



# GO Va. Region 5 UxS Route and Corridor Planning Grant

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## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Outline



- Background
  - a) Context (Study Scope / Purpose, Key Terms, Applications, etc.)
  - b) Approach
  - c) Implementation Partners
- Focus Group Discussion Overview and Findings
  - a) Military
  - b) Community and Transportation Planning
  - c) Non-Military
  - d) Industry
- Commissioned Study Report Findings
- Conclusions

# GO Va UxS Lower Chesapeake Bay Route / Corridor Study – Context (Scope/Purpose)

 **Hampton Roads Eastern Shore Autonomous Systems Strategic Playbook**

## Regional Corridor/Route Development

**Scope / Purpose:** Examine the viability of establishing and implementing a UxS route network overlying the Lower Chesapeake Bay (LCB) and between local municipalities by assessing relevant operational, technological, schedule, and resourcing and economic impact feasibility factors.



Figure 6:  
 Corridor/Route  
 Area of Interest



Figure 7: Example Route  
 Corridor Topography

**Potential Application Objectives:** Create persistent routes for unmanned and autonomous vehicles to use for sustained operations.

**Play #1: Regional UxS Route/Corridor Study**  
 GO Va. awarded VISA a \$100K Planning Grant  
 Period of Performance – March 2022 - 2023



The study would examine how a series of networks, nodes, and routes/corridors utilizing air, ground and maritime unmanned systems could expedite the transport of goods, services, and travelers in our region. As well as identify key benefits, applications, and barriers.

## What is AAM ?

- Emerging air transportation system that moves people and cargo into places previously not served or underserved by Revolutionary aircraft systems
  - Non-traditional power sources – Hybrid, Electric, Solar and hydrogen
  - Fixed-winged and rotary aircraft with piloted or automated operations
  - Vertical Take Off and Landing (VTOL) utilizing “vertiports”
  - Innovative designs will enable new complex missions in civilian and defense environments
  - Potentially Faster, cheaper, and safer than operations by ground vehicles, traditional helicopters and fixed-winged aircraft



Small/Medium Unmanned Aircraft Systems (UAS)



Regional Air Mobility (RAM)



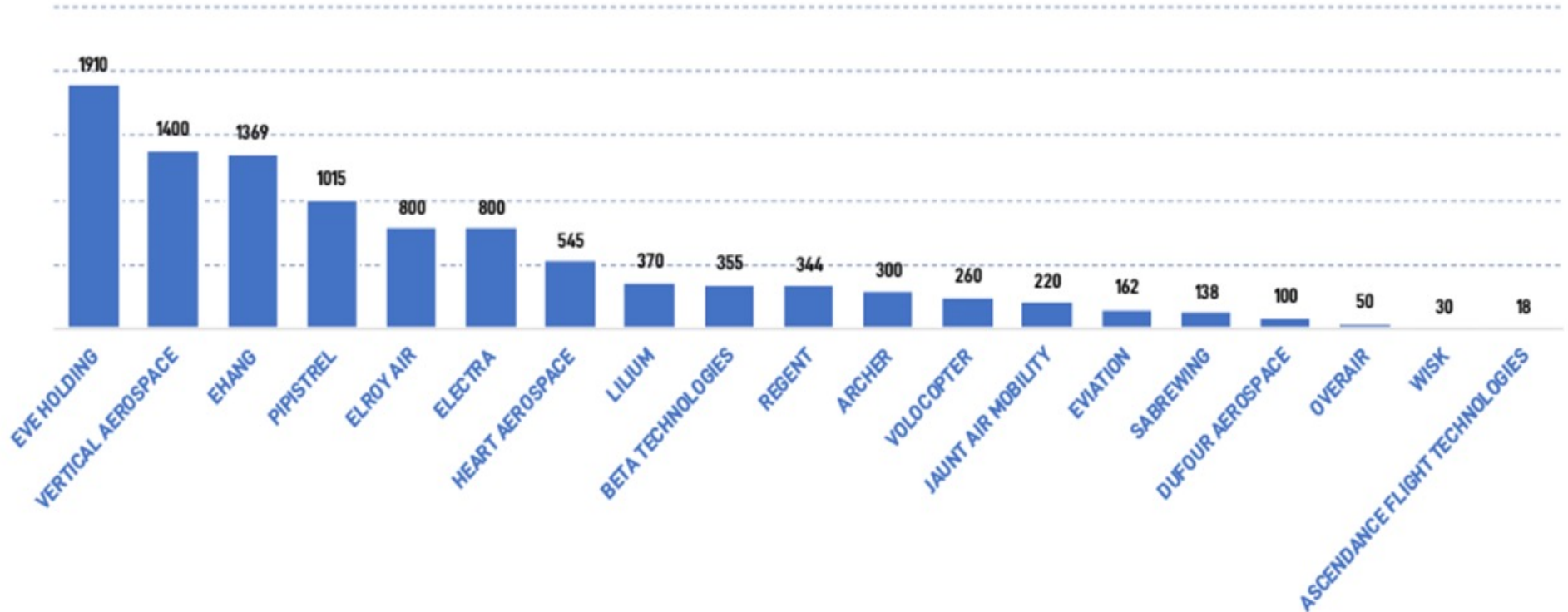
Urban Air Mobility (UAM)  
(Air Taxis)

**“Routes and Corridors” are very general terms to help guide and focus discussions. UxS systems especially small maritime and aerial drones operate differently than Regional or Urban Air Mobility systems. Our complicated Airspace and DOD presence will drive fixed pathways where UxS can traverse**

## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Context (Scope/Purpose)

**AAM Orders and Markets are Growing - This is going to happen, and our region should be a leader and key contributor**

BY OEM





## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Context (Applications)



- Search and Rescue
- Tracking and Surveillance
- Food / Package delivery
- Port Operation (Land and Sea)
- Port Safety and Security
- Moving People (Air, Land, and Sea)
- Road Assessment
- Beach Safety
- Warehouse Operations
- Cargo / Shipping
- Ship Inspection
- Medical
- Medical Package Delivery
- Military / Defense (People, Cargo, Weapons, Counter drone)
- Land / Real Estate assessment
- Flooding and Coastal assessment
- Urbanization / Community Planning
- Building Inspection
- Power / Pipeline Line inspection
- Waterway / Channel assessments
- Water quality assessment
- Air Quality assessment
- Aquaculture
- Agriculture
- Bio and Hazmat
- Emergency Management
- Law enforcement
- Communications
- Virtual Tours
- Wildlife / Animal Management
- Air Quality / Atmospheric Science

**The applications are numerous and diverse, and well suited for our region!**

## Why ?

- Other States and Regions are beginning to do this type of planning so they can make informed decisions to support economic growth, workforce development, and improvements in infrastructure



More than 10 “vertiports” are planned to connect major cities in Florida



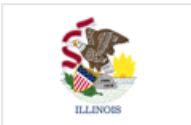
North Carolina General Assembly awarded a \$5 million grant for the design and development of an advanced air mobility system in Winston-Salem and \$20M for a Drone Test and training facility in Washington NC



An \$8.2 million National Advanced Air Mobility Center of Excellence is under construction in Springfield, Ohio, and will open next year



Wisk Aero and the City of Long Beach are partnering to make AAM a reality in Southern California



Illinois-based United Airlines to buy 200 flying electric taxis from startup Archer for \$1 billion to take you to the airport

Note: Maryland and New Jersey have done similar studies like this but not to this level of detail



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – How



- Took a Regional approach / perspective to plan a conceptual future where UxS are operationally integrated into the public
- Ensured participants are aware what others are thinking and planning
- Placed a sense of importance and urgency
- Leveraged our unique regional attributes to grow this sector for our region
- Goal was to lay out “A” likely not “THE” concept that could optimize our public regional investments in community planning, TT&C infrastructure, and transportation vs suboptimize locality by locality
- Implemented a Focus Group approach with a Lead Organization that organized and coordinated their respective communities, with cross focus group lead discussions to share thoughts and findings
- Tailored key questions for each Focus Group to answer
- Funded key SME’s in UAS / AAM technology, policy, and Unmanned Traffic Management Systems to provide support to the Focus Groups which were factored into this study
- Funded necessary Ground / Air focused risk and usage assessments to help guide route and corridor planning





## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Focus Group Key Questions



1. Using your current fence line (Air Land Sea) do you envision the need to expand those in an environment of increased UxS usage ?
2. EXTERNAL to your facility, Are there use cases where you will need a node, route, or corridor that is "secured for military purposes only ?
3. Do you envision needing any external Tracking Telemetry, Command, Control infrastructure or data to help with C-UxS
4. Do you have a need for an external location / set of infrastructure in the region to test UxS (Air Land Sea) for DT&E
5. Is UxS in your current thoughts on planning for the future ?
6. What are your thoughts on uses and applications of UxS ?
7. What are the benefits of those uses and applications ?
8. Where do you see the linkages across our Region that exploit the uniqueness of UxS and sharing of capabilities ?
9. Where / What are the key linkages that connect us outside our region (NE NC, SW Va., NoVA, etc.)?
10. Where do you envision desired key routes and corridors in our Region ? Think broader than just roads air traffic patterns, and channels
11. What do you see are key barriers to the infusion of UxS in an operational environment including technology gaps ?
12. What are the needed infrastructure including Tracking, Command / Communications, Operations ?
13. What demonstration opportunity(s) could you envision that will help inform / validate these study products, validate technologies and concepts to enable routes and corridors ?
14. From an Air and Maritime perspective .... Is there a better way to move people / Tourists within and through our region, and could these new approaches enable new business and growth opportunities within our region



# GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Implementation Partners



## Focus Group Leads

Community and Transportation

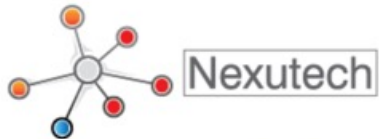
Economic Development

Military Facilities

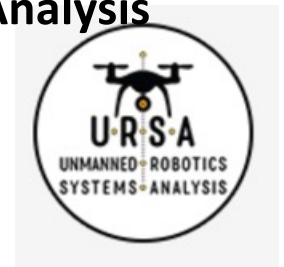
Non Military  
(Other Federal Facilities)



## Subject Matter Experts



## Contracted Studies: Ground Based and Airspace Risk and Air and Traffic Pattern Analysis



This \$100K EC Planning Grant not only had cost sharing built in but we leveraged an estimated +100 of years of combined knowledge and \$100's K other federal and State funded projects and capabilities.



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study

### Community and Transportation Focus Group



- Conducted 3 Focus Group meetings; Organized and conducted by HRPDC (Keith Nichols).
- City Planners from all localities were invited to participate. Portsmouth, Isle of Wight, York, and Norfolk attended. Other Participants included Port of Va., and Newport News PHF, Freight Transport Advisory Member

#### **Key Take Aways:**

- Huge learning curve associated with UxS Terminology, Planning, Applications etc. All representatives wanted the focus group to continue. **Action: via HRPDC engage with Regional Planning Directors Committee**
- Participating Localities (at their level) agreed that if public infrastructure (Fueling, Air Volume Awareness, etc.) is needed to support UxS operations it should be a Regional approach to ensure all data and information is shared and accessible. **Action: via HRPDC engage with Regional Planning Directors Committee**
- Participating localities (at their Level) were concerned with noise issues, creating ordinances, regulations, or specific zoning requirements, as well as identifying “No Go Zones” because of concern associated with limiting community and economic development, creating barriers or suboptimizing the use of UxS to improved transportation and delivery of goods / services. **Action: via HRPDC engage with Regional Planning Directors Committee**
- Community acceptance needs to be a part of the thinking / planning and roll out as UxS operations become more prevalent. **Action: Regionally explore key events to promote UxS applications to build awareness**
- Port of Va. is exploring UxS uses within their port operations currently not exploring ways to potentially move cargo out of the Port / Region using UxS. However, one suggestion offered was to move Cargo using UmS across the Elizabeth River to utilize Craney Island and other locations. **Action: Continue working with Port of Va. to explore funding opportunities to improve Port Operations, Safety and Security using UxS**
- **Bottomline: Localities and the region will need help planning and factoring UxS into their 2050 comprehensive planning efforts**



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Military Focus Group



- Leveraged HRMFFA outstanding connections to DOD Military Base commanders to assemble, lead, and develop key questions for this Focused Group
- Conducted 4 team meetings including a special focused discussion on a DOD developed UTM from the Office of Secretary of Defense for Technology at the Pentagon
- Team members were from ALL DoD installation in the region and the Coast Guard. Representatives had duties covering Air Traffic Management, Airfield Operations, Counter UaS, UaS Operations, Safety and Security, and Port operations and management

### **Key Findings:**

- Kick off meeting provided an overview of the Planning Grant, current state of the technology, and what others are doing in this sector. Participants, rightly so, focused the discussions on protecting their fence lines especially from small UxS
- Discussions evolved over time to understanding Military applications and potential infrastructure needs for a variety of the new UxS, but again only within their fence lines. Limited discussion of cross service uses routes or Corridors.
- Discussions mainly focused on AAM type systems with limited discussion of Maritime and Ground based UxS
- Overall representatives felt that as more and more UxS become prevalent in the air, water, and ground there **MIGHT** be a need to expand current buffers between military installations and UxS Operations. Largest concern was Airspace. This could be mitigated by better integration and understanding of potential public / private UTM architectures and applications



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Military Focus Group



### ***Key Findings Cont'd***

- Based on our connections, we arranged to have Mr. Joel “Cash” Castillo who works in the Office of Secretary of Defense at the Pentagon to talk about the Military developed Collaborative Low Altitude UAS Integration Effort (CLUE) UTM. A Non-classified briefing is included as an additional deliverable enabled by this Grant. Results from this briefing were:
  - Mr. Castillo lives in our region, worked as the Air Boss at “NOB” previously, and knows the complexity of our region
  - Other States / Localities with DOD bases have worked over the last 2 years to include directed funding language within the NDAA to deploy CLUE to their Installations
  - Every Military Installation desired more information and wanted to begin the planning on bringing the CLUE system to the region. Ongoing discussions have continued since this Focused Group has ended.
- All members wanted the UxS Focus group to continue. Further ad hoc support and conversations have occurred over the last 6 months to resolve issues and bring additional information forward for consideration.
- ***Bottomline & Forward Actions: Continue the dialog and partnership building with DOD. Both HRMFFA and localities Via HRPDC have standing interfaces with the DOD. This will be the most challenging interface and could also represent a huge opportunity to pursue resources for joint programs for infrastructure related improvements, advanced testing and operational integration***



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study



### Non-Military and Economic Development Focus Group

- Conducted 1 Meeting with UxS Industry; None with Non-Military as existing efforts/relationships with NASA, Law Enforcement, and Emergency Management allowed us to understand their thinking regarding Routes and Corridors / UxS Planning

#### ***Key Take Aways from Industry Focus Group***

- Industry was mainly focused on how our Planning Grant could help them get funding and not what was needed from the localities or others to help enable the implementation and uses of their systems
- Never followed back up. Revectoring approach to enable a specific application / use case and let that help drive regional thinking and planning
- We do have an underserved UmS community – **Action: discuss with AUVSI HR Chapter on ways to engage and help boost the Maritime related Drone applications and needs**

#### ***Key Take Ways from Non-Military Focused Group***

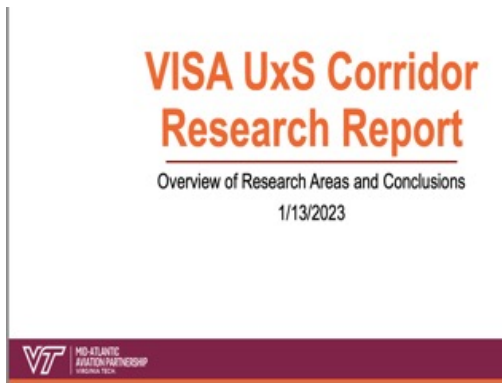
- NASA Langley has a desire to enable a BVLOS testing area in the Chesapeake Bay with routes across the bay (e.g., Accomack and Wallops). This could be used for Maritime systems as well to conduct joint testing and applications.
- NASA Wallops has existing capabilities (Hangar, Runways, Restricted and Controlled airspace, and TT&C capabilities that should be utilized to the maximum extent possible by AAM as well as deep water access ramp that is under development
- DHS, EPA, and DOT / Commerce are focused on Port Operations, Safety, and Security. See attached additional reference materials associated UxS Port Safety and Security that was implemented and produced in Partnership with VIPC. These materials provide a clear road map for .....?



# GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Contracted Studies



- Study Reports are included as Attachments and key findings are included in Conclusions Charts



HR ASE Assessment Document V1.0

## Hampton Roads AAM Service Enablement Assessment

Minimum Viable Infrastructure System Assessment Document  
Prepared by ATA, LLC



# HAMPTON ROADS

## VIRGINIA AIRSPACE ANALYSIS

A REPORT BY URSA INC. FOR THE VIRGINIA INSTITUTE FOR  
SPACEFLIGHT & AUTONOMY



T&E Range Location Options Supplement



Strome College of Business  
Dragas Center for Economic Analysis and Policy



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Key Takeaways



### Contracted Independent Studies:

- Highly complicated airspace and waterways with many DOD users makes the region problematic for UxS Testing and Full-Scale operations. However, this also creates opportunities if efforts are well coordinated. “Demonstrate it here, Operate it anywhere”
- More in-depth analyses using FAA Certified AAM Flight Paths and Ground Based Risk Assessments are needed to help guide where strategic investments could be made to optimize the region UxS Test Sites and operational Vertiports. VT MAAP is critical to performing these assessments.
- Several UaS Research Test and Development “Locations / Corridors” can be established
- Regional Approach for “Air Volume” awareness especially below 400 ft for UaS is a must. Doesn’t have to be 1 system for the entire region but could be multiple “Low Cost” network of systems that is accessible to Localities and DOD.
- Historical ADS-B data clearly shows the complicated nature of the airspace and locations where high volume AAM type vertiports could create complications especially on approach and takeoffs for DOD and Commercial Air Traffic
- Pertinent Data is contained in the URSA – HR Airspace Analysis for the “Go Va. Regional Airport Study”
- Studies only focused on Aerial Autonomous Systems (need ground and maritime)





## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Key Takeaways



### Contracted Independent Studies:

- Economic Analysis clearly shows a wide variation of demand and actual ROI / Economic growth potential because of various high level assumptions pertaining to technical / operational risks, policies, taxes, job displacements, application infusion, as well as infrastructure requirements
- Horizontal and Vertical equity challenges in AAM (costs and access) will likely play into the overall usability and growth of this sector. For example: AAM for moving cargo and people in a urban environment
- Many questions / assumptions need to be resolved or challenged before credible / defensible economic analysis can be performed. These questions are:
  - How will the emergence of AAM urban cargo delivery services impact transportation. service companies and employment?
  - Will the shift of passengers to AAM passenger services impact bus, rail, and more current forms of air passenger travel?
  - How closely will AAM service consumption be related to household income and, if the disparities mirror automobile transportation, how will this influence transportation equity?



## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Actions



### Contracted Independent Studies:

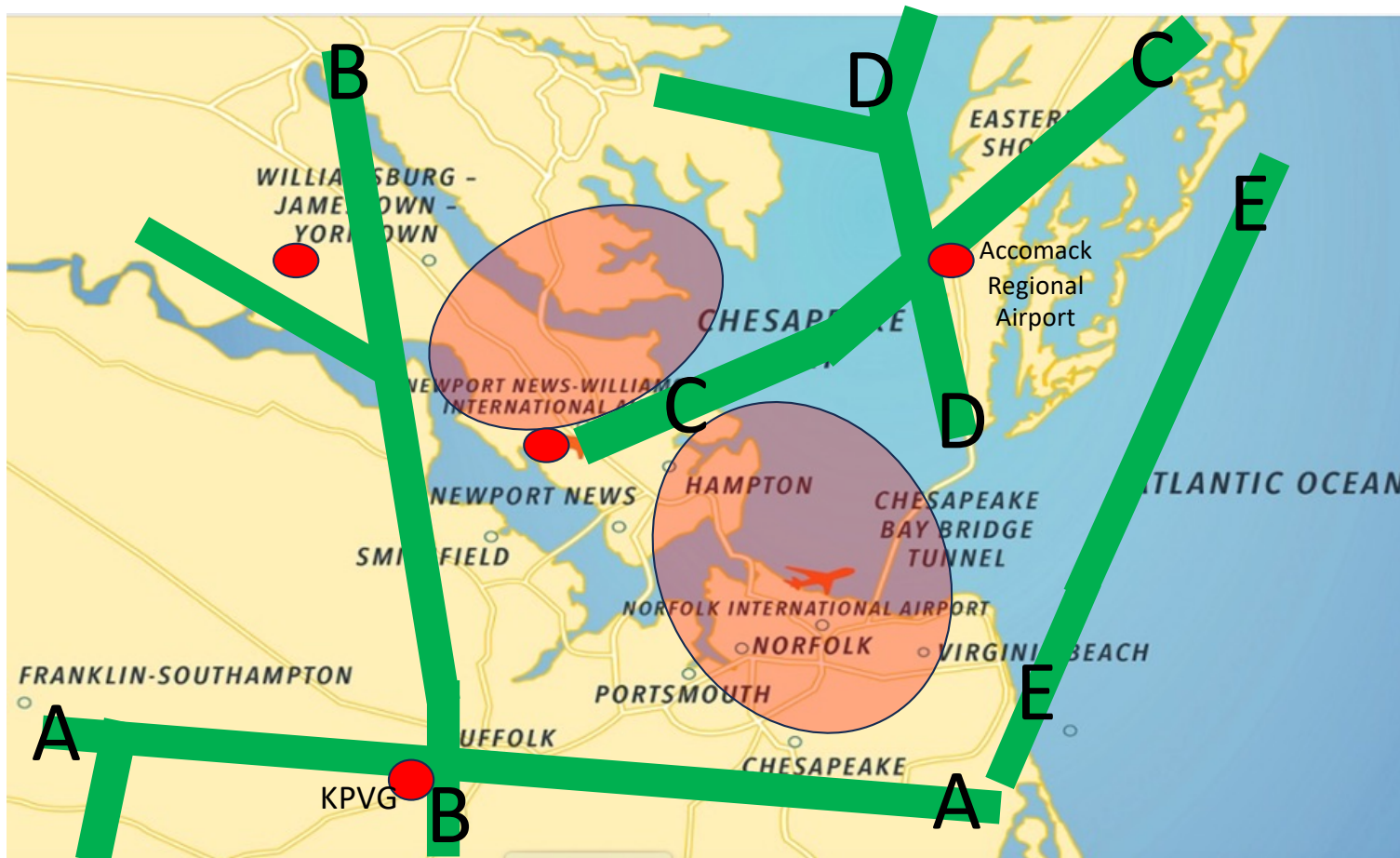
- Build partnership with Virginia Tech MAAP to bring their capabilities to the region in order to:
  - a) Help establish test and operational corridors that capitalizes on the uniqueness of the “ruralness” with low ground-based risks that in close proximity to Military locations and operations over water. Brings in Commercial, DOD program uses, and other Government Agency Testing (Accomack and Hampton Roads Executive Key locations)
  - b) Capitalize on their FAA designation and working relationship, and recent BVLOS COA application for testing at Accomack Regional Airport
  - c) Create opportunities to formulate proposals to State, DOD, and other Government Agencies for testing and infrastructure (Data, Air Volume Awareness, Fueling, etc.)
  - d) Demonstrates the Region is being proactive to solving key operational challenges for UxS
- Clearly communicate to State DOAV where the region would like to begin establishing AAM enablement locations and corridors, pursue funding
- Begin discussions with DOD regarding joint testing of Aircraft and Air Volume Awareness

## GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Airspace Complexity

- Beside the National Capital Region, Hampton Roads represents the 2<sup>nd</sup> most complicated airspace in the Country
- Combine the above with Naval Ship Repair, one of the worlds largest Navy bases, and a very busy Cargo Port the region has a HIGHLY complex operational environment.
- While this creates numerous challenges it can create numerous opportunities for the region to be a leader in UxS testing and operational integration
- Solve it here you can operationalize it almost anywhere !!!!!!!



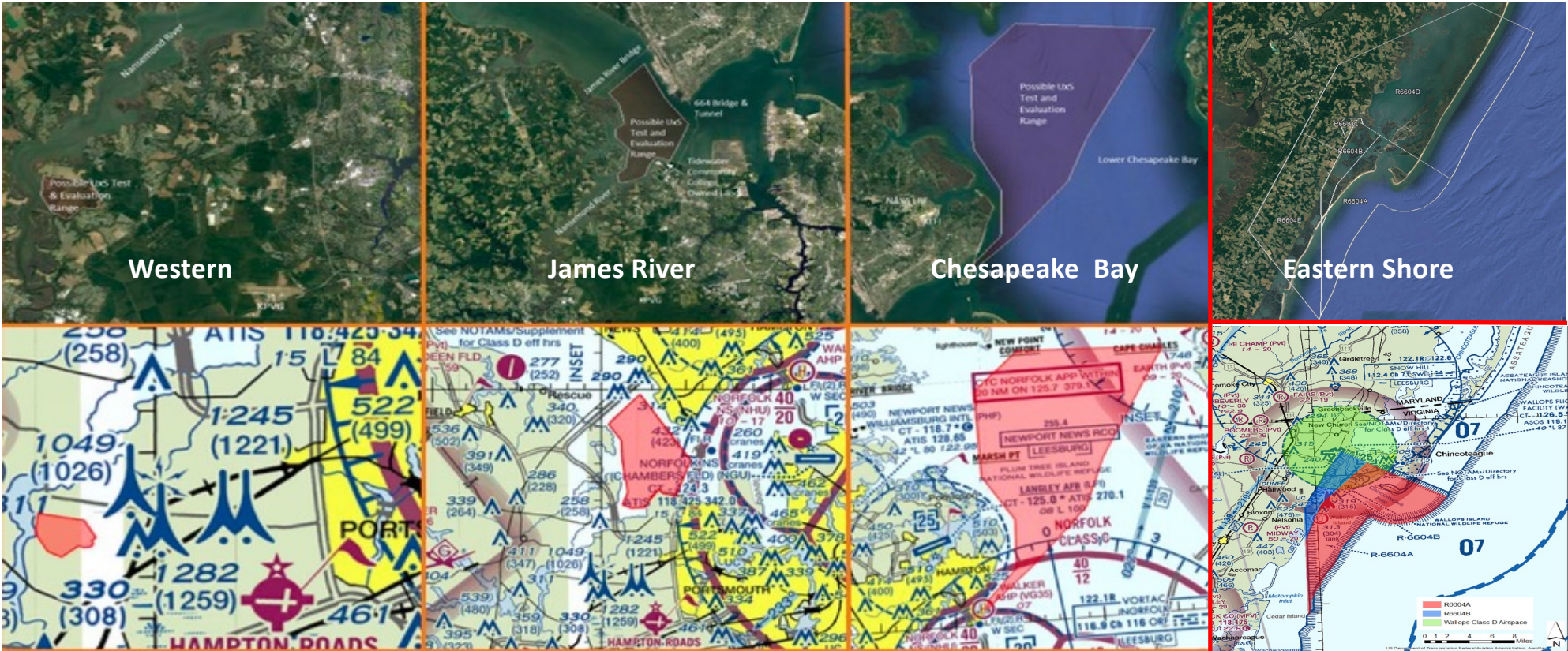
Preliminary Key AAM Routes / Corridors for Test and Operations of RAM Type Vehicles  
 (Note: based on ground risks and restricted airspace)



- A – RT 460  
Corridor SE Va to SW Va. / NC  
Research Triangle
- B – Richmond/  
James River to NE  
NC Corridor
- C – NASA LaRC to  
Wallops Corridor
- D – Eastern Shore  
Corridor
- E – Atlantic Ocean  
Corridor

● Key Nodes / Vertiports

# GO Va UxS Lower Chesapeake Bay Route and Corridor Study – Key Takeaways (Possible Test and Development Ranges )





## Go Va. UxS Route and Corridor Planning Grant Conclusions



- In general, this Planning Grant began the conversations and thinking. Localities that participated felt like they were drinking water from a fire hose and will need help to support their Comprehensive Planning efforts.
- While most participants were aware of small UaS (Picture taking, Package delivery) most are not thinking RAM or UAM benefits and challenges or about ground and maritime UxS and their benefits
- Over the next 10 years there will be a growth in applications which will drive an increase in small UaS, RAM, UAM, as well as ground and Maritime Autonomous Systems
- The DOD will be the driver on UxS Routes and Corridors as well as a Regional approach for Air Volume Awareness / Unmanned Traffic Management. The region has been doing a good job of engaging with the DOD to resolve encroachment and other issues. UxS will likely demand we be a GREAT partner in order to share and leverage resources to with the maximum extent possible
- Continued dialog with the DOD via HRMFFA and HRPDC is a MUST ! Since the conclusion of our Focus Group, I have been involved in providing additional support to the DOD and helping to open up additional contacts
- It will be difficult to plan or bound routes and corridors for Small UaS as well as Small Unmanned Underwater or Surface. RAM or UAM will need general Routes /Corridors and or protocols to follow because of our EXTREMELY complicated Airspace and Waterways



## Go Va. UxS Route and Corridor Planning Grant Conclusions



- To go from a potential “conceptual picture of Routes and Corridors” to the operational Infusion of UxS into the region will require multiple system trades, budgetary decisions, and coordination with key stakeholders
- Key Nodes (HREA-KPVG, PHF, Accomack Regional) have clear strategic benefits with lower risk for operations. Isle of Wight needs to be vetted further because of location and existing under utilized airfield and water access.
- VT MAAP is a national asset and should be brought into the region to help guide any regional AAM T&E strategy as well as overall AAM planning. Progress has been made in this direction and needs to continue if the region want to grow this business sector.
- Other States (Florida, New York, and Ohio), and Localities are being very active at the Federal level to enable directed funding to solve infrastructure challenges, as well as safety and security challenges
- There are existing Regional Level Committees and Organizations that can be utilized to help move the region forward in this Sector however we should think about how the integration and decision making is accomplished.



## Go Va. UxS Route and Corridor Planning Grant Conclusions



- This study has many tangible and intangible benefits to the region because it demonstrates our proactiveness to engage with key regional partners and stakeholders to effectively optimize and infuse UxS into our regions operational environment.
- Because of the relationships and connections that were built over that last +4 years we were able to execute this detailed study for a fraction of the costs it would have cost.
- **Bottomline: Our region should:**
  - *Be a leader vs a follower in pathfinding the adoption of UxS into our operational environment by focusing on applications with associated demonstrations*
  - *Utilize and leverage our our regional assets such as locality demographics, geography, academic institutions, key challenges and applications, key Government led research, testing capabilities, and operations to move this sector forward.*
  - *Establish a formal structure / organize, establish a focal point for the region, integrate key stakeholders and document key capabilities, and pursue opportunities that could help infuse UxS into the region's operational environment.*





## Go Va. UxS Route and Corridor Planning Grant Report and Reference Materials



Please Visit – [visaatodu.org](http://visaatodu.org) to download this report and all reference materials

The screenshot shows the VISA website header with the VISA logo on the left and the Old Dominion University logo in the center. The navigation menu includes 'What is VISA?', 'Staff & Leadership', 'Partners', 'Projects' (highlighted with a yellow box), and 'Survey'. A teal graphic on the right contains the words 'GROWTH', 'TALENT', and 'INNOVATION'. The main content area features a large teal heading: 'UXS ROUTE AND CORRIDOR PLANNING GRANT AWARD'. Below this is a teal button labeled 'UxS Route and Corridor Overview'. The text below the button reads: 'We are excited to announce our award from GO Virginia administered via Reinvent Hampton Roads for an Unmanned Autonomous Systems (UxS) Route/Corridor Network Planning Grant for \$100,000. We will examine how a network of nodes and routes utilizing air, ground, and water through unmanned systems could expedite the transport of goods, services, and travel between currently valuable assets and underutilized points. The much-appreciated financial match made by the Cities of Norfolk and Hampton is one of the first elements of to be released Autonomous Systems Strategic Playbook for our Region, and leverage state and federal investment in maritime and aviation-related facilities at NASA Langley Research Center, Airport, Fort Monroe, Southside Hampton Beach, and others. We are looking forward to implementing this grant with participants throughout our Region.'