ADVANCED AIR MOBILITY

IN THE

SHENANDOAH VALLEY

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AGENDA

- NASA Aeronautics Research Mission Directorate
- Virginia Innovation Partnership Corporation (VIPC) State Initiatives
- Report Overview: “Virginia’s Advanced Air Mobility Future”
- Community Integration & Infrastructure
- City of Winchester Emergency Management Drone Operations
- AAM Workforce Development
- Airport of the Future

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Nancy Mendonca, CPA, CGFM, PMP
AAM Mission Integration Manager (Acting)
Aeronautics Research Mission Directorate (ARMD), NASA

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Community Integration of AAM: Path Forward
AAM in the Shenandoah Valley

March 1, 2023

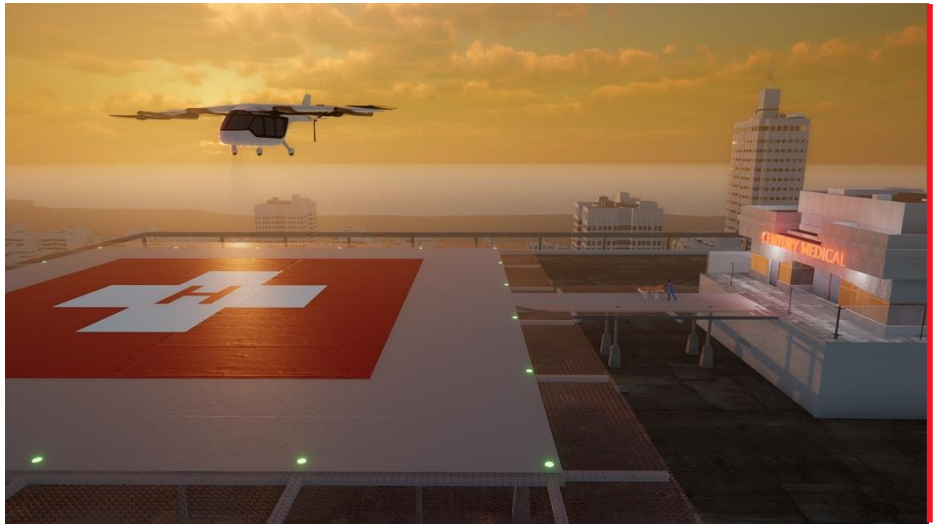
Current Challenges around Community Integration

From the perspective of the local decision maker

- Awareness
- Understanding
- Informational Resources

Awareness - Advanced Air Mobility is Emerging

REGIONAL CARGO AND PASSENGER TRANSPORT



PUBLIC GOOD

CONSUMER/ ENTERPRISE GOODS AND SERVICES

LOCAL PASSENGER TRANSPORT

Safe, sustainable, affordable, and accessible aviation for transformational local and intraregional missions

NASA's Passenger Carrying Reference Vehicles

Tiltduct

Tiltwing

Tiltrotor

Quadrotor

Lift + Cruise

Side-by-Side

Quiet Single Main Rotor

Vertical Flight Society is tracking over 700 eVTOL designs

Awareness - Survey

Maven conducted a survey to effectively solicit the public to obtain inputs on potential Advanced Air Mobility (AAM) vertiport locations specifically:

- **Where they would like to see vertiports located**, and
- **How they would like to use this new mode of transport**

Survey Structure: 1500 people focused in Ohio and Los Angeles with respondents matching that area's demographics

Maven

Biggest Concerns

Approximately 75% had never heard of AAM or knew very little about it at the beginning of the survey

Understanding - Taxonomy

Currently 5 definitions of Advanced Air Mobility, and maybe more.

Understanding - Community Partnerships

- Enabling AAM is highly dependent upon close coordination
- Communications are critical
- Successful partnerships already exist
- Successful partnerships take effort

Potential Community Partners

- Visionary(s)
- Decision Maker(s)/Councils of Governments
- State/Regional/Local Transportation Department(s)
- Transportation Planning Organizations/MPOs
- Local Federal Officials/Agency(s)
- First Responders/Public Service Providers
- Airport Operator(s)/Port Authorities
- System Engineering Companies/Subject Matter Experts
- Ground Transportation Providers
- Businesses/Entrepreneurs/Chambers of Commerce
- Aircraft Vehicle Manufactures/Operators
- Universities/Colleges
- Workforce Development Organizations
- Utility Companies
- Real Estate Company(s)
- Infrastructure Providers
- Supplemental Service Providers
- Customer(s)

Informational Resources - AEWG

AAM Ecosystem Working Groups - 4 Groups

108 Recorded meetings as of March 1, 2023

2000+ people registered

Upcoming Topics:

- Workforce Strategies – April 6th

https://nari.arc.nasa.gov/aam-portal/

Accelerate the development of safe and scalable AAM flight operations by bringing together the broad and diverse ecosystem

Informational Resources – Vertiport Considerations

- Federal Regulatory
- Local Regulatory
- Physical – fixed
- Physical – mobile & temporary
- Vertiport configuration
- Surrounding uses
- Economic considerations
- Equity considerations
- Demand considerations
- Environmental considerations
- Airspace integration considerations
- Contingency considerations
- Utility considerations
- Communications/Data
- Security – Physical, Cyber and Airspace
- Safety
- Automation
- Others

- Federal funding used
- Public vs Private
- Airspace impact evaluation
- Design Circular(s)
- Maturing Design Circular(s)
- Maturing taxonomy
- Grant restrictions
- Occupational Safety and Health Administration (OSHA) and Americas with Disabilities Act (ADA) requirements
- Future climate requirements
- Leadership in Environmental and Energy Design (LEED) Goals/requirements
- Physical security (pax + cargo) regulations
- Applicable existing regulations
- Regs developed for AAM
- Environmental requirements e.g., National Environmental Protection Act (NEPA), FAA 1050.1
- Cross-boarder operations
- Governing regs e.g., Part 135
- FAA Regulatory Roles & Responsibilities (CAA)
- FAA Operational Roles & Responsibilities (ANSP)
- Federal vs Local Roles and Responsibilities
- Species protection regulations
- Registration in National Registry of Airports
- Airport Master Record e.g., 5010-1 forms
- Mitigation Programs e.g., noise abatement
- Interstate commerce regs
- Part 157 Forms 7480 & 7460 Notice of Construction
- 49 USC 5501 National Intermodal Transportation
- Data collection, retention and disposal policies and procedures (for audit and safety trend analysis)
- Federally provided vs commercially provided service
- Engage early with the FAA

- Zoning of site
- Zoning of surrounding area
- Local/state funding
- Noise ordinances
- Operating hours
- Economic Development Plan
- Building, plumbing code(s)
- Lack of building codes
- Local data requirements
- Adopted fire codes
- Incorporate & adhere to local master and transportation plans
- Support local planning goals
- Current or future land use plans
- Environmental requirements. e.g., Special purpose state/local laws, California Environmental, Quality Act Coastal Commission
- Long term local goals and plans
- Long term transportation integration planning
- Stakeholder groups assembled
- Processes in place to obtain stakeholder input
- Understanding public opinion
- Federal vs Local Roles and Responsibilities
- Digital Policy (flexible & rapid policy implementation tools)
- Information
- publicly fund
- Local mandat
- requirement
- Differences i
- Local airport
- State Aviatio

- Temporary vertiport (1 year, disaster recovery, special event)
- Building cranes
- Blowing debris
- Construction staging
- Noise
- Lightening protection equipment
- Non-acoustic annoyance factors e.g., visual
- Static discharge
- Urban wind shadows
- Future local land use

- Near-by buildings (e.g., high rises)
- Antennas
- Towers (cell & water)
- Trees
- Power and other lines
- Power poles
- Billboards
- Land use designation of vertiport site
- Compatible with existing airports & their future plans
- Compatible with other transportation infrastructure and plans
- Property owner(s) rights
- Time/ease for multi-modal transportation changes
- Terminal Instrument Procedures (TERPS) evaluation

Impacted by surrounding area
- Critical infrastructure nearby
- Local Fire station
- Metro/bus/train stop
- Building security
- Local land use
- Maturing vegetation
- Compatibility - Business/industrial vs residential
- Connectivity to existing transportation networks
- Distance to Maintenance or Repair Facility (MRO)
- Down wind of wind farm
- Noise sensitive area
- Visual distractions e.g., solar panel reflectivity, ambient or artificial lighting, both on ground in and air
- Nearby animals (zoo, domestic)
- Protected wildlife habitats
- Future property values
- Impact on local community, environment or surrounding land use considerations impacts from increased traffic accessing vertiport
- Follow-on development compatibility
- Hazards from specific land uses e.g., birds at landfills, ash from burning, weather radar around wind farms
- Privacy of vertiport neighbors
- Operations distracting other activities e.g., drivers on a freeway

Affect surrounding area
- School in vicinity
- Property under approach and departure paths

Over 450 considerations collected covering the siting, design and operations of vertiports

AAM Coordination and Leadership Act

Interagency Working Group

- Review and examination
- AAM National Strategy
  - Recommendations
  - Plan detailing roles and responsibilities
- Report and AAM National Strategy delivered to Congress

In general.--The working group shall engage with State, local, and Tribal governments, aviation industry and labor stakeholders, stakeholder associations, and others determined appropriate by the Secretary of Transportation and the Administrator of the Federal Aviation Administration, including

…

(D) airports, heliports, fixed-base operators;

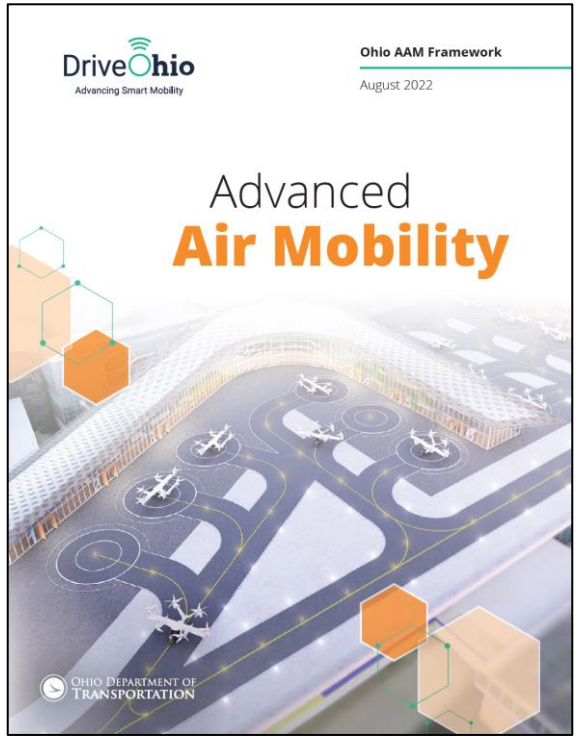
…

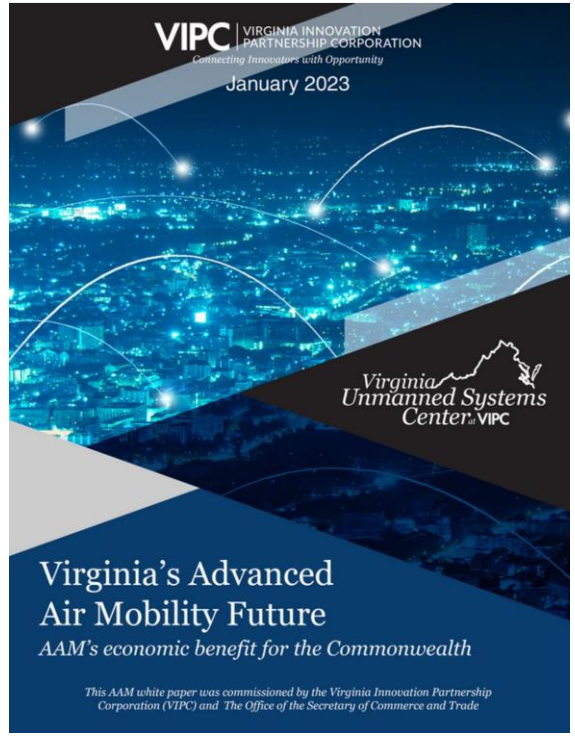
(F) State, local, and Tribal officials or public agencies, with representation from both urban and rural areas;

…

Full text: https://www.congress.gov/117/plaws/publ203/PLAW-117publ203.pdf

Informational Resources – Community Documents





Welcome to the Orlando Advanced Air Mobility Plan!

Cross-pollination supports a harmonized national implementation

Tracy Tynan

Director

Virginia Unmanned Systems Center at VIPC

Tom McMahon

Strategic Communications and

Government Relations Advisor

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Virginia Unmanned Systems Center at VIPC

Advanced Air Mobility in the Shenandoah Valley

Shenandoah University
Winchester, Virginia
March 1, 2023

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Connecting Innovators with Opportunity

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Connecting Innovators with Opportunity

The Virginia Innovation Partnership Corporation (VIPC) serves the Executive Branch of the Commonwealth via the Department of Commerce and Trade. *Connecting Innovators with Opportunities is our Business.*

Virginia Unmanned Systems Center at VIPC

The Virginia Unmanned Systems Center at VIPC serves as the nexus for Virginia's activity in UxS and is a primary source for information, grants, partnerships, and seed funding for UxS in the Commonwealth.

The Commonwealth of Virginia is ranked #1 for UAS Systems Business Climate (Since 2019)

Virginia Unmanned Systems Center at VIPC

Virginia Unmanned Systems Center Projects Supported for the Development of UxS Technology and Applications

- FAA UAS Integration Pilot Program at Virginia Tech helped launch Wing's drone delivery service in Christiansburg
- Demonstration project to deliver Covid test kits in Blacksburg led to DroneUp receiving a nationwide contract with Walmart
- Provided grants to VA companies that participated in the Port Security and Emergency Response pilot program in Hampton Roads with Port of VA, VISA, VDEM, US Coast Guard, CNA and regional public safety agencies.
- Virginia FIX Fly-In in Winchester enabled the first simultaneous integration and operation of drone systems in the U.S. NC has signed an agreement to utilize the FIX. Several additional states are interested as well.
- Kick-Off of the Advanced Air Mobility Alliance (*Project George*) teaming VIPC with DOAV

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What is Virginia Doing to Foster AAM?

Virginia Unmanned Systems Center at VIPC

Established the Virginia AAM Alliance (Project George) in collaboration with VA Dept. of Aviation (DOAV)

- Recognized need to build a unified voice and consensus among industry, government and academia
- Created the charter document outlining the mission, goals, etc.
- Two teams: DOAV focus on policy, physical infrastructure and education
- VIPC focus on technology demonstration and implementation
- Over 50 participants to create strategy for Virginia
- Kick Off meeting was held in July 2022

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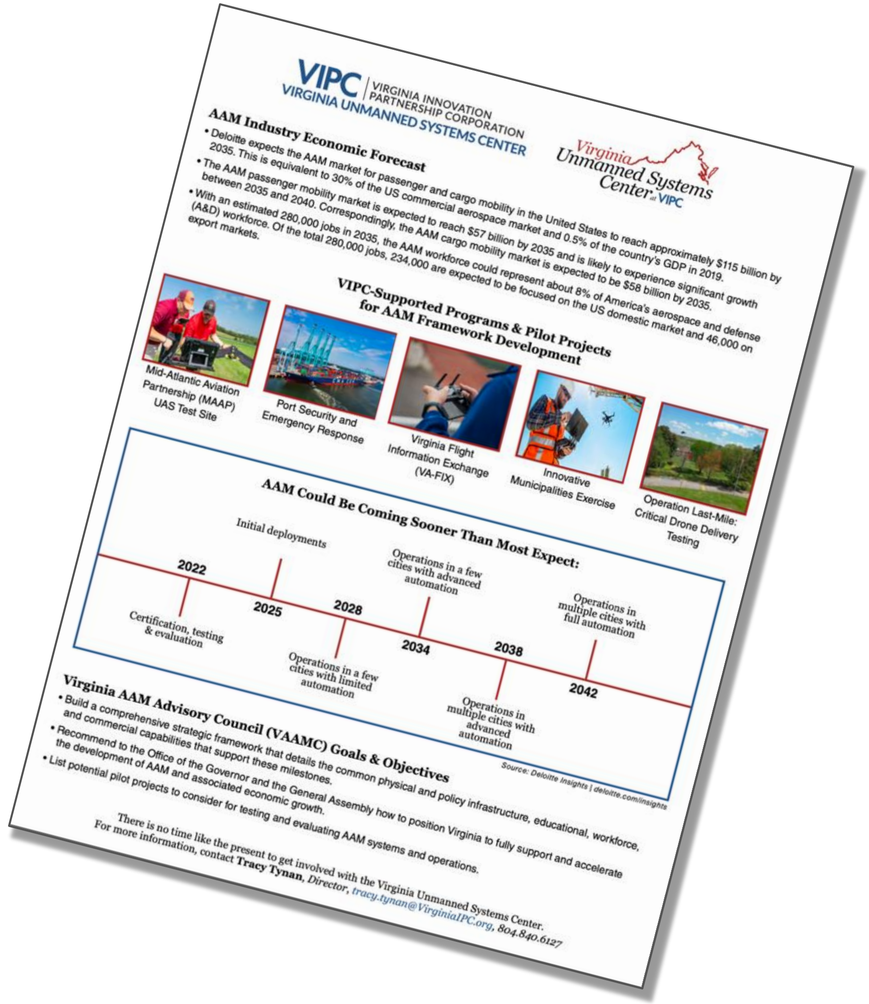
What is Virginia Doing to Foster AAM?

Virginia Unmanned Systems Center at VIPC

Virginia is investing in the future to prepare for the AAM industry throughout the Commonwealth

- Commissioned NEXA to perform an AAM Economic Impact Study of Virginia
- Educate and inform government officials about the benefits of AAM
- Create a strategic plan to implement AAM across the Commonwealth
  - Develop an affordable minimum viable infrastructure framework
  - Electrification of airports
  - Hydrogen fuel cells systems
- VT MAAP research on BVLOS
- ODU VISA Hampton Roads Corridor and Route Study



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VIRGINIA UNMANNED SYSTEMS CENTER

Virginia Unmanned Systems Center at VIPC

AAM Industry Economic Forecast

- Deloitte expects the AAM market for passenger and cargo mobility in the United States to reach approximately $115 billion by 2035. This is equivalent to 30% of the US commercial aerospace market and 0.5% of the country's GDP in 2019.
- The AAM passenger mobility market is expected to reach $57 billion by 2035 and is likely to experience significant growth between 2035 and 2040. Correspondingly, the AAM cargo mobility market is expected to be $58 billion by 2035.
- With an estimated 280,000 jobs in 2035, the AAM workforce could represent about 8% of America's aerospace and defense (A&D) workforce. Of the total 280,000 jobs, 234,000 are expected to be focused on the US domestic market and 46,000 on export markets.

VIPC-Supported Programs & Pilot Projects for AAM Framework Development

Mid-Atlantic Aviation Partnership (MAAP) UAS Test Site

Port Security and Emergency Response

Virginia Flight Information Exchange (VA-FIX)

Innovative Municipalities Exercise

Operation Last-Mile: Critical Drone Delivery Testing

AAM Could Be Coming Sooner Than Most Expect:

2022 — Certification, testing & evaluation

2025 — Initial deployments

2028 — Operations in a few cities with limited automation

2034 — Operations in a few cities with advanced automation

2038 — Operations in multiple cities with advanced automation

2042 — Operations in multiple cities with full automation

Source: Deloitte Insights | deloitte.com/insights

Virginia AAM Advisory Council (VAAMC) Goals & Objectives

- Build a comprehensive strategic framework that details the common physical and policy infrastructure, educational, workforce, and commercial capabilities that support these milestones.
- Recommend to the Office of the Governor and the General Assembly how to position Virginia to fully support and accelerate the development of AAM and associated economic growth.
- List potential pilot projects to consider for testing and evaluating AAM systems and operations.

There is no time like the present to get involved with the Virginia Unmanned Systems Center.
For more information, contact **Tracy Tynan**, *Director*, *tracy.tynan@VirginiaIPC.org*, *804.840.6127*

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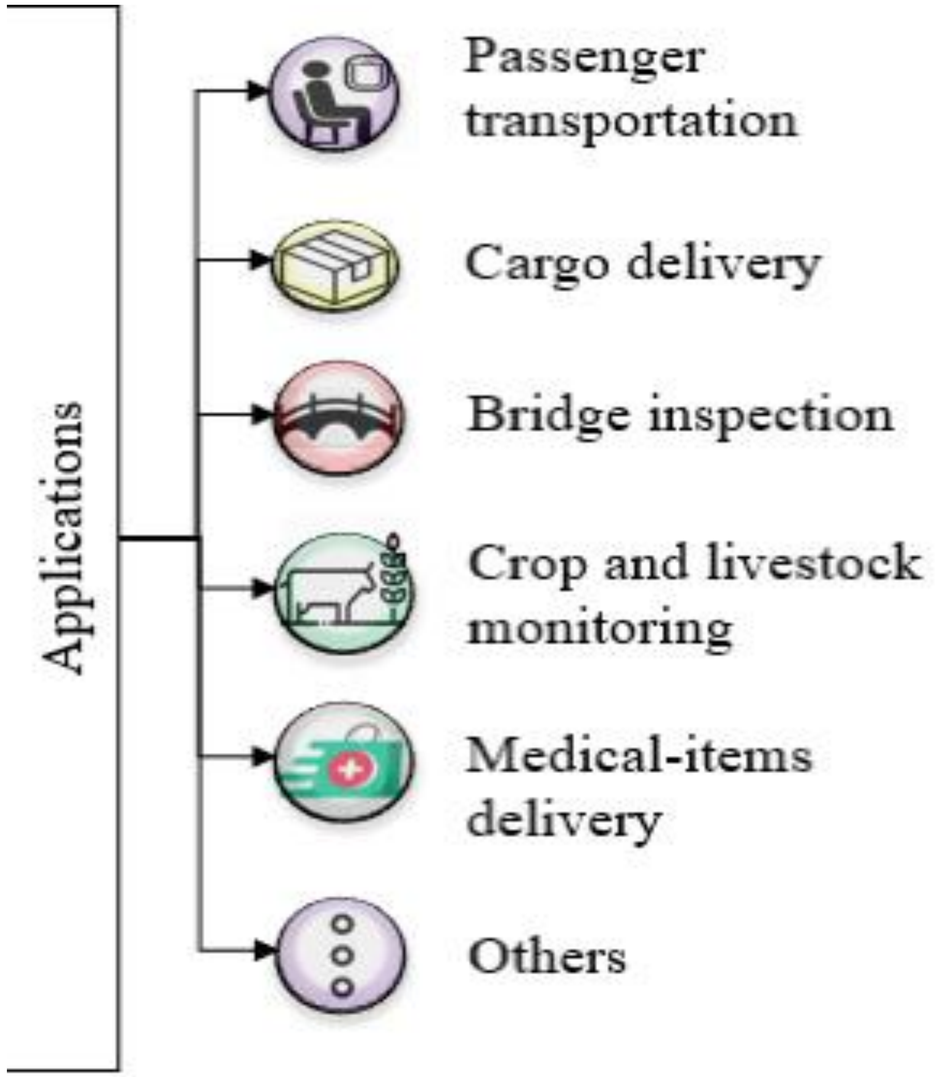
Benefits of Advanced Air Mobility for Society & Environment

Virginia Unmanned Systems Center at VIPC



Travel Time Savings for Passengers
Safety Cost Reductions for Passengers

Cost and Delivery Time Savings in Package Delivery by Drones
Cost Savings for Logistics Companies Lead Time Savings

Cost and Travel Time Delay Savings for Bridge Inspections
Travel Time Delay Savings for Passengers

Increased Crop Yield,
Livestock monitoring, less time, less money

sUAS provides faster transmission of test samples, patients can receive treatment more quickly. Blood, lab samples, organs, medications, AED defibrillators

Increased Tax Income for Government, Savings in Social Cost of Greenhouse Gases

Source: MDPI, Applied Science

Benefits of Advanced Air Mobility for Society and Environment: A Case Study of Ohio 2021

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Benefits of Advanced Air Mobility for Society & Environment

Virginia Unmanned Systems Center at VIPC

Small/Medium Unmanned Aircraft Systems (UAS)

- Package delivery by Wing in Christiansburg and DroneUp in Richmond; Apple Blossom Fly-In flight exercise
- Increased situational awareness for Virginia State Police and other public safety agencies
- Power generation and distribution network inspection for FirstEnergy

Urban Air Mobility

- Uber-like, on-demand air service and comparable fares for faster commuting to Dulles, BWI, and urban destinations
- Emergency air transportation from rural communities to Winchester Medical Center and Fairfax Hospital
- Flights from Winchester to Tysons Corner for work and shopping

Regional Air Mobility (RAM)

- Cargo delivery to Winchester by FedEx, UPS
- Military transport from Pentagon to Hampton Roads
- Commercial air service between unserved city pairs: Winchester to Richmond, Virginia Beach and Blacksburg

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Benefits of Advanced Air Mobility for Society & Environment

Virginia Unmanned Systems Center at VIPC

Eve Air Mobility
Florida
2,770 Orders
--
United Airlines
Skywest Airlines
Blade India

Ehang
China
1,230 Orders
--
United Therapeutics
Prestige Aviation
Aerotree

Vertical Aerospace
United Kingdom
1,375 Orders
--
Gol Airlines
American Airlines
Air Asia

Electra
Virginia
1,000 Orders
--
Flyv
Skyportz
Bristow Group

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Virginia Unmanned Systems Center at VIPC

For more Information about the
Unmanned Systems Industry in Virginia,
please contact:

Tracy Tynan, Director,
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Tracy.Tynan@virginiaipc.org * 804.840.6127

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Phillip Dyment, Vice President
NEXA Capital Partners
UAM Geomatics

Eleanor Herman, President
UAM Geomatics

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Virginia AAM and sUAS Business Case and Economic Impact Analysis

NEXA Advisors and UAM Geomatics

March 1, 2023

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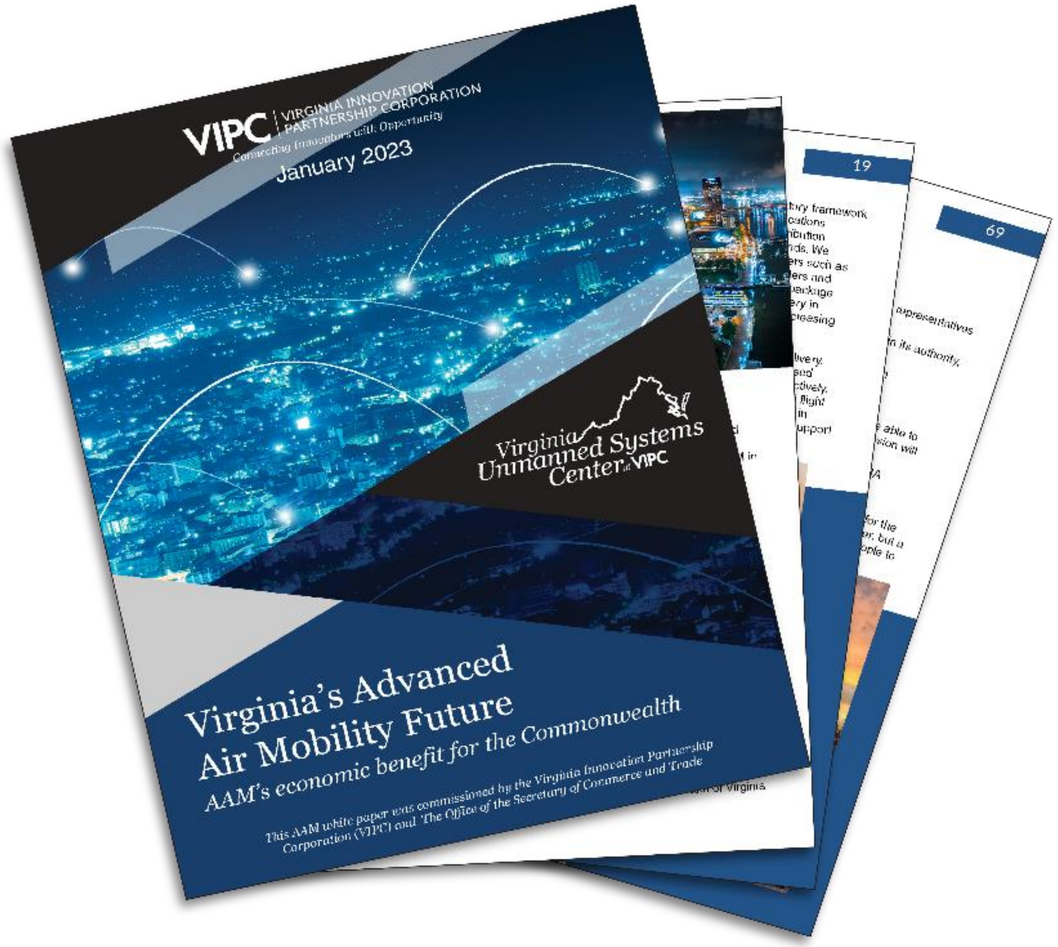

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Advanced Air Mobility Defined

A Trillion Dollar Market Opportunity

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The World of Advanced Air Mobility

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What We Found

The AAM Opportunity in Virginia

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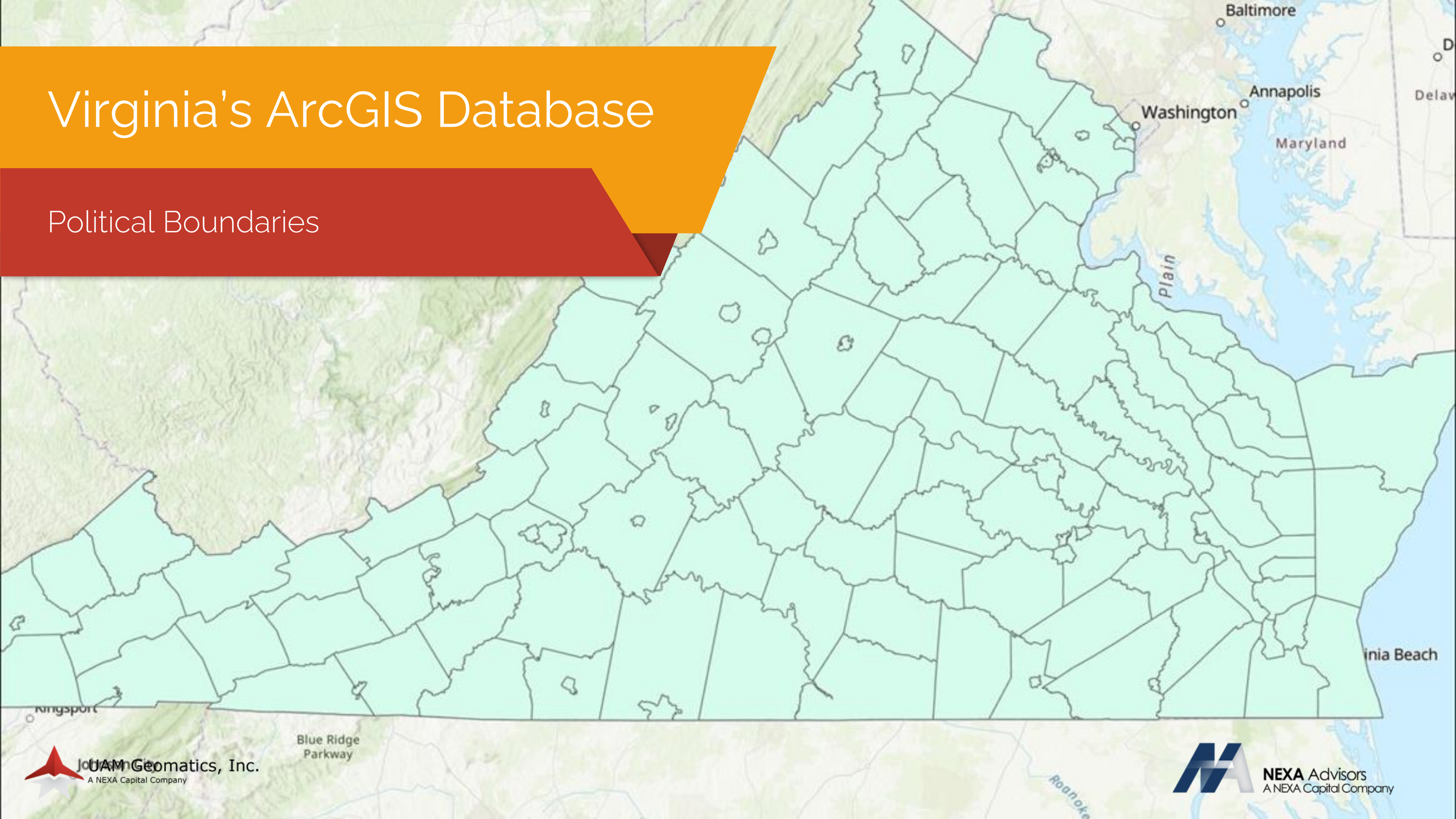
Virginia's ArcGIS Database

Political Boundaries



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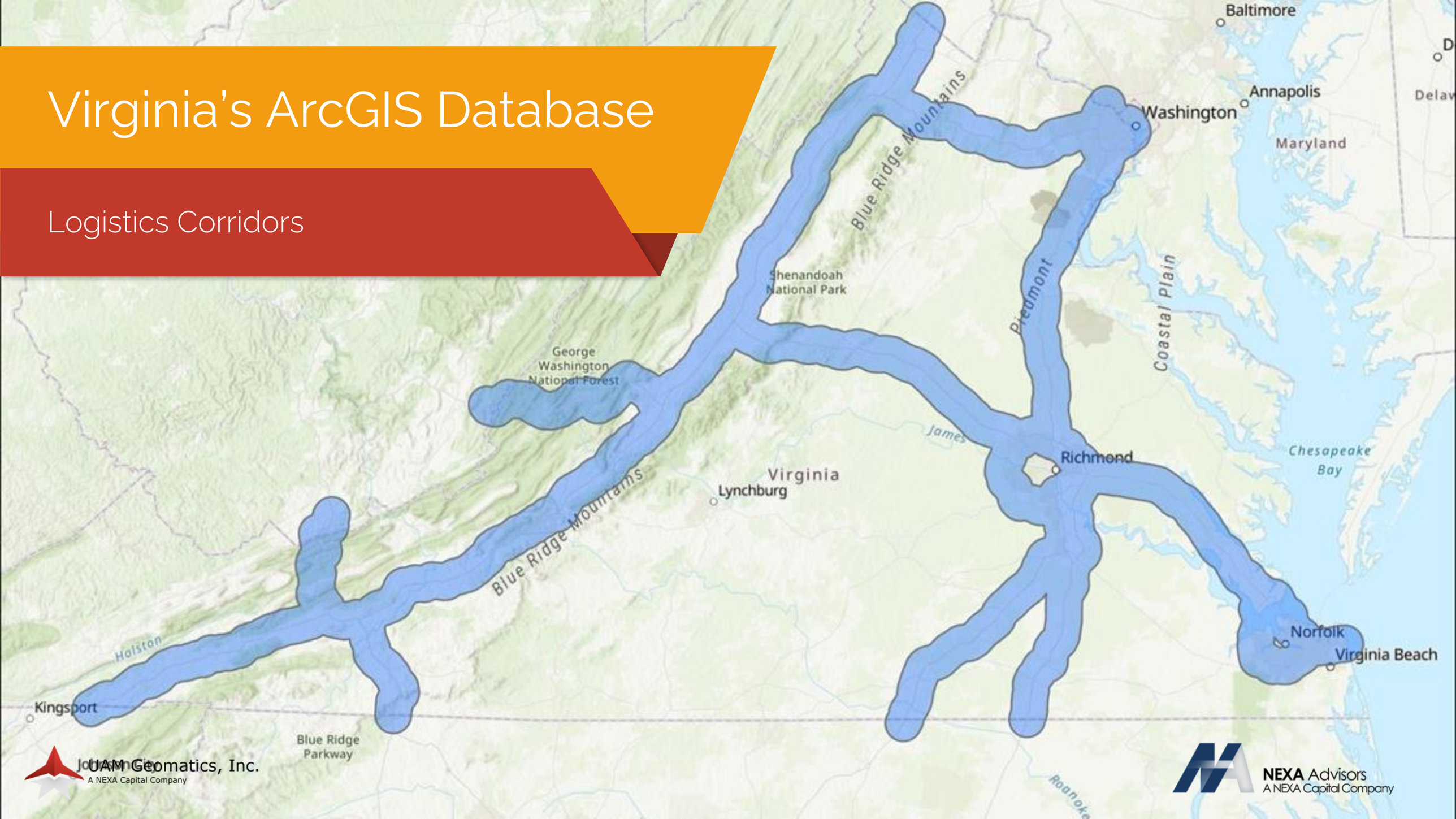
Virginia's ArcGIS Database

Logistics Corridors



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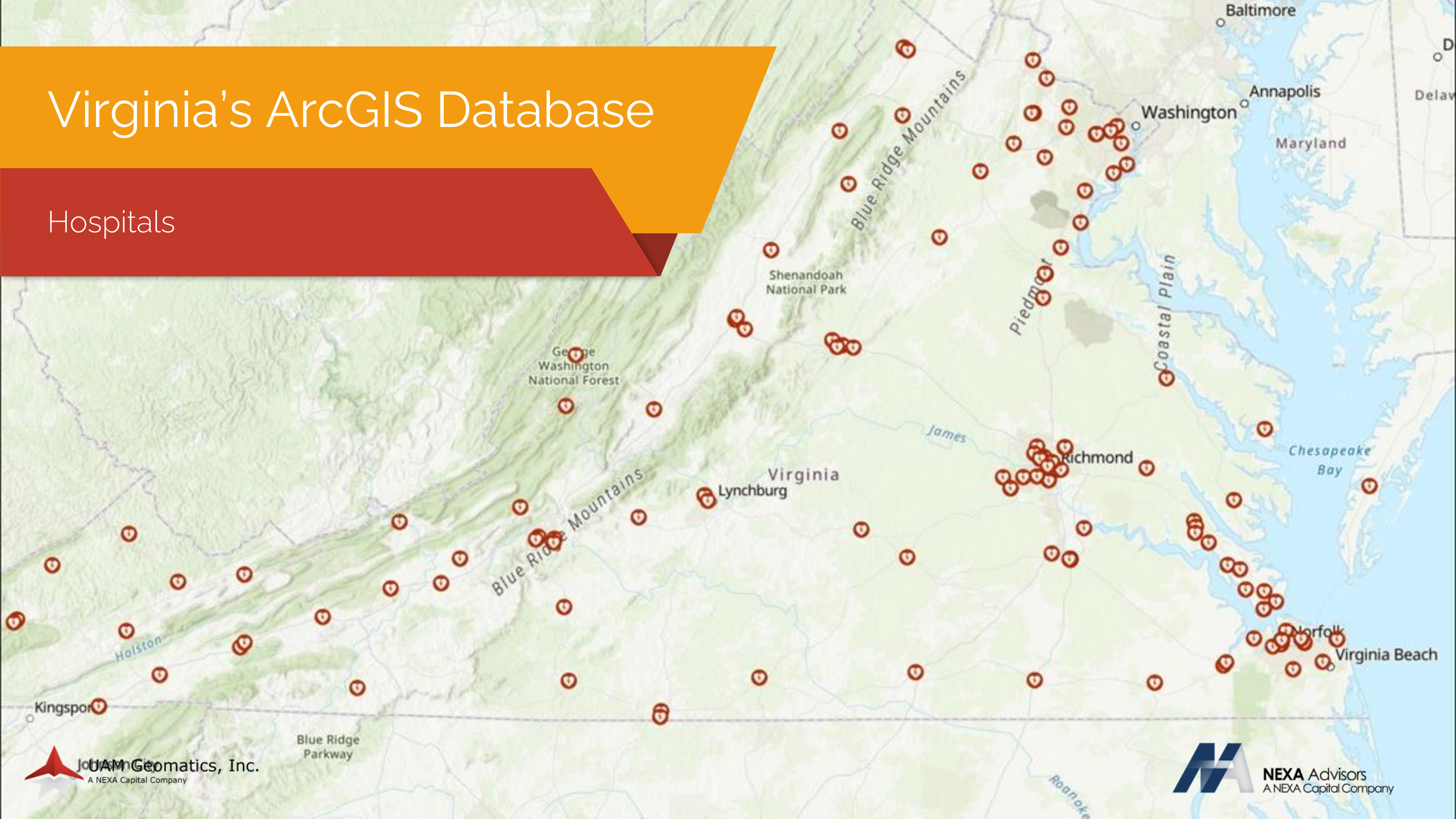
Virginia's ArcGIS Database

Hospitals



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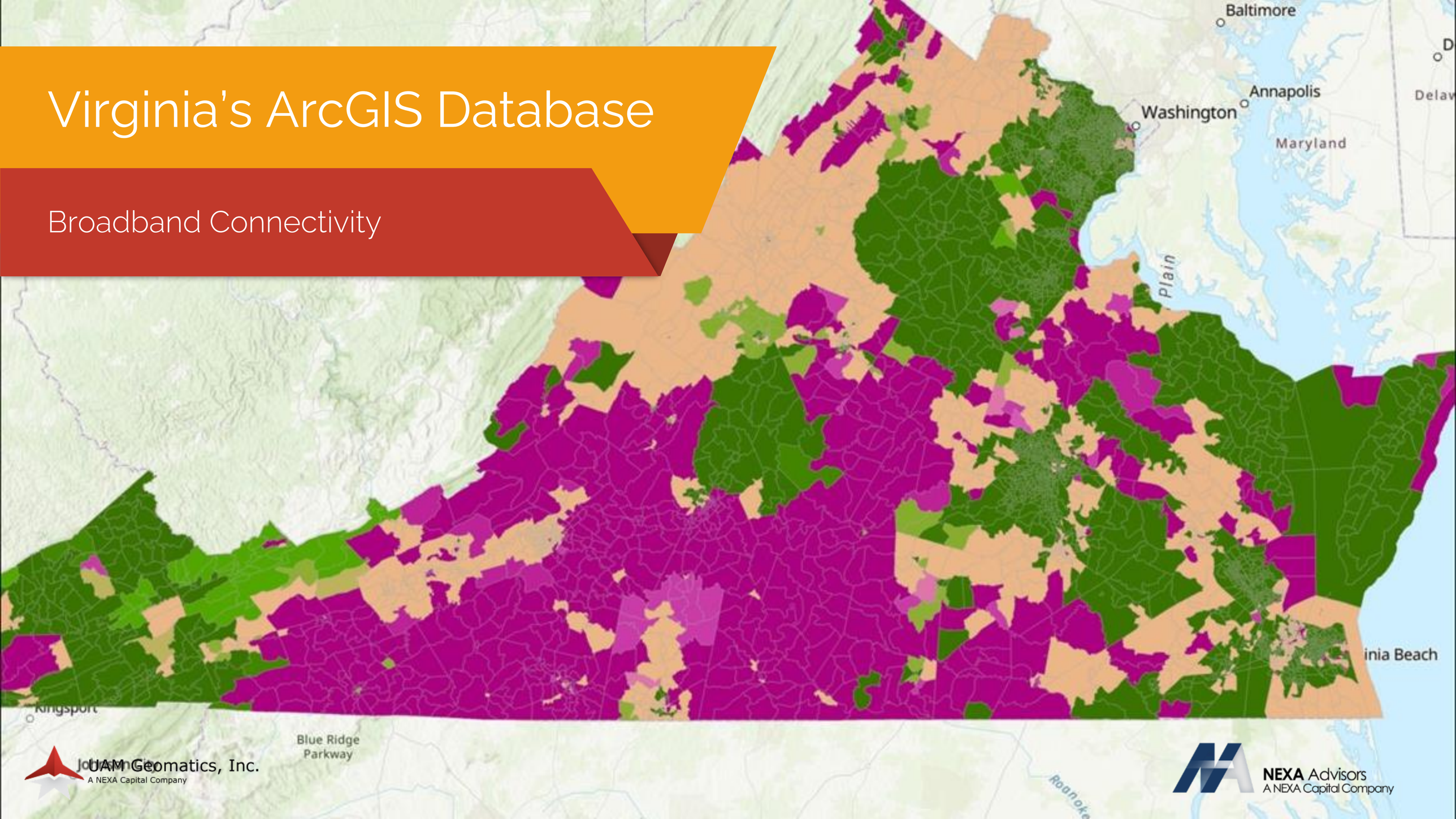
Virginia's ArcGIS Database

Broadband Connectivity



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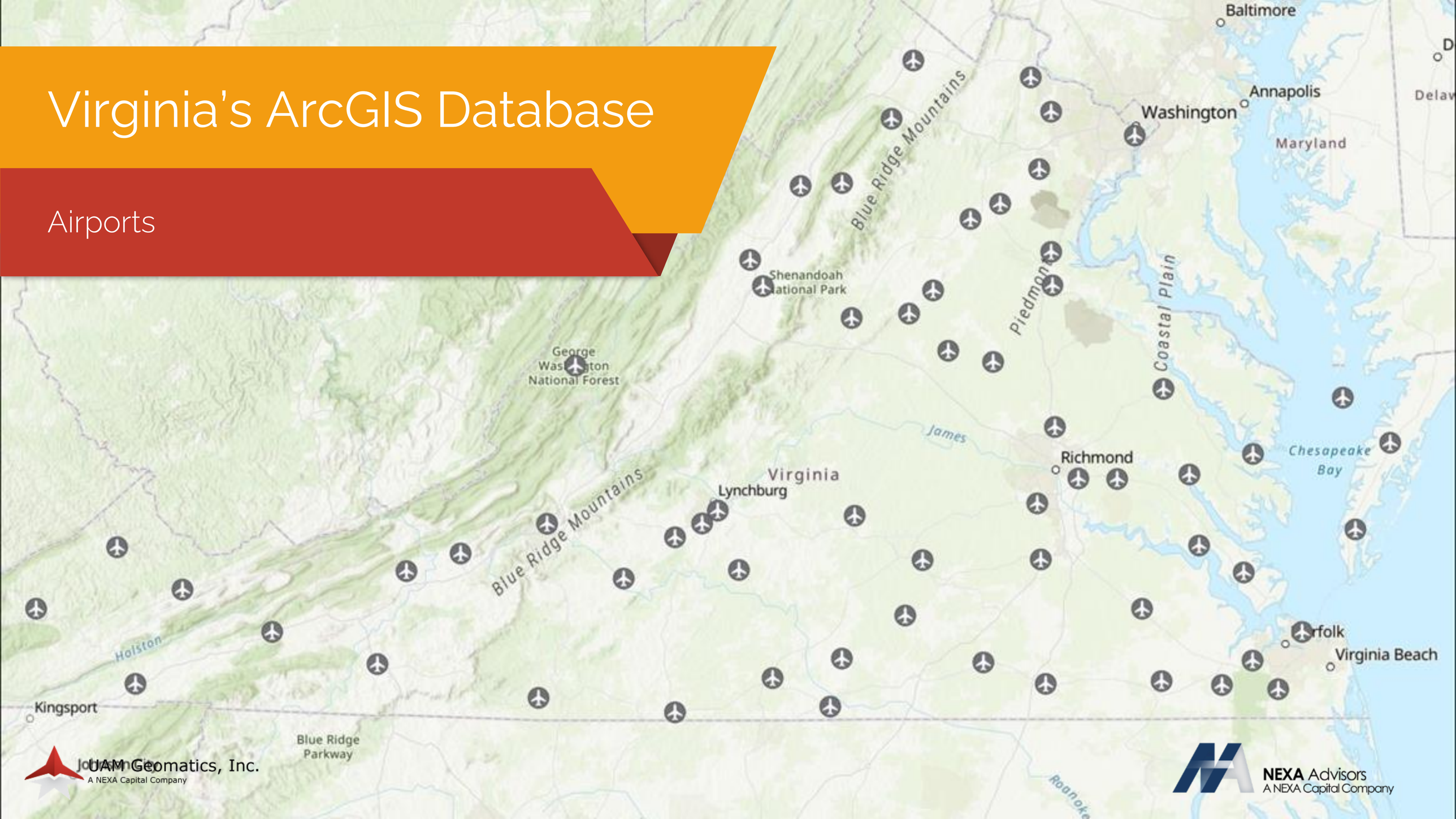
Virginia's ArcGIS Database

Airports



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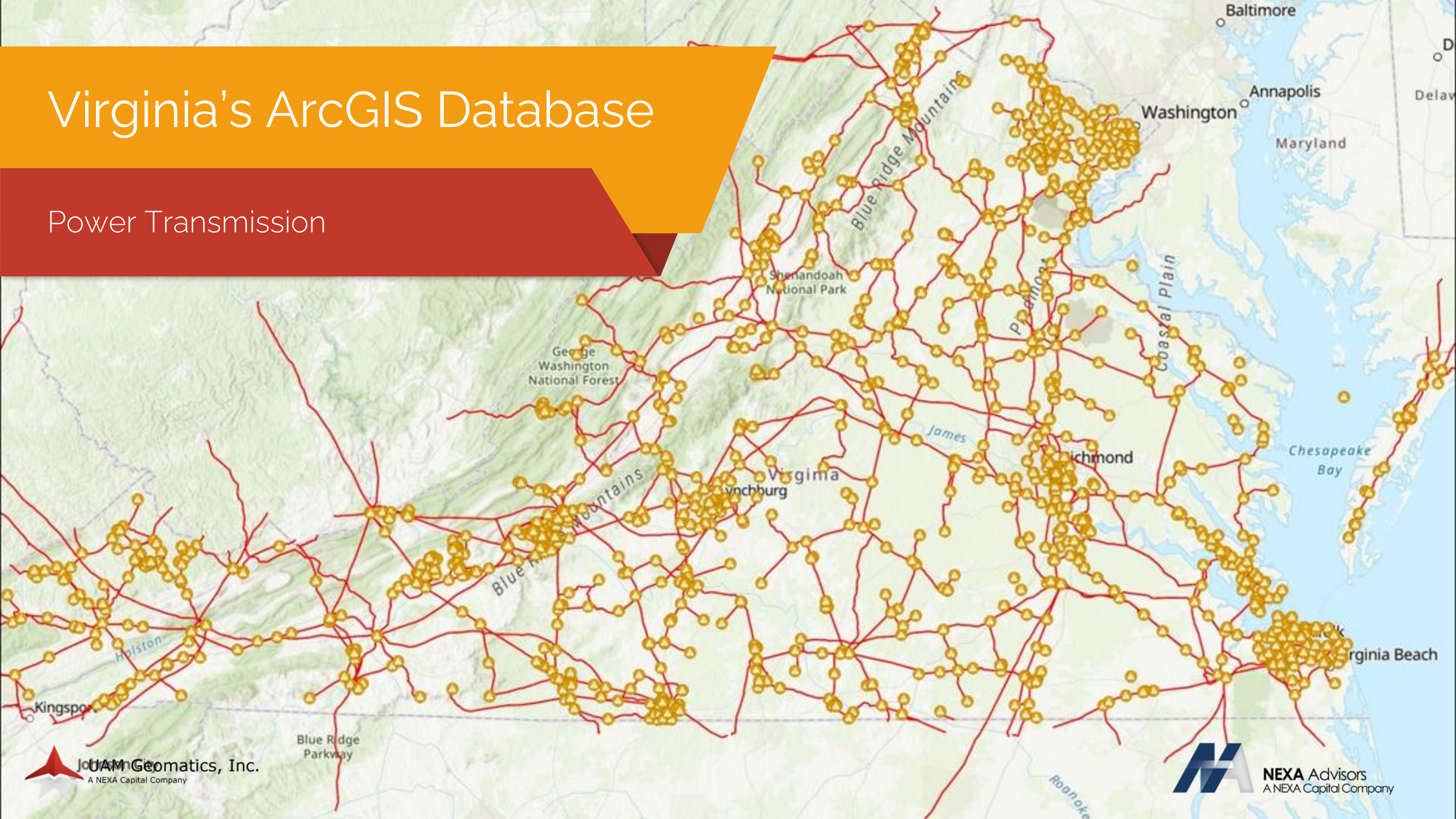
Virginia's ArcGIS Database

Power Transmission



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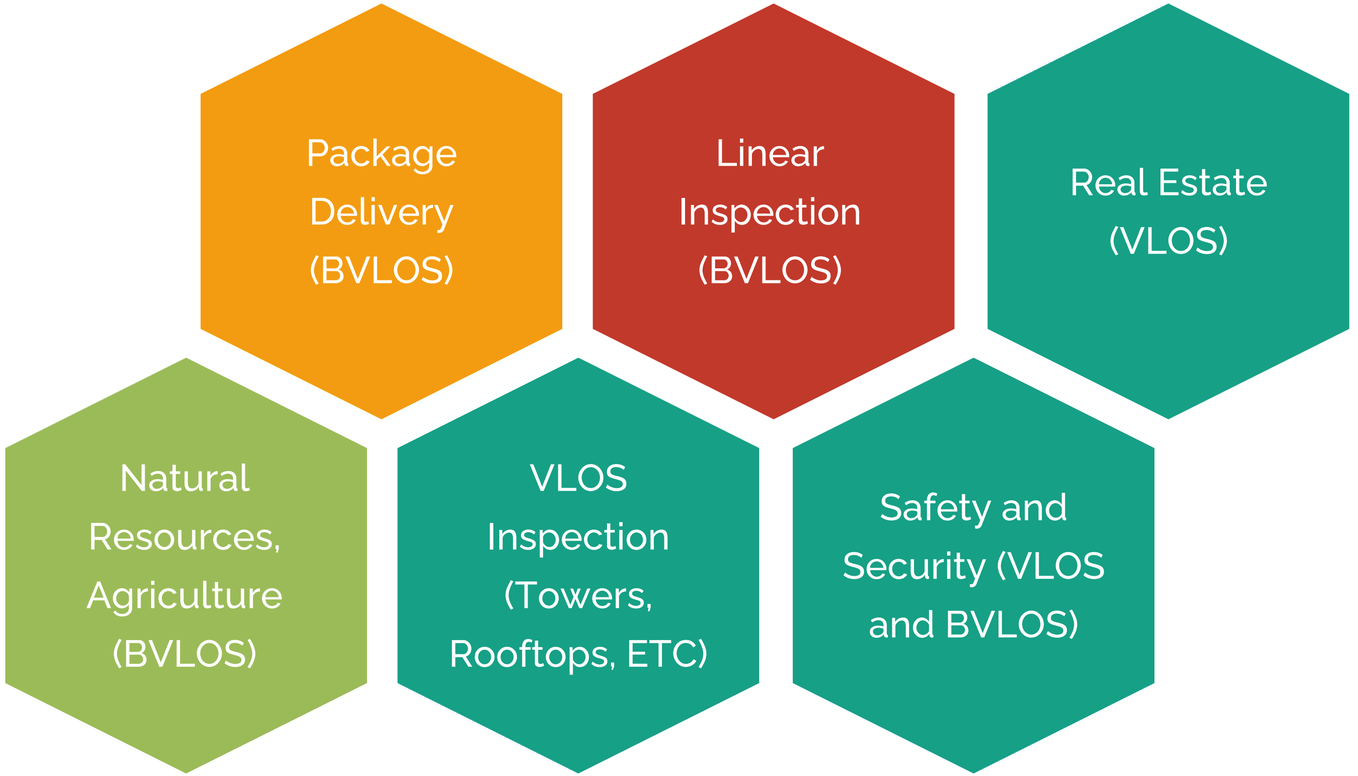
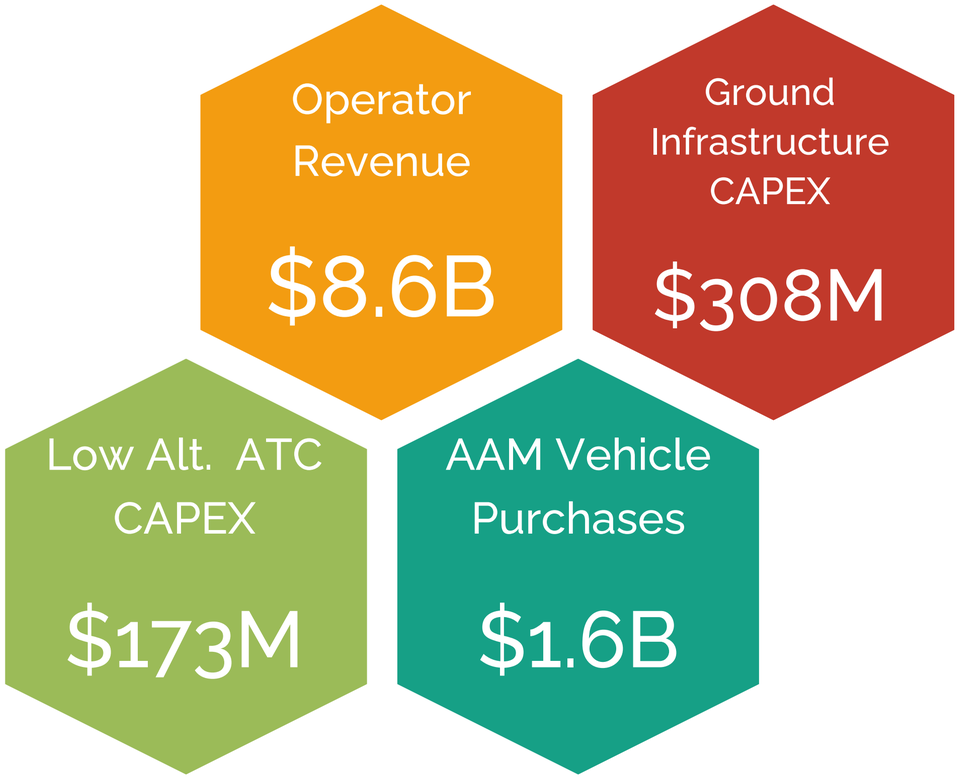
What We Found

Top sUAS Use Cases in Virginia



What We Found

Revenue and CAPEX Activity, 2023-2045 ($USD)



R

Operator Revenue

Revenue collected by AAM Operators through ticket sales and tonnage rates

I

Ground Infrastructure

CAPEX costs of constructing, maintaining, and operating passenger handling facilities

A

Low Altitude ATC

CAPEX costs of constructing, maintaining, and operating low altitude ATC sytems

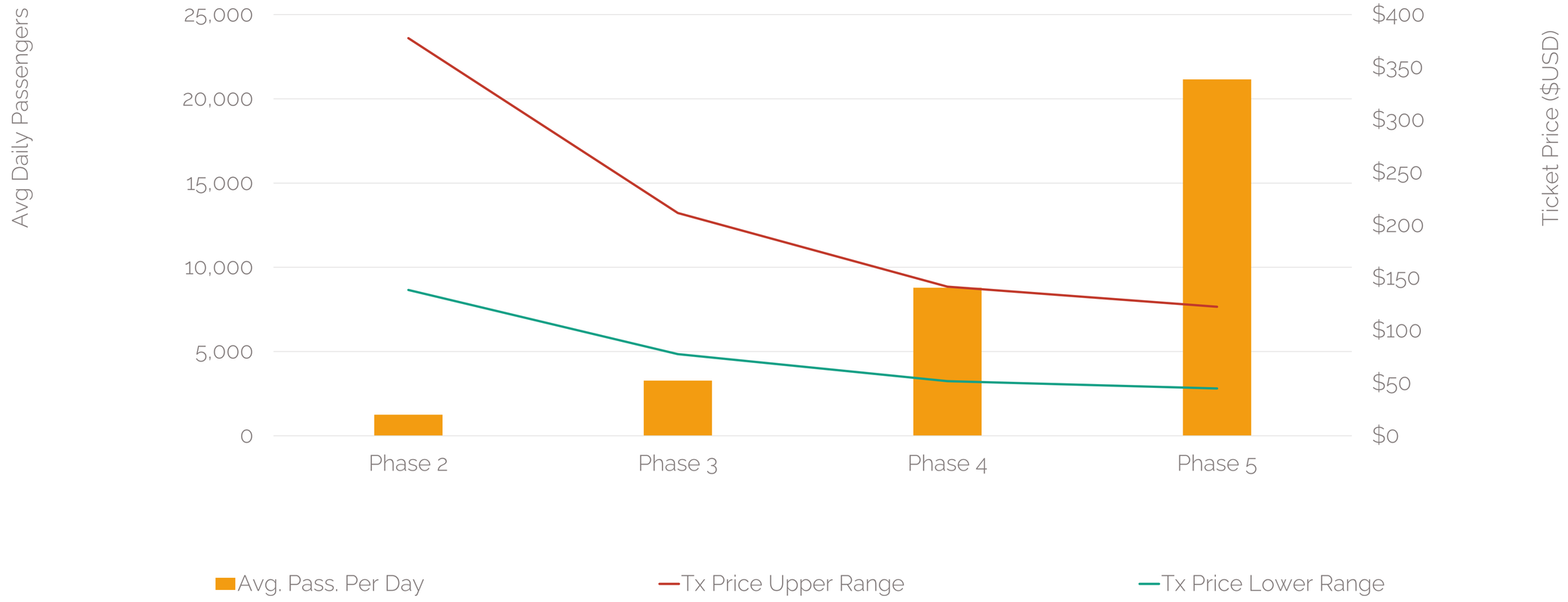
V

Vehicles

Costs of new vehicles including the continual replacement of older vehicles

What We Found

Demand and Ticket Pricing



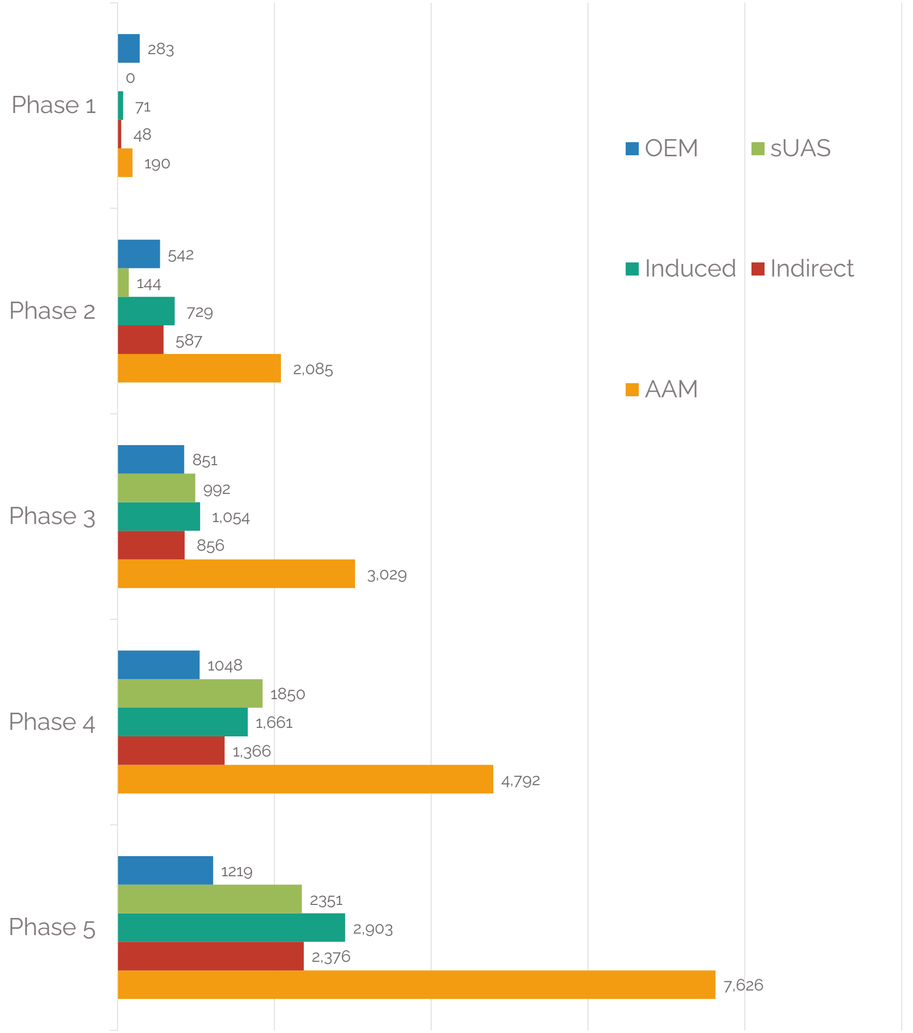
What We Found

Job Creation, Permanent Full-Time

17,400 Permanent Full-time Jobs

Securing an OEM is Important

Drones are an Efficiency Tool



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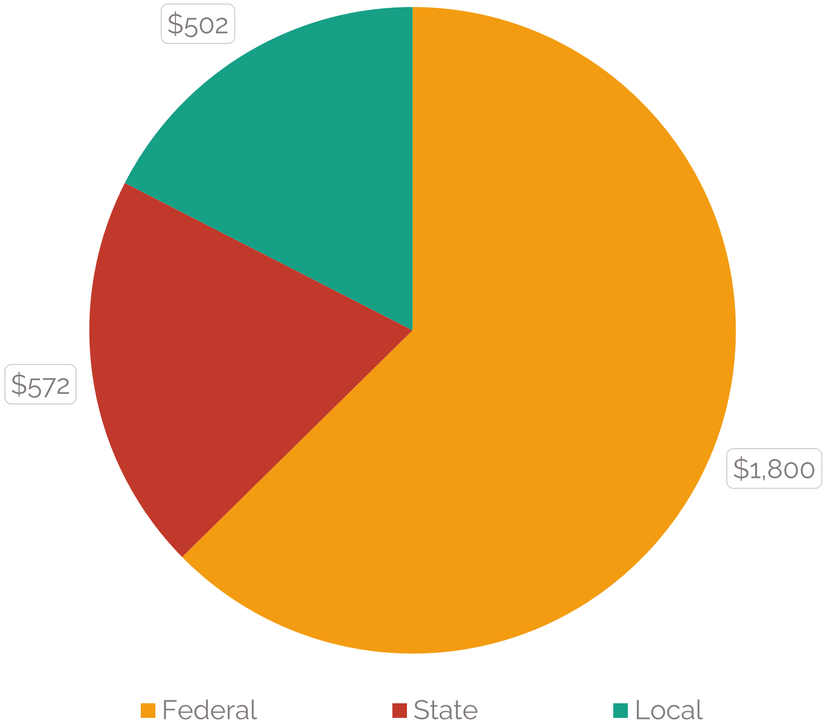
What We Found

Tax Revenues ($M, USD) 2023-2045



F

Federal

$1.8 Billion

S

State

$572 Million

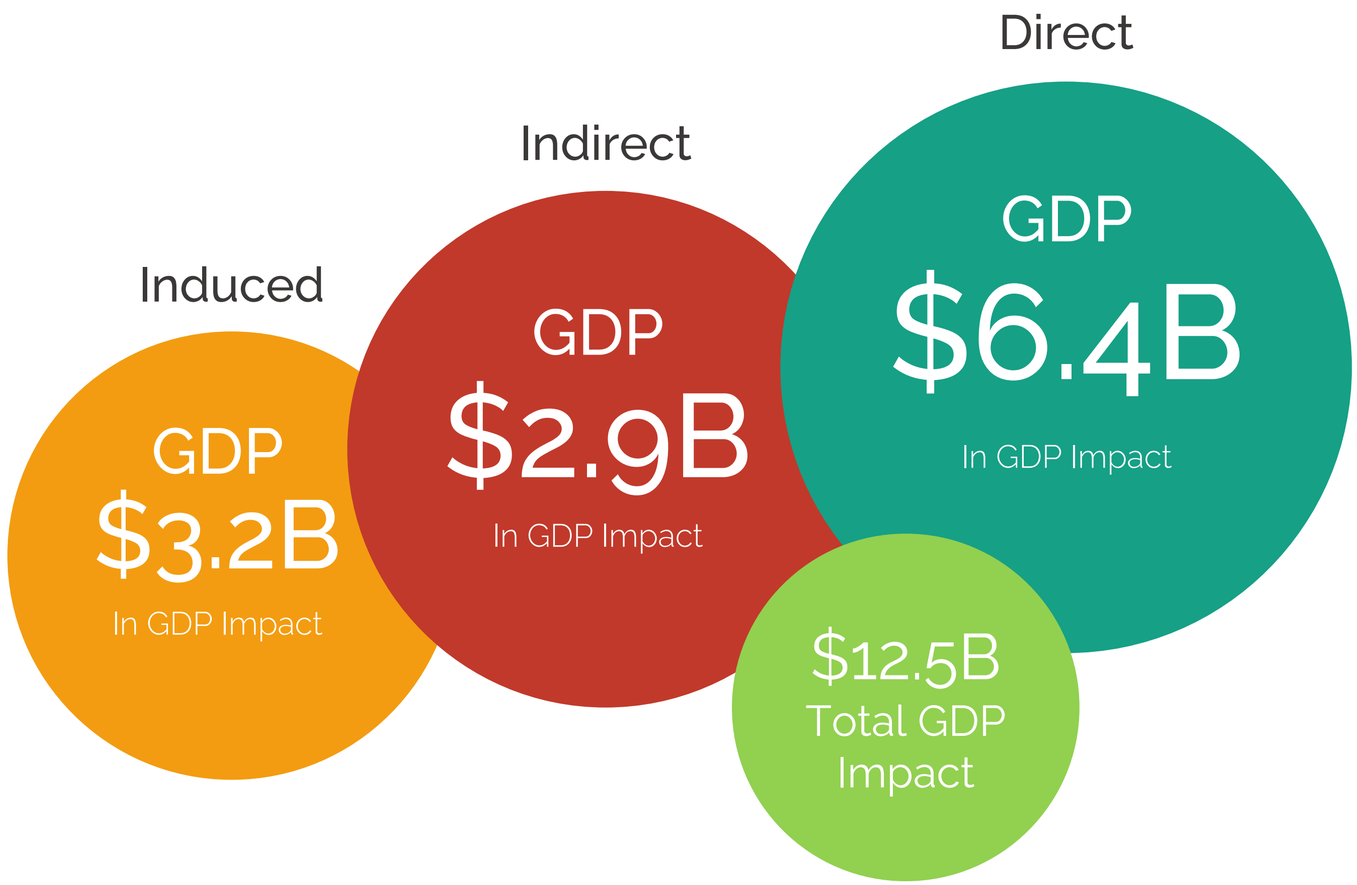
L

Local

$502 Million

What We Found

GDP Impact



Direct

The set of expenditures applied to the I-O multipliers for an impact analysis

Indirect

The business-to-business purchases in the supply chain taking place in the region that stem from the initial industry input purchases.

Induced

The induced effects are generated by the spending of the employees within the business' supply chain.

Questions?

NEXA Advisors
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UAM Geomatics, Inc.
A NEXA Capital Company

John Eberhardt

Chief Technology Officer

Advanced Technology Applications (ATA, LLC)

WINCHESTER
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Scott Kensinger

Emergency Management Coordinator

UAS Program Director

City of Winchester

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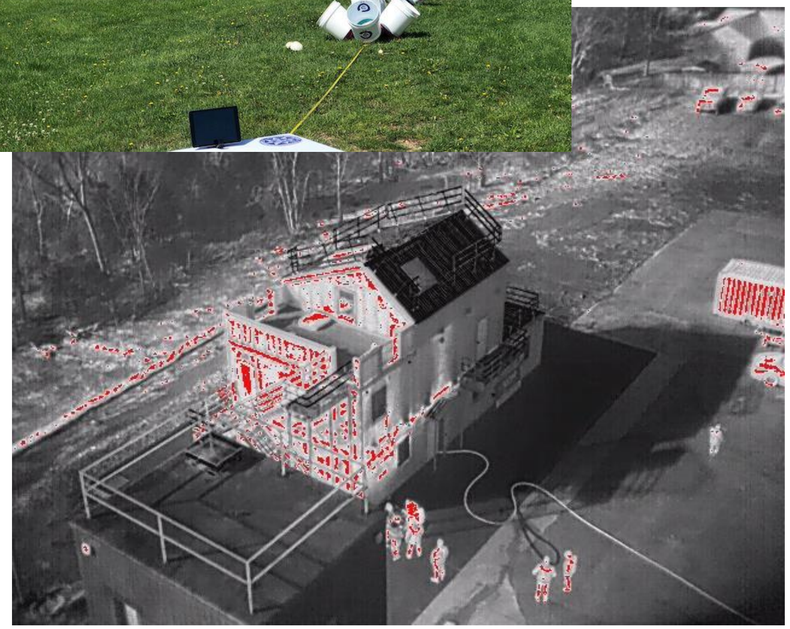
Winchester Virginia

“More than just a pretty picture”

Governance

- Early Adopters
- Council Approved 1/2018
- Program Supports All City Services
- Part 107 Entity
- 10 Aircraft
- 11-Part 107 Certificated Pilots from Various Dept.

Training and Education



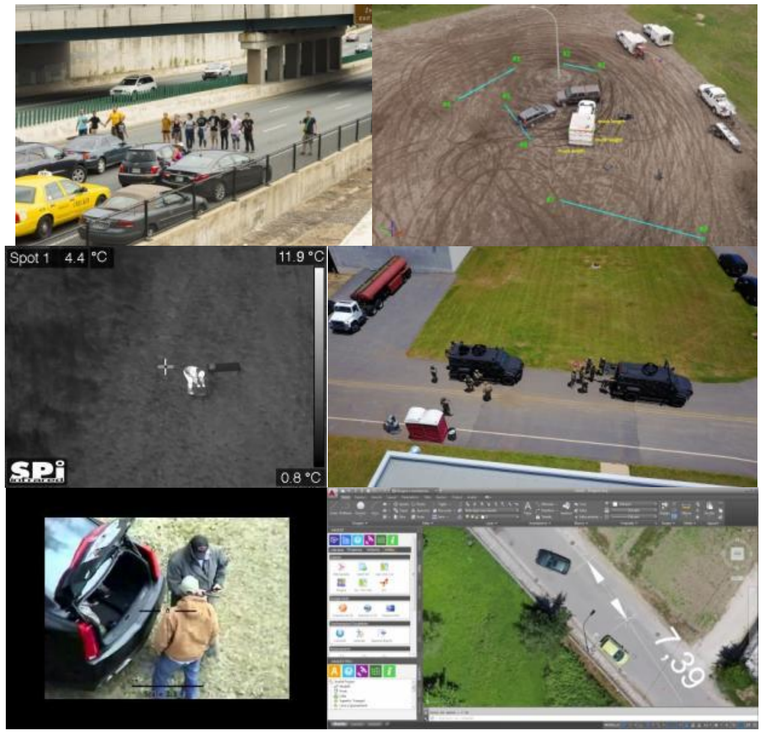
- Train Monthly for Team Proficiency
- Conduct Annual Part 107 Preparation Classes for Employees
- Explore New Technologies to Strengthen the Program
- Working with Outside Agencies such as the VIPC, the VA FIX, Winchester Airport, etc.
- Provide Outside Agency Support

Public Safety Applications

- Emergency Management
  - Quick Response UAS Vehicles
  - Live Streaming Through Virtual Environments
  - Emergency Response for Public Safety
  - Equipment and Supply Drop Capability
  - Thermal Imaging
  - Tracking Capability
  - Scene Illumination

Public Safety Applications

- Law Enforcement
  - Overwatch for Barricaded Subjects
  - Suspect Searches with Police and K-9
  - SAR Missions
  - Suspicious Package Identification



Public Safety Applications

- Firefighting
  - Thermal Identification
  - Atmospheric Condition Monitoring
  - Temporary Illumination
  - Assessing Structural Status
  - Identification of Fuel Types and Loads
  - Pre-planning

Municipal Services Applications

- GIS/Surveying
  - Aerial Mapping
  - Topography Surveying
  - 3D Modeling
  - GPS Locating
- Inspections
  - Infrastructure Inspections
  - Construction Progress
- Public Services
  - Construction Inspections
  - Facilities Inspections
  - Traffic Management
  - Utility Surveys
- Communication
  - Still and Video Imagery for Publication
  - Marketing
- Parks and Recreation
  - Infrastructure Inspections
  - Vegetation Health
  - Ground Maintenance Analysis

Public Outreach

- Program Requirement
- Safety Fair Demonstrations
- Leadership Academy
- Working with Local Stakeholders
- Proof-of-Concept Events

We use UAS as a tool to support City services while ensuring safety in the airspace and on the ground. This service relies on people to know and understand the capabilities of the equipment and when it is appropriate to use them.

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WINCHESTER
REGIONAL AIRPORT

AIRPORT OF THE FUTURE

1. Infrastructure
   A. Northside Development
   B. Airport Capital Improvement Plan (ACIP)
2. Alternative Fuels
3. New Aeronautical Services (e.g., Regional Air Mobility)
4. Facilitate UAS Community Integration
5. Partnerships for Workforce Development

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THANKS FOR ATTENDING!

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