable goal. Creating *new* open space parcels and natural features on developed private property as shown on Pages 13, 18, and 20, however, would be an extreme downzoning tantamount to condemnation.

Perhaps a corridor study, as opposed to a comprehensive plan, is a more appropriate vehicle to utilize to attain a shared vision. The guidance provided by such a study can drive the vision as set forth in a comprehensive plan. For the Plan, however, which is first and foremost a planning document, to provide such rigid specificity for future development is a dangerous measure that results in an unworkable framework. A binding comprehensive plan that attempts to plan every redevelopment detail down to the precise location of buildings and green space will generate many more problems than solutions.

The specificity provided in the Plan also violates the County's zoning ordinance. Article 9, Chapter 90 of the ordinance defines "District" as "any section of the unincorporated territory of St. Mary's County within which the zoning regulations *are uniform*" (emphasis added). Section 25.1 of the ordinance provides that "[d]evelopment in the County and execution of this Ordinance are based upon *the division of the County*

into districts within which the use of land and buildings and the bulk and location of buildings and structures in relation to the land are substantially uniform" (emphasis added).

The Plan would, therefore, violate this uniformity principle, as it would subject certain properties within AICUZ to more cumbersome regulation than other properties in the same overlay district. The Plan would require the Property to be redeveloped with a road and a park square green, while other AICUZ properties would not be so burdened. Certain properties, including the Property, would be required to redevelop with buildings that could not exceed 50 occupants, while other properties within AICUZ do not appear to be similarly affected. This violation of the uniformity principle will not withstand legal scrutiny.

Lastly, the Plan and its recommendations seem premature. As the Plan provides on Page 7, the preparation of a joint land use study (the "JLUS") for NAS was recently initiated by the Tri-County Council for Southern Maryland. Presumably, the JLUS will generate recommendations regarding land uses within AICUZ as well as how to best prevent development encroachment. It is unknown at this time to what extent the proposed Plan may contravene the findings of the JLUS.

In summary, the Plan should be revised to better maintain the status quo that has to this point been satisfactory to the County, NAS, and Downtown property owners. Should the JLUS make any contrary findings, the County should work with the affected property owners to provide realistic redevelopment options instead of simply mandating a downzoning of properties that is not supported by the AICUZ guidelines.

We trust that you will consider the issues presented in this letter as you review the Plan. Thank you.

Very truly yours,

TALKIN & OH, LLP

Sang W. Oh

Sang W. Oh

cc: Phillip J. Shire, Director
Patuxent Development Co., Inc.

+ enclosures
– available separately

63

9-10-13 (23)

St. Mary's MARYLAND

Community Development Corporation
46940 South Shangri-La Drive
Suite 100
Lexington Park, MD 20653
Telephone: 301-863-7700
FAX: 301-863-7713

September 10, 2013

Commissioners
St. Mary's County Planning Commission
St. Mary's County Government
P. O. Box 653
Leonardtown, Maryland 20650

Regarding: **Staff Draft Lexington Park Master Plan**

Dear Commissioners:

On behalf of the Board of Directors of the St. Mary's County Community Development Corporation, I am writing to convey our thoughts about the staff draft of the Lexington Park Development District Master Plan. We have reviewed the document and commend the Department of Land Use and Growth Management for the ambitious and integrated economic and community development plan proposed to guide the future of our County's largest employment and population center. We wish to draw attention, though, to the mixed messages pertaining to the future of the Downtown and request that the Planning Commission clarify its intentions for this important area. (1)

The County's overarching and decades-long goal has been to revitalize the Downtown using tax incentives, public infrastructure improvements and the establishment of cultural facilities, significant parkland improvements, support for new business growth, increased policing, and pursuit of an employment campus on the Lexington Manor property to spur private reinvestment in the Downtown. New investment to existing privately-owned property located in the AICUZ portion of the Downtown has been supported and these owners have been encouraged to rebuild with the understanding that they can retain the existing square footage. The staff draft now proposes that, over time, the size of these properties be dramatically reduced, that "normally incompatible" but permitted uses such as full-service restaurants be eliminated along with cultural activities and other amenities we've come to enjoy in the Downtown.

In our estimation, a market-driven revitalization of the Downtown will not and cannot be achieved under the terms of the staff draft of the Lexington Park Development District Master Plan. We recommend instead, that the County not only continue but enhance its efforts to revitalize the area and, as explained further in this letter, we propose a very specific way to

64

address the issue of density in the AICUZ portion of the Downtown. If, however, the staff's recommendations become the will of the Planning Commission, then we suggest a more thorough discussion be had about the future location of a "Downtown" for Lexington Park and also recommend that a strategy to assist the existing property owners to shoulder the economic consequences of the inevitable change in the prospects for the area be developed.

(2) The staff's recommendation to better understand the Development District as an area comprised of four subareas is smart. Using the subarea approach allows the County to more carefully consider the character and needs of each area in the prioritization of public infrastructure and capital investments. Coupling preferential sewer and water and zoning categories with economic incentives to leverage re-development of older commercial and residential areas is also a novel recommendation for St. Mary's County. Aggressive use of these tools will attract developers and business and property owners to reinvest in targeted areas without jeopardizing the potential of the remainder of the Development District. The creation of new incentives such as a business improvement district, Tax Increment Financing and a development fund are also seen as critically important to the success of the Master Plan for Lexington Park.

(3) We are particularly pleased to note the attention given to the revitalization of the Downtown, the Great Mills Road Corridor and the neighborhoods surrounding this older commercial district. Countless remarks offered during the nearly year-long public visioning process confirm the importance of this goal to sustaining the Navy's mission and improving the County's economy. The draft Master Plan clearly reflects the public's sentiment on this important subject.

(4) Staff is also to be commended for drawing attention to the need to revitalize other shopping areas such as Laurel Glen. The commercial and residential abandonment we see in Lexington Park can be traced to the County's policy to encourage sprawl development northward along the MD Route 235 corridor. This pattern has precipitated the obsolescence of the Great Mill's Road corridor and now threaters parts of the 235 corridor.

While the County does not control market conditions, it does regulate land use and can create conditions favorable to in-fill development and reuse and reinvestment in older areas. The County must either adopt more aggressive approaches to guiding growth in the Development District or accept the continued investment of public resources to tackle the economic unraveling of communities left in the wake of the largely laissez faire approach used to date. The choice is obvious. The decision to act, however, requires determined leadership.

(1) To this end, we must argue against staff's recommendation to implement the U. S. Navy's 2009 guidance for the Air Installation Compatibility Use Zone (AICUZ) which is central to the issue of the future of the Downtown. The Navy's guidance is not compatible with creating a market-driven preference for redevelopment in the Downtown. It does not support reinvestment by the existing property owners who have shouldered the impact of the AICUZ since the adoption of the overlay zone in the 1970's nor does it reflect the County's practices to date on the interpretation of the AICUZ ordinance.

St. Mary's County was the first jurisdiction in the United States to adopt an overlay zone to protect the growth of the Navy's mission by reducing residential and commercial density within

the AICUZ. In the last 10 years, the County has worked diligently and at considerable tax payer expense to eliminate the more obvious sources of encroachment on NAS Patuxent River. A 199-student seat elementary school was closed and rebuilt outside of the boundaries of the AICUZ along with a busy community health department and an active public library. Over a hundred families were relocated from a rental housing development and the 242-unit neighborhood was subsequently demolished. The County permanently eliminated the potential for residential and commercial development on 2,693-acres of land within and immediately surrounding the AICUZ boundaries through the purchase of agriculture preservation easements and the acquisition and demolition of the Lexington Manor community. Furthermore, the County has changed the ordinance to deny any new proposals for residential development on the remaining AICUZ properties.

During this time the County has maintained a very careful approach to the application of the AICUZ ordinance for existing commercial properties located in the Downtown while simultaneously encouraging these owners to reinvest as part of the revitalization strategy for Lexington Park. Permits for potential new businesses have routinely been reviewed with Navy personnel and, throughout the last 12 years, if not considerably longer, new restaurants have opened, cultural activities have been established and churches have continued to grow and flourish in the Downtown. Limitations on the number of people-per-building and, therefore, the number of people-per-acre, have been set by the Fire Marshall and Health Department not by an interpretation of the AICUZ guidance. Properties located in the AICUZ are grandfathered and the allowable Floor Area Ratio (FAR) is determined by the underlying DMX zoning. Owners have been permitted to renovate and, thereby, increase the square footage dedicated to an existing use by 25%. A property owner who wishes to redevelop an AICUZ-located property can proceed with the knowledge that they may do so but may not exceed either the square footage or intensity of use. In a somewhat recent example of the construction of the new Mr. Tire store, though, the owner was allowed to nearly double his square footage.

The County's current approach to the application of the AICUZ would be swept aside with the recommendation to implement the Navy's 2009 guidance. Allowable uses within the AICUZ would be severely restricted by the 50 people-per-acre requirement of the 2009 guidance. The 50 people-per-acre requirement would supersede the Fire Marshall's and Health Department's people-per-building limitations and enforcement would create a considerable, if not laughable, challenge for County officials who must often work with different owners whose properties share the same acre. Full-service restaurants, churches, cultural events and other services or activities that attract and cluster people in one area would, over time, no longer be permissible. Furthermore, implementation of the 2009 guidance would impact future redevelopment efforts as the FAR would be drastically reduced bringing about a commensurate loss of existing square footage.

The Corporation recommends that, instead, the County continue its present practice toward the implementation of the AICUZ ordinance. Furthermore, we recommend that the County take full credit for reducing the overall density within the AICUZ through its relocation, acquisition and agricultural preservation activities thus far and should continue to work with the Navy and the State to purchase easements where possible. Finally, we recommend take the County take yet a bolder step toward reducing the overall density of AICUZ by forgoing all but the most minimal

commercial development on the 34-acre Lexington Manor Northern Parcel. Development of a privately-owned and operated, 2009 AICUZ compliant "employment campus" at this location is not achievable because the plan shows a Wildewood-like development approach of offices tucked within and among densely wooded areas but with nowhere near Wildewood-type densities. How can such a plan be financed and sustained? Striving to establish an employment campus at this location should no longer be pursued except for modest commercial development on the edges of the property or until such time as there is a Navy or other federal service use for the property as the County has so often proposed.

Continuing to protect our largest employer in planning for the future of our community is the undisputed preference of the Development Corporation. The staff draft of the Lexington Park Development District Master Plan as it pertains to the Downtown brings us to a cross roads in this discussion. We recommend that the County continue its current approach to the implementation of the AICUZ guidance or reconsider the future location of Lexington Park's Downtown as a revitalized and prosperous center cannot be achieved using the more stringent Navy guidelines as proposed.

Having recommended a way forward on this matter, we trust that the Planning Commission will develop a master plan for the Board of County Commissioners' consideration that is in the best interests of St. Mary's County. We stand ready and willing to assist in crafting this final plan for the future of Lexington Park.

Sincerely,
Billy Higgs
Chairman

C.c.: Dr. Rebecca Bridgett, County Administrator
Phil Shire, Director, Department of Land Use and Growth Management

(27)

4

(67)

SOLTESZ

October 9, 2013

St. Mary's County Planning Commission
P.O. Box 653
Leonardtown, MD 20650

Re: Lexington Park Development District Master Plan (LPDDMP)
July 2, 2013 Staff Draft

Dear members:

Please accept this letter on behalf of Millison Development Company. These comments, observations and questions on the draft Lexington Park Development District Master Plan are predicated on potential impacts to properties owned by Millison Development Company.

- The July 2, 2013 staff draft of the LPDDMP is substantially different from the 2005 Plan. It is much more comprehensive, recognizes many of the issues currently facing the Lexington Park area and includes new County, State and Federal mandates. The framework of the LPDDMP is based on the twelve visions of the Land Use Article of the Annotated Code of MD and has an ambitious vision. However, as a planning document, the LPDDMP has way too much detail about how to redevelop the downtown. It prescribes the size and location of future buildings, number of occupants in structures, and proposes new streets and open space on developed private property in the AICUZ.

- There are currently 20 or so property owners in the AICUZ. Millison Development Company is one of the largest landowners with roughly 20 acres and the County owns the Lexington Manor/Flat Tops site with approximately 34 acres.

- The LPDDMP is a County planning document. After its approval and adoption, the zoning ordinance, subdivision and environmental regulations and road ordinance must be revised to show consistency with the LPDDMP.

- The Navy Joint Land Use Study (JLUS) should be completed and its recommendations considered as part of the LPDDMP process.

- The LPDDMP suggests downzoning the AICUZ portion of the Downtown Core to encourage revitalization. However, there are no incentives for existing commercial properties to redevelop as suggested. These property owners currently have viable businesses and occupied buildings with long term leases. Downzoning these properties will only encourage deterioration and decline of the downtown.

[illegible] Winkler Street #6, Leonardtown, MD 20650 301.769.3500 301.[illegible]0135 www.soltesz.com

- Development strategies proposed for properties within the AICUZ include new Navy guidance language that places additional limits on development in the AICUZ. The Plan suggests properties within the AICUZ be redeveloped at a significantly lower FAR than exists today to limit the number of people at any site to 50 persons per acre.

- It is inappropriate to include Navy/AICUZ guidance language into the LPDDMP. It is guidance not regulation. There is no need to include this guidance in the LPDDMP. The Navy currently reviews permit applications for properties located within the AICUZ. The 20 some properties within the AICUZ should be allowed to continue as nonconforming grandfathered uses and the specific AICUZ guidance language about 50 people per acre, limiting FAR to 70,000 sqft in 7 buildings for Millison Plaza . . . should be removed. The Navy reviews all development applications to determine if a project is reasonable and meets their requirements. If this language is put in the LPDDMP it will later be put in the zoning ordinance and become law.

- In an effort to protect the current and future mission of Pax River, the County should preserve Lexington Manor, formerly known as the Flat Tops as open space and not condemn the existing commercial development that has been located in the AICUZ since its inception.

- The LPDDMP states the AICUZ overlay zone should be updated to include the noise zones consistent with the latest Navy guidance. What impacts will these changes have on properties and structures within the AICUZ and will including noise zones expand the existing AICUZ area and encompass more properties? See page 21.

- Who will build and pay for the new parking garage proposed on privately owned property fronting on Millison Blvd?

- Will a separate zoning ordinance and subdivision ordinance be created for the LPDDMP given the proposed form-based zoning and Conservation Subdivision Design Ordinance described on page 10?

- Please explain the proposed "form-based" zoning for the Central Subarea (See pages 10)?

- The FDR Corridor proposes specific design standards for development. Please provide examples of such design standards and how they will be implemented. These design standards should be considered as part of subsequent zoning and development regulations and not included in this planning document.

- Is it the intent of the "Complete Streets" concept to require development and redevelopment projects fronting on major roads to acquire additional r/w for hiker/biker trails and sidewalks, in addition to the standard mitigation requirements for road improvements? See page 4

- Why is a 200' buffer around streams being proposed in the LPDDMP? This is more restrictive than currently required. What type of streams will require this 200' buffer? Currently, intermittent streams require a 50' buffer from each bank and a 100' buffer for perennial streams (and as expanded for steep slopes and hydric soils). I don't think the County should be any more restrictive than the State already is.

- What is the difference between the proposed "Conservation Subdivision/Site Plan Ordinance" and the current State mandated Forest Conservation Ordinance and FIDS regulations?

- The LPDDMP and subsequent development regulations should consider possible redevelopment incentives to help address stormwater management and the new WIF regulations for the downtown area.

- The word "Future" should be removed from the Jarboesville "Future" Focus Area. It implies the area is slated for development at a later date. This area should be a prime focus of the Plan for development, not the AICUZ area. The triangle between Chancellors Run Road and Pegg Road located across from the new base gate on Rt 235 has large tracts of vacant land and could be designed and developed to accomplish much of the vision proposed for the downtown (i.e. integrated mix of office, residential and recreational uses, complete streets with bike trails, sidewalks, employment campus meeting Navy building security standards, inter- connection of neighborhoods). This would encourage pedestrian-oriented developments and provide a sense of place for people to live, work and play. And it's not in or near the AICUZ but is close to the North Gate entrance to the Base. See pages 8, 28, 33, 37

Thank you for allowing us to be a part of this important planning process and considering our interests, thoughts and ideas.

Sincerely,

Laura Clarke

Laura Clarke, Associate
Director of Planning
Soltesz

cc: Millison Development Company
Department of Land Use & Growth Management

SCOTT

Stephen H. Scott
ATTORNEY AT LAW

204 Washington Ave
Suite 200
La Plata, MD 20646
PHONE (301) 870-5355
FAX (301) 870-6471

SScott@ScottLawLLC.com

HAND DELIVERED

November 18, 2014

Mr. George Clark
JLUS Project Manager
Tri County Council of Southern Maryland
15045 Burnt Store Road
Hughesville, Maryland 20637

Re: Naval Air Station Patuxent Joint Land Use Study

Dear Mr. Clark:

This office represents HHHunt Corporation ("HHHunt"). HHHunt is in the process of completing a 650 unit apartment community on Willows Road in Lexington Park, Maryland. This professionally managed and maintained project represents a quality and affordable housing option to the citizens of St. Mary's County. HHHunt started the approval process for this project in 2002, and will complete the last phase of this community in April, 2015. When HHHunt selected this location, it was already zoned RH, allowing ten apartment homes per acre. One of the criteria in selecting this property was that this property was located outside of the AICUZ area of Pax River Naval Air Station.

This HHHunt community was developed using a US Housing and Urban Development mortgage program. Neither this mortgage, nor any other financing, would be available in this community were it located in an AICUZ zone. If the County adopts the proposed boundary, HHHunt will not be able to sell or refinance this community. This would be an extreme hardship causing significant economic damage to HHHunt. To provide some perspective, a local apartment project, Elan at Settler's Landing, recently sold for $171,667.00 per unit. Using this sales value, HHHunt's project, Abberly Crest, would have a retail value of nearly $112,000,000.00. HHHunt's current mortgage balance on the project is approximately $100,000.00 per apartment.

In addition, please note our other concerns as follows:

- HHHunt would have to notify all current residents and any potential residents that the community was in the AICUZ and this would create adverse marketing issues.
- Insurance – HHHunt's carrier requires notification of any changes, and such a change would negatively impact current and future insurance rates.

Please consider these issues when you make your decision about this change. HHHunt has a presence in this community and appreciates the cooperation from the County in the development of this community.

Very truly yours,

Stephen H. Scott
SHS/kd

cc: St. Mary's County Board of Commissions
HHHunt Corporation

Ltr - George Clark @ Tri County Council of Southern Maryland (Naval Air Station Patuxent Joint Land Use Study) HHHunt.doc

LIBERTY HOME BUILDER

VIA Email and US Mail

November 19, 2014

George Clark
Michelle Desoto
Tri County Council for Southern Maryland
P. O. Box 745
15045 Burnt Store Road
Hughesville, Maryland 20637

RE: October 2014 Draft Pax JLUS comments

Good Afternoon George and Michelle,

Please accept my comments on the Draft JLUS dated October 2014 and enter them into the official record. I am extremely concerned that the new ½ mile buffer as proposed will devalue all property owners within the new ½ mile buffer.

Specifically, I am opposed to the new Safety Buffer MCA as mentioned on page 6-5, the new ½ mile safety buffer as shown on page 6-6 and the new noise buffer as shown on page 6-7.

Please do not downzone my property or any other properties without a planned compensation fund. Until there is a way to adequately compensate land owners within the newly proposed buffer, I would suggest taking the buffer completely out of the draft Pax River JLUS document.

Sincerely,

Edward R. Curley III (Guy)

President, Liberty Home Builder

22501 Iverson Dr., Great Mills, MD 20634 (301) 862-5246 Fax (301) 862-9552

GUY CURLEY
PAX RIVER JLUS COMMENTS 10-14-14
INTER PARCEL AND EXTRA PARCEL DENSITY TRANSFERS

While considering the Transfer of Development Rights (TDR's) to achieve goals of rural preservation, please also consider the interparcel (onsite) transfer of density and extraparcel (offsite) transfer of density for the protection of the mission of Naval Air Station Patuxent River. As you know, an equally effective means of protecting the rural areas of the County is creating a viable development district and growth areas with predictable regulation and expedited processing of applications.

The Comprehensive Plan and the Lexington Park Master Plan states that the Air Installation Compatible Use Zone (AICUZ) shall create predictability for property owners with respect to land development within the AICUZ and take advantage of the high open space requirements within the AICUZ to create a town center with large amounts of attractive green space.

The Lexington Park Master Plan identifies existing and potential high density residential development in or near the currently mapped AICUZ. Much of the County's (former)Focus Enterprise Zone, which encourages development and maintenance of commercial uses, is also in or near AICUZ. As an industry, the members of the Maryland Building Industry Association support the goals of protecting NAS Pax River from encroachment, perceived or real. We also support the recognition of property rights and oppose down zoning actions that strip owners of their property rights without compensation.

Therefore, we request that the Board consider, with the pending Comprehensive Plan process, recognizing inter-parcel density transfers within the vicinity of NAS Patuxent River that would allow property owners to voluntarily move or transfer residential density and commercial floor area to noncontiguous (extra parcel density transfer) properties within a growth area and allow the conversion of 1,000 square feet of commercial development by right to a residential use within a designated growth area. The Development Districts are already a receiving zone so it may be as simple as changing the AICUZ to a sending zone much like the Rural Preservation District is now.

We support and request your support of this position because it addresses the real or perceived threats to the future mission of NAS Patuxent River, respects the density rights of existing property owners, creates an incentive to shift development away from AICUZ and provides residential density rights that could be used to lower the costs for bringing new housing online, thereby addressing the lack of workforce housing in the County. Thank you for your consideration.

Sincerely,

Edward R. Curley, III
22501 Iverson Drive
Great Mills, Maryland 20634

ESCAMBIA COUNTY
JOINT LAND USE STUDY

Escambia County, Florida
Growth Management Department

United States Navy

United States Department of Defense

Naval Air Station Pensacola

Navy Outlying Landing Field Saufley

Navy Outlying Landing Field Site 8

September 2003

B. Uses prohibited.

Playgrounds and neighborhood parks.

C. Height limitations. See section 11.02.00.

11.01.14. Airport Environs Overlay 1 (OL-1) (0--3 d.u.'s/acre).

A. Uses permitted. See underlay zoning districts.

B. Uses prohibited.

Playgrounds and neighborhood parks.

C. Height limitations. See section 11.02.00.

11.01.15. Density limitations. Density limits in each of the airport zones is absolute, meaning that the minimum lot size is established as the inverse of the maximum density for each overlay zone, exclusive of any required infrastructure. For example, when the maximum density is three dwelling units per acre, the minimum lot size is one-third acre. When the maximum density is two dwelling units per acre, the minimum lot size is one-half acre. Clustering of residential lots or dwellings whether by density transfers, planned unit development or other means is prohibited on-site.

11.01.16. Existing single-family dwelling units. Single-family dwelling units existing as of August 21, 2001, shall be considered conforming uses regardless of the allowable density in the overlay district or the date of construction.

11.01.17. Nonconforming uses and noncomplying structures. Article 9, pertaining to nonconforming uses and noncomplying structures, shall apply to the AICUZ Overlay Zones.

11.01.18. Family conveyance exception. The exception for family conveyance found in section 4.01.03 will apply in the AICUZ Overlay Zones.

11.01.19. Temporary medical waiver for mobile home as a guest residence. Section 6.04.10, allowing for a temporary medical waiver for mobile home as a guest residence, will apply in the AICUZ Overlay Zones.

11.01.20. Variances, conditional uses and other relief.

A. Variances and conditional uses. Section 2.05.00 providing for variances and conditional uses shall apply in the AICUZ Overlay Zones. When considering a variance under section 2.05.02 proximity to the AICUZ Overlay Zone boundary lines shall be considered an unusual physical condition.

B. Other relief. Any person who is denied a development order because of the restrictions imposed herein within the AICUZ Overlay Zones may apply for relief under sections 78-211 through 78-220 of Part I of the Escambia County Code of Ordinances, which provides an administrative process for resolution of such disputes.

C. [Concurrence by the Navy.] Variances, conditional uses and other relief within AICUZ Overlay Zones shall require concurrence by the Navy.

11.01.21. Subdivision of land for commercial use. Land within the AICUZ Overlay Zones may be subdivided for commercial use subject to all other provisions of this Code. Parcels limited to one single-family dwelling unit per lot of record as of August 21, 2001, may be subdivided for commercial use provided that the one unit per lot of record requirement is not exceeded.

11.01.22. Clustering, intraparcel density transfers and off-site transfer of development rights. At such time as the county develops a comprehensive program for clustering and intraparcel density transfers, the AICUZ Overlay Zones and areas abutting/contiguous to such zones will not be included in that program. At such time as the county develops a comprehensive program for off-site transfer of development rights, the AICUZ Overlay Zones and areas abutting/contiguous to such zones will not be included in that program as receiving parcels.

(Ord. No. 97-51, § 1, 10-2-1997; Ord. No. 2001-27, § 2, 5-3-2001; Ord. No. 2002-8, § 1, 2-7-2002)

Page left intentionally blank.

Matrix
DESIGN GROUP

NAVAL AIR STATION PAX JOINT LAND USE STUDY

For More Information Contact:

JLUS Project Manager
Tri-County Council for Southern Maryland
P.O. Box 745, Hughesville, MD 20637
301.274.1922