

Statewide Framework

VIRGINIA AIRPORTS SUSTAINABILITY MANAGEMENT PLAN



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LETTER FROM THE EXECUTIVE DIRECTOR



At the Virginia Department of Aviation (DOAV), we take seriously our responsibility to support Virginia’s communities in cultivating an advanced and sustainable aviation system that is safe, secure, and provides for economic development across the Commonwealth.

As the complexities and challenges of managing an airport continue to evolve and grow, we are committed to supporting airport operators in managing their sustained success in an uncertain world. We have assembled the framework presented in the following pages to help Virginia’s airports identify best practices and resources to implement cost saving measures and efficiencies and limit environmental impact while addressing a broad range of challenges and opportunities related to airport management.

Every airport is different, and this framework is written with that in mind – providing guidance, templates, and specific tools to help each airport undertake tailored sustainability planning to best suit local priorities, capabilities, and needs. Our intention is that it will help Virginia airports of all types and sizes to more efficiently utilize available resources and save money, promote economic development in the Commonwealth, further develop and strengthen relationships with community members, and better manage the environmental footprint of airports.

We are proud to release this document – the first statewide aviation system Sustainability Management Plan in the country to include all types of airports – as the culmination of months of input from airport operators and other stakeholders across the Commonwealth, and with the support of the Federal Aviation Administration (FAA). We are grateful for the contributions of the many Virginia airports that helped us by participating in our outreach efforts.

We hope that you find it useful. As always, we welcome your comments and feedback.

Sincerely,



Randall P. Burdette
Executive Director, Virginia Department of Aviation

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The purpose of the Steering Council was to provide early input, share concerns, suggest areas of opportunity, help generate buy-in to the effort, and guide the implementation of the specific recommendations. A primary role of the Steering Council was to help maintain focus on the usability and practicality of products for airport practitioners.

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1. CHARACTERISTICS OF THE VIRGINIA AVIATION SYSTEM

1.1 System Overview

The Commonwealth's aviation system is comprised of 66 public-use airports, including nine commercial and 57 general aviation (GA) airports. More than 94 percent of Virginia's population is within 30 minutes of a GA airport or within 45 minutes of a commercial service airport. More than 67,000 people in Virginia board a commercial aircraft each day and more than 6,000 aircraft depart from and land at Virginia airports on a daily basis.

Virginia is a leader with regard to state funding of airports, number of instrument approach capable runways, weather reporting facilities, and number of airports with Navigational Aids. Of Virginia's 66 public-use airports, 48 are in the National Plan of Integrated Airport Systems (NPIAS) and are eligible to receive financial assistance from the Federal Aviation Administration (FAA) for capital projects.

1.2 Types and Sizes of Airports in Virginia

As noted in the current 2016 Virginia Air Transportation System Plan (VATSP), the airport classifications serve as the framework for describing the function of each airport in the system, and as a reference for evaluating how those airports operate in the system as a whole. The Sustainability Management Plan (SMP) combines the five VATSP airport classifications into three tiers/groups based on commonalities of airport function, types of operations, and resources available.

The VATSP airport classifications are defined as:

Commercial Service (CS): Commercial Service airports provide scheduled air carrier and/or commuter service for surrounding communities. Destinations are both domestic and, in some cases, international. Airports with established commercial service are included in this category. Should a noncommercial service airport acquire commercial service, it would be considered a Commercial Service airport upon reaching 10,000 annual enplanements. Commercial Service airports are recommended to meet a minimum of FAA Category "C" design criteria. A precision instrument approach should be provided if feasible from a technical and financial perspective. Commercial Service airports are eligible for Air Carrier entitlement and Air Carrier/Reliever discretionary funding from the Commonwealth Airport Fund..

Reliever (RL): Reliever airports are general aviation airports located near or in larger metropolitan areas that are intended to reduce congestion at commercial service airports, providing comparable general aviation facilities and services typically found at a commercial service airport. They are recommended to meet a minimum of FAA Category "C" design criteria to accommodate the full range of general aviation aircraft. A precision instrument approach should be provided if feasible from a technical and financial perspective. Reliever airports are eligible for Air Carrier/Reliever discretionary funding from the Commonwealth Airport Fund.

General Aviation - Regional (GR): General Aviation Regional airports serve a large market area and accommodate general aviation activity. These airports offer a full range of services and facilities for general aviation activity including jet fuel, full-service fixed based operators, hangars, and a general aviation terminal building. General Aviation Regional airports are recommended to meet a minimum of FAA Category "C" design criteria when feasible. Instrument approach capabilities should also exist at General Aviation Regional airports. A precision instrument approach should be provided if feasible from a technical and financial perspective as well as justified by the level of operations. General Aviation Regional airports are eligible for General Aviation discretionary funding from the Commonwealth Airport Fund.

General Aviation - Community (GC): General Aviation Community airports provide general aviation facilities and services to a smaller market segment than General Aviation Regional airports. The services at General Aviation Community airports may include fuel sales, aircraft rental, and pilot training. General Aviation Community airports are recommended to meet a minimum of FAA Category “B” design standards when feasible. A non-precision instrument approach should be provided if feasible from a technical and financial perspective as well as justified by the level of operations. General Aviation Community airports are eligible for General Aviation discretionary funding from the Commonwealth Airport Fund. .

Local Service (LO): Local Service airports generally have a lower level of operational activity than other general aviation airports. Local Service airports provide limited facilities and often have constraints on expansion capability. Local Service airports should meet FAA Category “A” or “B” design criteria. Commonwealth funding for Local Service airports is limited to safety and preservation projects. Local Service airports are eligible for General Aviation discretionary funding from the Commonwealth Airport Fund. These airports must meet 5.1-7 of the Code of Virginia and 24 VAC 5-20-140 licensing requirements. Local Service airports may be in close proximity to larger airports.

Grouping of Airports for the SMP

For the purposes of the SMP, the airports are grouped as follows:

- Commercial service;
- Reliever and GA-regional; and
- GA-community and local service.

Commercial service airports represent the largest airports in Virginia and typically have more facilities and resources available than smaller airports. As such, commercial service airports are grouped into their own tier.

Reliever and GA-regional airports represent the next grouping, characterized by similar runway dimensions, airport facilities, and levels of operation (based aircraft and annual flights).

GA-community and local service airports are grouped into the third tier representing smaller airports with fewer operations. The number of aircraft based at these airports ranges from zero to a few dozen, depending upon location and local demand.

Additional variations in airport contexts – such as geographic, climatic, and urban/rural differences – may be used to further subdivide each tier. The airports included in each tier, categorized by geography and urban/rural classification, are listed in Appendix A.

Commercial Service

Commercial service airports typically have more employees (anywhere from 30 to over 200); more classifications and individual departments; specific staff functions; personnel dedicated to managing resources, public outreach, and long-term development planning; as well as multiple businesses within the airport including airlines, fixed-base operators (FBOs), rental car companies, and concessionaires (e.g., food, beverage, gifts). These airports have indicated that they are very concerned about future revenue streams, competition, and diversification.

Reliever and General Aviation-Regional

Reliever and GA-regional airports typically have fewer than ten full time employees, and many GA-regional airports have no full time employees. Some personnel typically fill multiple roles. These airports typically do not have employees dedicated to community outreach or to planning and development;

rather, these tasks typically fall on the airport manager. This tier of airports is typically not engaged with any scheduled airline service; however, air charter flights are common at these airports. Businesses on the field include FBOs, Specialized Air Service Operators (SASOs), and rental car companies.

General Aviation-Community and Local Service

GA community and local service airports provide airport access to rural communities and areas in the Commonwealth not served by larger airports. Staffing levels typically range from zero to three full-time employees. Many of the personnel at these airports are part-time and may have other non-airport duties within the locality. Duties for community outreach, resource protection, or coordination and planning are the responsibility of the airport manager/caretaker or other department heads in the locality. Airlines do not operate at these facilities; however, some feature FBOs offer maintenance or flight instruction and rental cars.

Other Factors

Other airport factors include geographic and urban/rural classification. In many ways, the airports across the Commonwealth all experience similar challenges and operational constraints, some more acutely than others depending on geography, climate, and proximity to large population areas.

Geography and climate. Virginia has five geographical regions. West to east, regions include: Appalachian Plateau, Valley and Ridge, Blue Ridge, Piedmont and Tidewater. For the purposes of this study, we have combined the first three regions – the Appalachian Plateau, Valley and Ridge, and Blue Ridge – into the “Mountainous Region.” As a result, we effectively consider three main regions: the Mountainous Region, Piedmont, and Tidewater.

Airports in the Mountainous Region typically encounter more snow in the winter and lower annual temperatures, which can result in increased airport maintenance and operations costs when compared to airports in the Tidewater Region. Airports in the Mountainous Region typically generate fewer wetland impacts, simply due to the relative absence of wetlands in the region.

Airports in the Piedmont Region see less snow than at the higher elevations and more moderate temperatures in the summer and winter. Wetlands are more prevalent here than in the Mountainous Region.

Coastal or Tidewater airports have very low average snowfalls and high average annual temperatures. These airports typically face more numerous environmental constraints due to the prevalence of wetlands and coastal zones.

Urban/rural classification. Airports in rural areas tend to have fewer impacts from residential encroachment, although the opposite can occur due to the lack of zoning or land use planning in some rural areas. Protections such as land use and zoning restrictions around airports are necessary to ensure the safe and continued operations of these rural airports while meeting DOAV airport licensing standards such as providing clear, obstruction-free approaches to the runway ends.

Urban aviation facilities struggle to expand due to lack of available land and often face a relatively high volume of noise complaints given the large concentration of residential development near these airports. Urban airports can also face ground access challenges with the growth of communities and populations around them. These facilities depend on a close working relationship with their localities to ensure that these vital links to the National Airspace System are protected. Land use and zoning controls can be adopted to limit incompatible development near these airports, such as residential housing and schools.

1.3 Current Airport Challenges

As part of the development of the SMP, Virginia Airports have identified the following challenges:

Commercial service airports are grappling with ever-changing airline business models as well as Passenger Facility Charges (PFCs) and the uncertainty of local and federal funding. Diversifying revenue sources while responding to government agency regulations and un-funded mandates are making it harder for these airports to maintain their existing facilities. Non-financial or operational challenges include regulatory obligations and limitations (e.g., stormwater run-off, de-icing) as well as the delays associated with environmental requirements. Providing passengers with additional amenities in order to stay competitive in the market place is a concern. Commercial service airports anticipate a continued need to develop funding sources. The shift toward new forms of telecommunications for business interaction leaving airports with fewer passengers is a concern. Airport competition, loss of airline service due to consolidation, response to new Safety Management Systems (SMS) requirements, and outdated air traffic control systems are all on-going concerns as aviation continues to change in the 21st century.

Reliever and GA-regional facilities are not as dependent on airlines as commercial service facilities are. However, many of their concerns are similar. The burdens of increasing fuel prices and dwindling local funding support are exacerbated by the imperative to provide hangars and infrastructure in order to attract users from among a limited pool of aircraft owners. Increasing costs and declining budgets make it harder for an airport to support aging infrastructure while promoting itself as a local profit center. Operational and regulatory concerns are tied to noise and other public relations concerns, government regulatory restrictions, and in many cases, a lack of full time staff. Airport security and limited availability of utilities (water/sewer) can hinder an airport's ability to compete for business and based aircraft. In addition to residential encroachment, these airports are concerned about future challenges related to maintaining current facilities and equipment – including pavements, terminal buildings, and an aging GA fleet – and an insufficient number of new pilots. Additional concerns include diversifying revenue sources and meeting additional environmental regulations.

GA-community and local service airports face many of the same challenges that Virginia's larger airports face, yet they often have significantly fewer resources. Facility upkeep costs and limited local funding support top the list of financial challenges, along with the cost of insurance and taxes. Other hurdles include limited staff capacity, military joint use agreements, environmental regulatory requirements, noise concerns, and public relations. It is anticipated that revenue production, hangar vacancy, and access to adjacent land for obstruction removal will continue to challenge these facilities in the future.

1.4 Future Trends That Will Affect Airports in Virginia

Current National Trends

A series of events in recent years have affected the aviation industry and influenced activity at airports across the country. Many airports saw a significant decrease in travel demand in 2001 and 2002 due to the September 11, 2001 attacks on the United States. Travel activity experienced marginal recovery through 2007 until a second decline due to the Great Recession from 2007 to 2009. Subsequent rising fuel prices ushered in increased competition from low-cost carriers, leading airlines to emphasize

operational efficiency. The Government Accountability Office (GAO)¹ reported in June 2014 that the total number of scheduled flights at small and medium hub² airports decreased by 20 percent between 2007 and 2013, while the total number at large³ hub airports decreased by about 9 percent.

Airline mergers occurred more often in the last decade than at any other time in history. These mergers have led to a significant decline in the number of airlines that operate at small- and medium-size airports. Airlines are focusing on profitability by limiting capacity, thus resulting in fewer overall flights and higher load factors (percent of an aircraft that is filled with passengers). These airline capacity reductions have significantly affected medium, small, and non-hub⁴ commercial service airports. Between 2007 and 2012, large hub airports experienced an 8.8 percent decrease in commercial service flights, while smaller airports experienced a 21.3 percent decrease.⁵

Throughout the past decade, GA operations as a whole have steadily decreased. The total number of private pilots across the United States has declined and is predicted to continue declining. Between 2000 and 2013, the number of hours flown by fixed-wing, piston engine aircraft has declined from 73 to 56 percent of all general aviation activity. FAA predicts that piston aircraft activity will drop to 38 percent of all general aviation activity by the year 2034.⁶

Current Trends in Virginia

Virginia airport operators face important future challenges to business and operational continuity and are taking actions to address those challenges. In general, the future trends can be categorized as operational, developmental, financial, and regulatory.

Operational Trends

While the aviation industry in the Commonwealth of Virginia has generally followed the national trends noted above, air transportation has exhibited more stability in Virginia than in other states. Commercial airports in the Commonwealth continue to exhibit growth characteristics that are reflective of strong local economies.

The VATSP predicts that airline operations at commercial service airports will increase from 711,000 annually in 2012 to 921,000 by 2037 (Figure 1). Passenger enplanements (aircraft boardings by airline passengers) are forecast to increase from 24.5 million annually to 40.8 million between 2012 and 2037 (Figure 2). The following charts show the projected growth in airline operations and enplanements at

¹ Government Accountability Office. (2015). *Airport Funding: Changes in Aviation Activity Are Reflected in Reduced Capacity Concerns*. <http://www.gao.gov/products/GAO-15-498T>. Accessed June 5, 2015.

² Small Hub airports are airports that enplane 0.05 to 0.25 percent of total U.S. passenger enplanements. Medium Hub airports are airports that account between 0.25 percent and 1 percent of total U.S. passenger enplanements. FAA. (2014). *Report to Congress National Plan of Integrated Airport System 2015-2019*. http://www.faa.gov/airports/planning_capacity/npas/reports

³ Large Hub airports account for 1 percent or more of total U.S. passenger enplanements. FAA. (2014). *Report to Congress National Plan of Integrated Airport System 2015-2019*. http://www.faa.gov/airports/planning_capacity/npas/reports

⁴ Non-hub airports are those airports that enplane less than 0.05 percent of all commercial passenger enplanements but have more than 10,000 annual enplanements. FAA. (2014). *Report to Congress National Plan of Integrated Airport System 2015-2019*. http://www.faa.gov/airports/planning_capacity/npas/reports

⁵ MIT International Center for Air Transportation. Wittman, Michael. (2013). *Public Funding of Airport Incentives: The Efficacy of the Small Community Air Service Development Grant (SCASDG)*. Pg 4.

⁶ AOPA. Moore, Jim. (2014). *FAA predicts continued GA decline: Piston fleet contracts sharply in 20-year outlook*. <http://www.aopa.org/News-and-Video/All-News/2014/March/13/faq-forecast>. Accessed June 6, 2015.

both Metropolitan Washington Airports Authority (MWAA) airports – Reagan National Airport and Washington Dulles International Airport – and at all other Virginia commercial service airports.

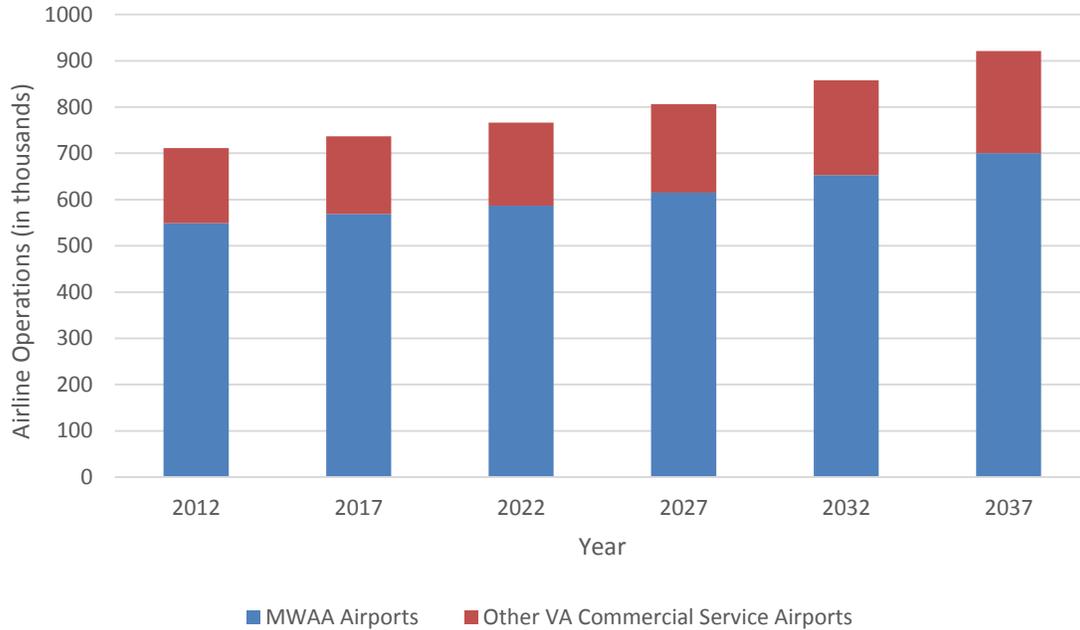


Figure 1: Airline operations trends at VA commercial service airports

Source: 2016 Virginia Air Transportation System Plan (VATSP), Virginia Department of Aviation.

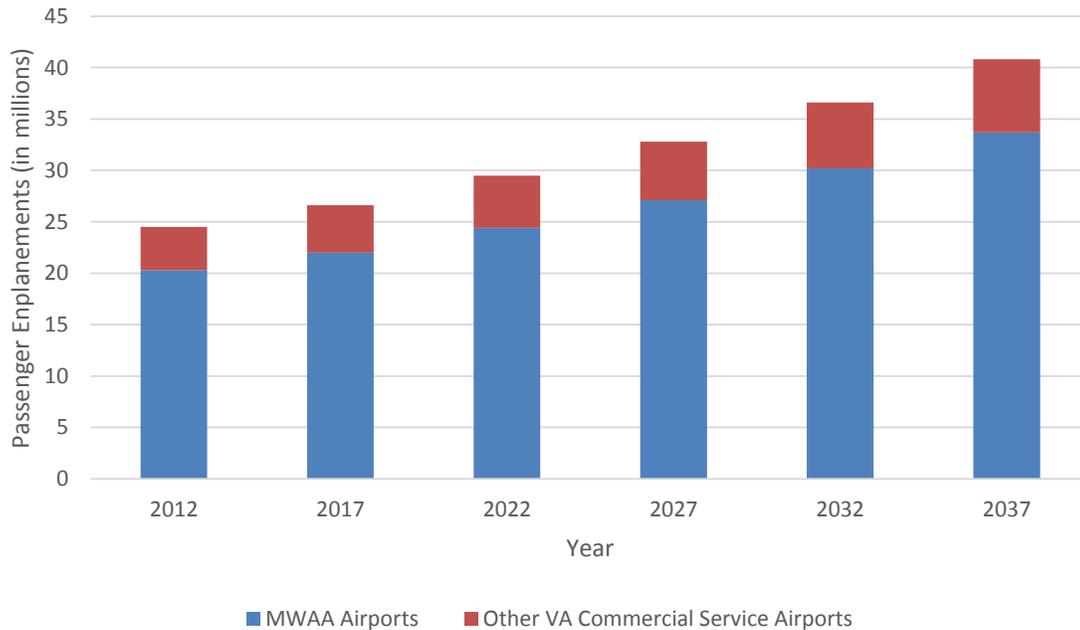


Figure 2: Passenger enplanement trends at VA commercial service airports

Source: 2016 VATSP, Virginia Department of Aviation.

Although national trends have shown a reduction in GA operations, Virginia has experienced more positive GA growth trends. From 2000 to 2012, aircraft based at GA airports in Virginia grew at a compound growth rate of 2.3 percent per year. During that time period, the number of GA operations grew at GA airports in Virginia but declined overall across the state – though at a much slower rate (-0.6 percent) than the national decline (-3.7 percent).⁷ And according to the VATSP, the number of GA operations in Virginia is projected to increase from 1.1 million annually to 1.3 million between 2012 and 2037 (Figure 3). The total number of aircrafts based at GA airports in Virginia is expected to increase from 3,156 to 4,175 between 2012 and 2037.



Figure 3: GA-based aircraft and operations growth in Virginia

Source: 2016 VATSP, Virginia Department of Aviation.

Existing and future challenges related to the operational trends in Virginia include:

- Larger aircraft sizes, with phasing out of large turboprop and small (50-seat) regional jet aircraft in favor of larger (75- to 100-seat) regional jet aircraft;
- Aging of airport equipment and infrastructure;
- Reduced air travel demand for smaller airports resulting from increased regional competition;
- Lagging implementation of NextGen into the Air Traffic Control system; and
- Maintaining consistent and competitive flights with increased airline consolidation and mergers.

⁷ 2013 Virginia Air Transportation System Plan Update Webinar #1. (2013).

http://www.doav.virginia.gov/Downloads/Studies/VATSP%20Update/2013%20Update/2013-05-01%20VATSP_PPT_VAOC_May%202013_Consolidated_v2.pdf Accessed June 15, 2015.

To mitigate these operational challenges, airport operators are providing necessary training to their employees to ensure safe and efficient practices when using airport equipment; striving for lower operating costs to airlines to maintain existing service and attract new service; and maintaining equipment such as Automated Surface Weather Observation Stations (ASOS/AWOS) to aid in flight planning.

Development Trends

Airports in Virginia face increasing pressure to develop their properties to increase aeronautical and non-aeronautical revenues, but they also encounter many barriers including limited developable land, lagging demand, or difficulty accessing funding. Rising off-airport development pressures require the use of aviation easements and close coordination with local planning departments to ensure proper land use and zoning actions to protect current operations and future development plans.

Commercial service airports are pursuing airfield projects (runway and taxiways) aimed at accommodating larger aircraft types, as well as passenger terminal renovations to provide an expected level of service and increase terminal concession revenues. GA airports are striving to maintain compliance with FAA design requirements to ensure the safe and efficient operation of private aircraft within the Virginia air transportation system. For example, four GA airports are in the process of lengthening their runways to meet standards. Airports of all types and sizes are exhibiting an increased interest in non-aeronautical development to expand revenue generating opportunities.

Financial Trends

Airports need to be as financially self-sufficient as possible, but operators report that it is becoming increasingly difficult to produce enough revenue to do so. Fuel sales and hangar rental revenue from GA operators has declined due to the downturn in GA demand. Local participation for capital improvement project funding is declining, as is federal funding from FAA's Airport Improvement Program (AIP). More airports are seeking to improve financial performance by developing financial and strategic plans, tracking revenues and expenditures more closely, reducing long-term debt to improve balance sheet and reduce debt service costs, and making prudent use of FAA and state entitlement funds to finance eligible capital improvements without incurring additional debt.

Regulatory Trends

Recent changes to FAA design standards (FAA Advisory Circular 150-5300-13A, Airport Design) have necessitated airfield modifications to meet the updated standards. Although these improvements are eligible for funding under FAA's Airport Improvement Program grants, it is still challenging for some smaller airports to maintain compliance with design standards. Additionally, some major commercial service airports, including Washington Dulles International Airport in Virginia, have implemented airfield modifications to accommodate new large aircrafts (Airbus A380 and Boeing 747-8). Changes in environmental regulatory requirements over the past decade have led some airports to pursue infrastructure expansion (for example, increased stormwater treatment capabilities), property acquisition, or establishment of easements.

2. AIRPORT SUSTAINABILITY

As Virginia’s airports work to navigate the current challenges and plan for the future trends detailed above, DOAV presents this comprehensive yet flexible sustainability framework as a potential mechanism to help address those challenges. An overview of sustainability (both within and beyond the airport context) is provided below, along with an identification of opportunities to be gained from adopting sustainability into airport operations. This section is followed by a description of existing sustainability efforts at airports in Virginia and some examples of the relationship that sustainability planning has to other goals, initiatives, and regulations affecting airports and their communities.

2.1 Overview of Sustainability

Sustainability as a concept emerged after the term “sustainable development” was coined in 1987 by the Brundtland Commission, an international group tasked with addressing the global, environmental, and developmental challenges of the time. For them, sustainable development meant development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Since then, a focus on sustainability has been adopted not only by governments, universities, and other institutions, but also by numerous businesses and global corporations. These diverse entities integrate sustainability into their operations through the combined consideration of environmental protection, community needs, and economic vitality for both current and future generations. These three concepts are inherently linked, as the natural and physical systems of the earth (e.g., clean air and water, and a stable climate) provide the critical support for healthy, functioning social systems (e.g., sanitation, energy systems, and

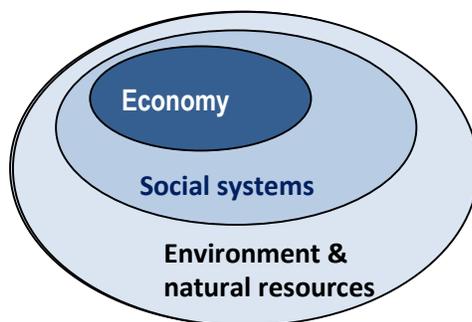


Figure 4: Concentric model of sustainability

safe transportation networks), which in turn enable our economic systems to be productive and thrive (Figure 4). In the context of businesses such as airports, sustainable thinking means not only looking at the traditional economic bottom line, but what is known as the triple bottom line: people, planet, *and* profit.

Business sustainability can also be thought of as ensuring resiliency over time. Businesses that are able to strategically integrate sustainability planning into their operations stand a better chance of weathering current and future challenges. An inclusive sustainability plan can help airports and other businesses ensure that operations continue to meet current demands while positioning for success long into the future.

DOAV’s Sustainability Definition

For DOAV, “sustainability” is a strategic approach to airport planning, development, asset management, and resource protection – including financial, environmental, community-relations, and other factors – that prioritizes current operational needs while best preparing Virginia’s airports for continued success in the future.

2.2 Drivers for Airport Sustainability

The Transportation Research Board’s (TRB) Airport Cooperative Research Program (ACRP) Synthesis Report 10, *Airport Sustainability Practices*, surveyed airports across the country to determine the existing and future drivers of implementing sustainability practices for airports. Based on the report published in 2008, the key drivers for implementing sustainability practices at an airport included:

- Federal, state, and local regulations, as well as policies within an airport;

- Corporate responsibility; and
- Concerns from the airports' stakeholders.

The ACRP Synthesis Report 10 highlights the fact that many of the factors driving the implementation of sustainability practices in 2008 were external. Airports must respond to federal, state, and local regulations. When done in a proactive manner, the response can be considered a sustainable practice. For example, developing off-site wetland mitigation sites prior to undertaking on-airport development that would impact wetlands proactively meets regulations and is a practice that balances the need for airport improvements with environmental resource protection. The concerns of stakeholders – most frequently neighboring communities, or the counties or municipal entities that own and operate the airport – can drive corporate responsibility.

Since the ACRP Synthesis Report 10 was completed in 2008, sustainability planning has been integrated into traditional airport master planning with increasing frequency, and a growing number of airports have created stand-alone sustainability plans. Through experience, the airport industry has started to realize one of the key internal drivers for sustainability – reducing operating costs and extending federal, state, and local investment in airport facilities. For example, airports that actively track their sustainability performance can judge how certain initiatives and strategies affect energy use, water consumption, or greenhouse gas emissions, among other things. Airports can also identify when billing errors or other utility infrastructure problems occur, and correct them, when monitoring and tracking sustainability performance. In addition to reducing operating costs through reduced utility and natural resource consumption, airports can extend the life of major infrastructure projects by implementing sustainability-focused features.

2.3 State of the Practice in Airport Sustainability

Airport sustainability planning in the United States is still evolving, and has been shaped primarily by FAA's Sustainability Master Plan Pilot Program and by research conducted by TRB's ACRP. Airport sustainability practices range from comprehensive organization-wide programs, to integrated planning efforts, to the implementation of discrete initiatives related to sustainability.

Sustainability Research and Guidance

In 2009, FAA created the Sustainability Master Plan Pilot Program to fund sustainability planning projects at airports nationwide. The FAA created guidelines for the program to help airports accomplish three goals:

- Reduce environmental impacts;
- Maintain economic growth; and
- Achieve social progress.

Airports approached the sustainability planning process in one of two ways: incorporation of sustainability principles into a comprehensive airport master plan, or adoption of an independent SMP. Airport sponsors that were preparing or updating a master plan incorporated sustainability into the planning and development process to provide an integrated sustainability approach. Airports with a current master plan already in place developed an SMP as a stand-alone exercise, outside of the traditional master plan process. Although funding of sustainability through FAA's Pilot Program is currently not available, funding of planning projects is eligible under FAA's AIP.

TRB's ACRP is sponsored by FAA and conducts applied research on aviation issues. Many recent research projects have focused on sustainability planning and integration of sustainability-related actions into the development and operation of airports. Projects conducted by ACRP include: ACRP Synthesis 10, *Airport*

Sustainability Practices; Report 42, *Sustainable Airport Construction Practices*; Report 80, *Guidebook for Incorporating Sustainability into Traditional Airport Projects*; Report 110, *Evaluating Impacts of Sustainability Practices on Airport Operations and Maintenance*; and Report 119, *Prototype Airport Sustainability Practices: Characteristics, Viability, and Implementation Options*. Together, these ACRP and other research projects have helped advance sustainability planning and implementation at airports.

Airport Efforts

Spurred on by a local commitment to sustainability, industry research efforts, and FAA's Sustainable Master Plan Pilot Program, airports in the United States have begun to plan for and implement sustainability practices in a thorough and systematic way. While major commercial airports have always heavily emphasized operational efficiency elements like aircraft delay or passenger throughput, many airports, both large and small, are now taking a holistic approach to measuring, assessing, and improving performance in economic efficiency, impacts to the natural environment, and social considerations.

Current sustainability initiatives at airports vary widely and exhibit a truly comprehensive sustainability approach. Airports are implementing stronger accounting and transparency programs and policies, asset management systems, Environmental Management Systems (EMS), climate action plans, resiliency and adaptation plans, operational measures to reduce aircraft and vehicle idling, facility upgrades to reduce energy and water use, waste reduction and recycling policies, employee training and feedback programs, and passenger experience improvement elements like Wi-Fi, electric vehicle charging stations, and various other stakeholder engagement programs.

Some early adopters of sustainability include major U.S. airports that have developed comprehensive ongoing programs, followed by airports that have developed formal sustainability plans, and other airports that have completed an inventory of sustainable activities and goals.

Comprehensive Airport Sustainability Programs

The City of Chicago Department of Aviation (CDA) led a collaborative effort among aviation industry experts and stakeholders to create the Sustainable Design Manual (SDM) in 2003 (Figure 5). The SDM ensured that sustainable initiatives were implemented during the build-out and modernization of O'Hare as part of the O'Hare Modernization Program (OMP). The SDM also introduced a sustainability rating system for different OMP project components. In 2009, CDA coordinated with airport operators, consultants, research institutions, governmental agencies and aviation organizations to update the SDM and form the Sustainable Airport Manual (SAM). The update identified lessons learned from nearly 200 contributors, airport case studies, and the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) 2009 Green



Figure 5: Example of CDA's sustainability rating system developed as part of its Sustainable Design Manual

Source: City of Chicago Department of Aviation, <http://www.flychicago.com/OHare/EN/AboutUs/Sustainability/Sustainable-Airport-Manual.aspx>

Building Rating System Reference Manual.⁸ Since 2009, SAM has undergone sequential updates in an effort to continually expand and improve based on stakeholder input, updated LEED guidance, new technologies, case studies and lessons learned. The latest version, SAM Version 3.2, was released in November 2014.

Other major U.S. airports also have developed comprehensive and regularly updated sustainability plans, such as San Francisco International Airport (SFO), an early developer of a published sustainability plan in 2007 (Figure 6). Similar to CDA, San Francisco International Airport (SFO) has developed comprehensive sustainable design guidelines that now extend to tenant operation and development.

Formal Airport Sustainability Plans



Figure 6: SFO's latest Sustainability Report published in 2014 (earlier versions were published in 2007 and 2011)

Source: San Francisco International Airport, <http://www.flysfo.com/community-environment/environmental-sustainability-reports>

FAA's Sustainable Master Plan Pilot Program promoted multiple forms of sustainability planning. For example, Ithaca Tompkins Regional Airport (ITH) and Northeast Florida Regional Airport at St. Augustine (UST) were the first airports to participate in the pilot program but conducted different forms of sustainability plans. Ithaca Tompkins (ITH) incorporated sustainability into its traditional master planning process, identifying sustainability practices for implementation and screening airport development alternatives with sustainability-related criteria, among others. Northeast Florida Regional Airport (UST) conducted a stand-alone sustainability plan that included sustainability goals, initiatives, performance tracking procedures, and performance targets. One airport in the pilot program, Nashville International Airport (BNA), developed an airport master plan and an SMP separately but concurrently. FAA's pilot program was split evenly among these two different types of planning efforts.

Within the Commonwealth, Newport News-Williamsburg International Airport (PHF) prepared a sustainability master plan as part of FAA's pilot program. As an early implementer of this type of planning, PHF contributed to FAA's lessons learned documentation for the industry.⁹

Other Sustainability Efforts

Many airports that aim to communicate their sustainability performance to the public undertake a less comprehensive and formal sustainability planning process. Many airports have prepared reports that describe current sustainable practices and

⁸ Chicago Department of Aviation. "LEED Certification." <http://www.flychicago.com/OHare/EN/AboutUs/Sustainability/LEED-Certification.aspx> Accessed June 15, 2015.

⁹ FAA. (2012). *Report on the Sustainable Master Plan Pilot Program and Lessons Learned*. <http://www.faa.gov/airports/environmental/sustainability/media/SustainableMasterPlanPilotProgramLessonsLearned.pdf> Accessed June 15, 2015.

performance in a qualitative manner. Although these efforts do not promote quantitative sustainability performance tracking or reporting of performance targets for continuous improvement, they do publicize efforts made by airports to operate in a sustainable manner. These reports feature a variety of sustainability-related initiatives, from facility-wide energy efficiency programs to smaller-scale efforts, such as keeping bees on airport property to biomonitor airport air quality, and to support local bee populations.

Within the Commonwealth, the Norfolk Airport Authority (Norfolk International Airport (ORF)) and Richmond International Airport (RIC) have been recognized as a “Virginia Green Partners” (described further in Section 2.6). The recognition certifies that these airports support the Virginia Green program, promote green meetings and conferences, practice recycling and waste reduction, conserve water resources, and implement energy efficiency measures.

2.4 Opportunities from Implementing Sustainability

Incorporating sustainability considerations into airport planning, operations, and development provides airports with opportunities to examine and improve processes in multiple areas beyond traditional approaches. The most direct benefits are typically related to environmental resources with reductions in energy use, water use, and waste generation, and associated cost savings. Significant opportunities also exist in organizational improvements, innovative funding, resiliency and risk management, and community partnerships.

Airport Organizational Opportunities

The roles and responsibilities of implementing sustainability into an airport organization are pertinent in sustainability plan implementation. It is important to establish, formalize, and communicate sustainability roles and to ensure that they are clearly defined to eliminate misinterpretation within the organization.

Sustainability implementation works best when built upon existing elements within an organization’s operating framework. For larger or more sophisticated airport organizations, potential programs, policies, and procedures for aligning with sustainability plan implementation may include: adopting an environmental or sustainability policy; establishing an EMS; adopting sustainable design standards or guidelines; incorporating building information modeling (BIM); employing Lean Six Sigma for projects; improving asset management systems; revising tenancy applications, leases, and licensing; adopting a Disadvantaged Business Enterprise (DBE) policy; providing employee support with recognition or awards; or implementing training programs.

Airports adopting a sustainable approach to planning can capitalize on existing organizational resources like airport tenants, employees, and investors. By involving these parties in initial planning exercises, airports are able to make informed planning and operational decisions based on input from individuals directly responsible for carrying out specific tasks. Engaging existing internal resources also establishes internal lines of communication and invests stakeholders in the success of the plan.

Funding Opportunities

For airports, the economic bottom-line is often the major driver for decision-making. Incorporating sustainability into long-term planning can provide significant benefits to airports’ bottom lines, and also open new opportunities for revenue generation. On the operational side, enhancements to existing buildings can produce operational savings from reductions in energy use, water use, waste generation, and maintenance costs. Modifying standard operating procedures to reduce power loads or idling times also can enhance fuel use and energy use efficiency.

Airports may be eligible to apply for funding for sustainability initiatives from a variety of agencies. FAA programs that support the reduction of energy usage and greenhouse gas (GHG) emissions include the *Energy Efficiency of Airport Power Sources Program*, the *Voluntary Airport Low Emissions (VALE) Program*, and the *Zero Emissions Airport Vehicle (ZEV) Program*. U.S. Environmental Protection Agency (EPA) provides funding opportunities to airports through various mechanisms, including the *Source of Reduction Assistance Grant Program* and the *Brownfield Development Grant Program*. Commonwealth agencies that offer financial incentives related to sustainability measures— in particular, energy efficiency— for public entities such as airports include the Virginia Department of Taxation, the Virginia Economic Development Partnership, the Virginia Resource Authority, and the Virginia Department of Environmental Quality. Energy and gas utilities provide various power and gas use reduction rebates, and airport operators in Virginia should check with local service providers to understand current opportunities. Incentives may also be available for solar photovoltaic installations.

These and other funding programs are presented in more detail in the “Funding Opportunities” guidance included as an appendix to the SMP Supplements, which are described later in this document.

Resiliency and Risk Mitigation Opportunities

Resiliency analyses can help reduce risk and enhance preparedness for unpredictable future challenges, by evaluating an organization’s ability to respond to and recover from natural disasters or extreme events. The process can also be used by airports to plan for potential physical impacts of climate change. Airports such as Boston-Logan International Airport (BOS) and the Port Authority of New York-New Jersey (PANYNJ) are preparing resiliency plans focused on flooding events that are more common due to sea level rise. Physical plans focused on adaptation can include infrastructure reinforcement and stormwater improvements. Airports can also prepare in advance for business risks such as flight delays, energy grid disruptions, airport closures, temperature change impacts on operations, risks to legal compliances, and changes in migration of invasive species. Security risks may include potential lightning strikes that could disrupt control systems at the airport. Unpredicted financial risks may occur due to expenditures, litigation, and seasonal changes in tourism.

Community Partnership Opportunities

Identifying and establishing partnerships with organizations at the state and local levels brings added value to integrating sustainability principles into airport planning, operation, and development. Partnerships with external organizations create stronger connections with the community and help establish a support base for airports.

Organizational partnerships can be used to create or augment existing sustainability efforts. While there are a wide range of potential partners, airports may find especially strong opportunities for partnerships with airport tenants; host and neighboring municipalities; regional planning organizations; local schools, colleges, or universities, utilities; local research centers; transportation agencies; or local non-profit organizations engaged in sustainability initiatives.

The “Stakeholder Engagement” guidance included as an appendix to the SMP Supplements provides a best practice overview and reference for airports initiating stakeholder engagement as a part of a sustainability program.

2.5 Existing Efforts in Virginia

Public use airports in Virginia are already making great strides towards streamlining their operations, increasing productivity and efficiencies, and protecting natural resources. The wealth of sustainability

knowledge and experience among Virginia’s airports can be learned from and adopted across the Commonwealth.

Economic Performance

Faced with economic uncertainty, Virginia airports have sought creative ways to expand their revenue bases and enhance their economic performance. For instance, Virginia Tech/Montgomery Executive Airport (BCB) began charging for on-site vehicular parking during Virginia Tech football games and re-structured its tenant leases to offset expense increases. The airport is also undergoing a substantial capital improvement program that is expected to increase corporate presence by 40 percent. This program will not only help the airport’s balance sheet and cash flow, but will also significantly boost the local economy. Another strategy airports use to increase and diversify their revenue streams is real estate purchase and development.

In conjunction with finding new ways to generate revenue, airports in Virginia have taken the lead in implementing a variety of measures to save money. Many have implemented energy efficiency measures such as replacing lighting fixtures, upgrading HVAC systems, or replacing aging equipment in order to reduce costs. In addition to these strategies, Norfolk International Airport (ORF) has implemented measures to increase economic viability by refinancing their long term debt on their arrivals terminal and a parking garage, and retiring an interest-rate derivative on long-term debt in order to improve financial ratings and meet debt service covenants. Other airports, such as Virginia Highlands Airport (VJI), have transitioned maintenance services to in-house staff, and cut back on hours of operation.

Airport Community



Figure 7: A B-29 Superfortress takes off from Manassas Regional Airport (HEF) for a flyover commemorating the 70th anniversary of the Allied victory in Europe

Source: Amanda Stewart/Insidenova.com

Leesburg Executive also provides annual reports and presentations to the town council and general public detailing the airport's accomplishments, goals, and economic impacts. Similarly, New River Valley Airport (PSK) actively participates in the local chamber of commerce and provides a monthly report to all local elected officials. The Roanoke Regional Airport Commission hosts an Aviation Summit, which is like

Strong relations between an airport and the surrounding community are crucial for facilitating airport development and operations. Airports in Virginia have had success fostering positive relationships with not only their customers, tenants, and employees, but also with their community members. Many airports host public and private events on site, such as airport open-houses, festivals, or air shows. In May of 2015, Manassas Regional Airport (HEF) served as a staging area for the Arsenal of Democracy World War II Victory Capital Flyover, an event commemorating the 70th anniversary of the Allied victory in Europe (Figure 7).¹⁰

Leesburg Executive Airport (JYO) conducts community and user outreach through frequent pilot town hall meetings and through participation with pilot groups such as "Friends of Leesburg Airport" and "Pilots and Paws." The Airport Commission at

¹⁰ InsideNOVA. (2015). *WWII flyover kicks off at Manassas airport*. http://www.insidenova.com/headlines/wwii-flyover-kicks-off-at-manassas-airport/article_399c3c04-f504-11e4-99c4-af7e8b3e51a2.html. Accessed June 9, 2015.

a State of the Airport address to the business community around Roanoke-Blacksburg Regional Airport (ROA).

Maintaining up-to-date communications can go a long way in informing community members of the value and benefits of an airport. Virginia Highlands Airport (VJI) updates information on its website often, periodically sends email blasts, and like many airports, sends regular reports to its county supervisors. Norfolk International Airport (ORF) utilizes social media to improve and broaden two-way communications with customers, tenants, and the community. Many airports ensure close coordination with their local planning departments, so they can actively participate in any discussions and decisions regarding development and land use around the airport.

Sensitivity to noise concerns from the surrounding community is yet another way Virginia's airports are working to build positive relationships with their surrounding communities. FAA's voluntary noise program, Part 150, allows airport operators, airlines, pilots, neighboring communities, and FAA to collaborate to reduce the number of people who live in significantly noise-impacted areas. Public use airports are eligible to participate, and those who do so may receive AIP funds to help with noise mitigation for non-compatible land uses and sound insulation.¹¹ In Virginia, Washington-National Airport (DCA), Manassas Regional Airport (HEF), and Roanoke-Blacksburg Regional Airport (ROA) participate in Part 150. Manassas Regional Airport (HEF) developed and implemented a "Fly Friendly" program to help reduce noise and avoid noise-sensitive areas. The airport also created a noise hotline and an online noise complaint form.

Energy and Emissions

As mentioned above, airports in Virginia have implemented a variety of energy efficiency projects, with the dual benefit of cutting costs to increase economic performance while also saving energy and benefiting the environment. Many projects involve lighting upgrades, primarily replacing old fixtures with LEDs. Mecklenburg-Brunswick Regional Airport (AVC) even has the first LED windsock in the state. Newport News/Williamsburg International Airport (PHF) has implemented LED lighting improvements in the parking lot and terminal ramp (Figure 8). The new lights have resulted in significant cost savings and safety improvement due to improved visibility. In addition, airports have made themselves more energy efficient by replacing outdated equipment with newer, more advanced technology and tinted windows. PHF also refurbished one concourse to include new high-performance glazing, durable floor and wall finishes, higher efficiency HVAC through new variable air volume (VAV) boxes with economizers, high-efficiency lighting with new acoustical ceiling tiles that diffuse light throughout the space, and lights that are controlled by an ambient light sensor to maximize the use of natural light and minimize reliance on artificial light.



Figure 8: LED lighting improvements at Newport News/Williamsburg International Airport (PHF)

Source: Melissa Cheaney, Newport News/Williamsburg International Airport (PHF), via email

¹¹ FAA. (2015). *Fact Sheet – The FAA Airport Noise Program*.

https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=18114 Accessed June 9, 2015.

Some airports have pushed beyond energy efficiency and into alternative fuels and energy sources. Richmond International Airport (RIC) has introduced shuttles powered by compressed natural gas (CNG) instead of diesel and have experienced the benefits of quieter shuttles, lower tailpipe emissions, lower energy costs, and reduced maintenance. Richmond International Airport (RIC) became the first airport in the state with a fully CNG-fueled shuttle fleet (Figure 9). The shuttles are expected to result in 23 percent fewer GHG emissions and 85 percent less nitrogen oxide¹² at the airport, thus reducing Richmond International Airport's (RIC) emissions and contribution to climate change. Lunenburg County Airport (W31) also has explored the possibility of installing geothermal heating and cooling for the airport terminal in order to save on its gas and electric bill.



Figure 9: Launch of nine CNG shuttles at Richmond International Airport (RIC)

Source: Troy M. Bell, Richmond International Airport (RIC), via email

Waste

In an airport environment, there are numerous hazardous and nonhazardous materials to track, contain, manage, and dispose of. Through compliance with federal and state regulations, many airports have a spill prevention control and countermeasure (SPCC) plan, which governs materials such as fuels, de-icing fluids, and materials from fixed-base operators and maintenance hangars. Thoroughness in preparation, training, and planning directed by regulations is crucial – if spills do occur, there must be procedures in place for systematically resolving the issue and resuming operations. As an example, Suffolk Executive Airport (SFQ) maintains ample containment and cleaning supplies for oil and fuel spills, and conducts employee training. Likewise, the Chesapeake Regional Airport (CPK) has an oil discharge contingency plan and stormwater pollution prevention program (SWPPP), and also works to review and update its SPCC plan, under regulatory guidance. Virginia's airports demonstrate many best practices when it comes to material and waste management. Roanoke-Blacksburg Regional Airport (ROA) has a recycling program for traditional materials such as paper, plastic, and glass, and also collects waste oil, sump fuel, batteries, florescent lights, and computers for recycling (Figure 10).



Figure 10: Recycling containers in the terminal at Roanoke-Blacksburg Regional Airport (ROA)

Source: Diana Lewis, Roanoke-Blacksburg Regional Airport (ROA), via email

¹² Richmond Times-Dispatch. (2013). *Richmond International Airport switches to less polluting shuttle fleet.* http://www.richmond.com/business/article_770eccd4-c2f8-535f-8a12-fac9bbc9cef.html. Accessed June 12, 2015.

Natural Resources

Virginia is host to a wealth of natural resources, and airports in the Commonwealth have a crucial responsibility in preserving these resources. Virginia’s public-use airports commonly interact with their surrounding natural resources through stormwater management. In conjunction with navigating and complying with stormwater runoff regulations, some airports have implemented other effective strategies to protect the environment around them. Lake Country Regional Airport (W63) has worked to plant as much grass as possible in open spaces in order to reduce runoff. New London Airport (W90) has taken the approach of working with its local county administration to minimize negative environmental impacts, while Accomack County Airport (MFV) and Roanoke-Blacksburg Regional Airport (ROA) follow quality control measures to ensure compliance with their airport SPCC and SWPPP. ROA also included a rain garden as a stormwater treatment measure when a new aircraft rescue and firefighting (ARFF) station was recently constructed.

Other airports have brought in outside groups to assess and evaluate their environmental impacts. For instance, Hanover County Municipal Airport (OFP) created a quarterly monitoring and yearly facility inspection system with EEE Environmental, a contractor specialized in environmental planning. Likewise, Leesburg Executive Airport (JYO) undergoes contractor-provided inspections, ensures maintenance of oil-water separators, and maintains a stormwater program.

Continuing to improve upon already regulated de-icing operations is an area with great potential to reduce an airport’s environmental impact. Norfolk International Airport (ORF) has worked to improve collection of aircraft de-icing fluid and retention during winter operations. Meanwhile, Stafford Regional Airport (RMN) is no longer using urea, which is nitrogen-rich, to eliminate ice and snow.

2.6 Relationship to Other Goals, Regulations, and Initiatives

Sustainability efforts undertaken by Virginia airports align with and support broader city, county, and state-level goals and initiatives. As such, these efforts have a lasting impact, not just for each individual airport, but also for the communities in which they operate. This section provides examples of these important relationships in a variety of areas relevant to the Virginia Airports SMP initiative. As is often the case with sustainability planning, many of the examples support several of the categories under which they have been organized, but are only listed under the most relevant category for clarity.

Economic Performance

Environmentally Conscious Tourism

As direct players in the tourism industry, airports can help support tourism-related economic development efforts throughout the Commonwealth, as well as specific initiatives related to sustainable tourism. The Virginia Green Travel Program – a partnership between the Virginia Department of Environmental Quality (DEQ), the Virginia Tourism Corporation, and the Virginia Hospitality and Travel Association – is a voluntary outreach program designed to further sustainability within the tourism industry. Virginia Green offers training and project management assistance for sustainable initiatives.¹³ Virginia Green certifies and promotes environmentally conscious options for tourists and promotes environmentally-friendly practices in all aspects of Virginia’s tourism industry, including airports. For instance, Norfolk International Airport (ORF) is a Virginia Green Supporting Partner. Richmond

¹³ Virginia Department of Environmental Quality. *Virginia Green*.
<http://www.deq.virginia.gov/Programs/PollutionPrevention/VirginiaGreen.aspx> Accessed July 20, 2015.

International Airport (RIC) is expected to become certified in the near future. Its Green Statement states that it has “followed sustainable environmental practices for decades as a ‘best business practice’ to conserve resources, and preserve our beautiful garden atmosphere”; the airport promotes its sustainability practices to the public through highly visible signage.

High Performance Buildings

Commercial buildings, including those on airports such as the terminal building, are significant consumers of energy, water, and other valued resources. The USGBC LEED certification for buildings provides building owners and operators with a voluntary framework for identifying and implementing practical and measurable green building design, renovation, construction, operations, and maintenance solutions. LEED certification provides independent, third-party verification that a building was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health, sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.¹⁴ As an internationally recognized mark of excellence, LEED certification demonstrates a global and local commitment to environmental stewardship, and is a powerful tool in enhancing public relations.

Several initiatives in Virginia promote high performance buildings. For example, the Arlington Initiative to Reduce Emissions requires all new buildings in the county to achieve at least LEED Silver certification, and has invested \$7.5 million to retrofit public buildings with more energy-efficient equipment.¹⁵ The City of Charlottesville strives to reduce stormwater runoff and water contamination by installing green roofs on many of its public buildings. By strategically choosing these roofs, they reduce energy costs due to the extra insulation; reduce stormwater runoff because the plants and dirt acts like a sponge; and decontaminate the water through natural filtration systems.¹⁶ Further, many cities such as Spotsylvania and Roanoke also offer tax exemption credits for energy-efficient buildings.¹⁷

Airport Community

Small and Disadvantaged Business Support

Virginia is working to support small and disadvantaged businesses – an important social element of the sustainability triple bottom line. Ensuring a diversity of businesses promotes innovation, competition, and efficiency. The Virginia Department of Small Business and Supplier Diversity (SBSD) is a state agency “dedicated to enhancing the participation of small, women- and minority-owned businesses in Virginia’s procurement process.” The Virginia DEQ offers the Virginia Small Business Assistance Program (SBAP), which provides free guidance, workshops, and training on environmental requirements and best practices for compliance. The Office of Small Business Assistance (OSBA) is available to help small businesses understand and comply with any regulations.¹⁸

¹⁴ United States Green Building Council. (2015). *About LEED*. <http://www.usgbc.org/articles/about-leed> Accessed June 15, 2015.

¹⁵ American Council for an Energy-Efficient Economy. *Arlington Initiative to Reduce Emissions (AIRE)*. <http://aceee.org/sector/local-policy/case-studies/arlington-initiative-reduce-emissions> Accessed June 4, 2015.

¹⁶ City of Charlottesville. *Green Roofs*. <http://www.charlottesville.org/Index.aspx?page=2270> Accessed June 4, 2015.

¹⁷ Virginia Department of Environmental Quality. *Incentives for Virginians*. <http://www.deq.virginia.gov/Programs/PollutionPrevention/VirginiaInformationSourceforEnergy/FinancialIncentives.aspx> Accessed June 4, 2015.

¹⁸ Virginia Department of Environmental Quality. *Virginia Small Business Assistance Program*. <http://www.deq.virginia.gov/Programs/Air/SmallBusinessAssistance.aspx> Accessed June 4, 2015.

Vocational Workforce Development

A competent and well-trained vocational workforce is a necessity for a thriving economy, and is critical for airports, especially smaller airports where workers must be skilled in a variety of trades. One of the most innovative practices for developing the existing aviation workforce in the United States has been to partner with educational institutions. These institutions have the resources and core competencies to provide training and education, particularly in skills that are broadly applicable to working in a professional environment, and important to the aviation industry.¹⁹ As such, there are many educational and scholarship programs sponsored by DOAV, the Virginia Airport Operators Council (VAOC), Virginia Aviation Business Association (VABA), and other agencies, available to those in the current and future workforce.

To ensure the strength of the current workforce, various training and development programs are provided in Virginia. For example, the Western Virginia Workforce Development Board aims to assist vocational and skilled laborers. The Board develops employee training and works to connect employers with eligible employees.²⁰ The Virginia Registered Apprenticeship Program (VRAP) supports worker development by collaborating with businesses to create structured apprenticeship and retraining programs. VRAP also provides a Worker Retraining Tax Credit to offset the costs to businesses for retraining eligible employees.²¹ The Virginia Workforce Connection (VAWC), a department within the state government, works with the Mid-Atlantic Regional Collaborative (MARC), an organization that works to place employees at “green” companies. VAWC provides training and education programs to assist employees in developing the skills required to effectively compete in the job market. It takes a sustainable and holistic approach to education and offers a wide range of options for skill development.²²

Energy and Emissions

Energy Management, Efficiency, and Reduction

Across Virginia, efforts are underway to increase energy efficiency and reduce energy use. In October of 2014, Governor McAuliffe instated Executive Order 31: Conserving Energy and Reducing Consumption in the Commonwealth of Virginia. Executive Order 31 requires agencies to reduce energy consumption by utilizing a free Energy Performance Contracting (EPC) tool and appoints a Chief Energy Efficiency Officer of the Commonwealth to oversee implementation of EPC and spearhead further efficiency initiatives.²³ Further, depending on specific location and utility provider, many rebates and incentives are offered to

¹⁹ TRB. (2010). *ACRP Synthesis 18 – Aviation Workforce Development Practices*.
http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_018.pdf Accessed June 15, 2015.

²⁰ Western Virginia Workforce Development Board. *The “One-Stop” Approach*.
http://www.westernvaworkforce.com/what_we_do/index.cfm Accessed June 3, 2015.

²¹ The Virginia Department of Labor and Industry. *Registered Apprenticeship*.
http://www.doli.virginia.gov/apprenticeship/registered_apprenticeship.html Accessed June 3, 2015.

²² Commonwealth of Virginia, Virginia Workforce Connection. <https://www.vawc.virginia.gov/vosnet/Default.aspx> Accessed June 9, 2015.

²³ Commonwealth of Virginia, Office of the Governor. *Executive Order 31, Conserving Energy and Reducing Consumption in the Commonwealth of Virginia*. <https://governor.virginia.gov/media/3257/eo-31-conserving-energy-and-reducing-consumption-in-the-commonwealth-of-virginia.pdf> Accessed June 4, 2015.

businesses and homeowners for increasing energy efficiency.²⁴ Progress made by airports on energy efficiency directly assists neighboring communities aspiring to similar energy reduction goals. For example, the City of Roanoke is implementing its LEAN Roanoke Project that utilizes the Six Sigma framework commonly applied in engineering to “improve quality, eliminate waste, minimize cost, reduce time, [and] improve services.”²⁵

Climate Change Resiliency and Greenhouse Gas Reduction

Certain regions of Virginia are at risk of disruptions caused by climate change. For example, one report ranked the Virginia Beach-Norfolk Metropolitan Statistical Area as tenth in the entire world in terms of exposure to sea level rise.²⁶ In anticipation of severe coastal flooding from sea-level rise, in 2015 Governor McAuliffe signed legislation requiring all localities in the Hampton Roads Planning District Commission region to incorporate consideration of sea-level rise and flooding in local comprehensive planning documents²⁷. Other expected impacts in Virginia include more extreme precipitation²⁸ and storm surges²⁹ (Figure 11), changes in regional weather patterns, species displacement and ecosystem disruption, and other risks to coastline integrity, infrastructure, and public health. Former Governor Tim Kaine created a Commission on Climate Change that released a Climate Change Action Plan in 2008. In the report, the commission acknowledges that the existence of climate change is no longer debatable and has been affirmed by numerous significant scientific studies. The report’s recommendations include: requiring that state-funded infrastructure projects be designed to resist climate change impacts; providing funding to a network of scientific and technological institutions to regularly produce Virginia-specific predictions of climate change and to monitor and evaluate impacts in Virginia; reviewing state agency and local government authority to account for climate change; and assessing the impact that climate change will have on persons of low socioeconomic status, members of racial and ethnic minorities, and people living in coastal areas and

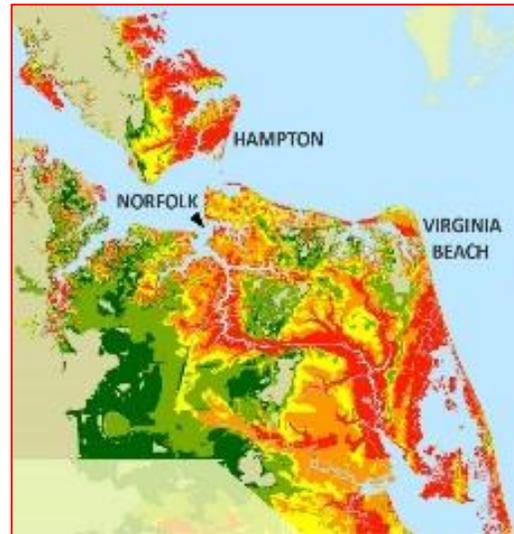


Figure 11: Map of the Hampton Roads region and areas at risk for storm surge

Source: CoreLogic, *CoreLogic Storm Surge Report*

²⁴ Virginia Department of Environmental Quality. *Incentives for Virginians*. <http://www.deq.virginia.gov/Programs/PollutionPrevention/VirginianInformationSourceforEnergy/FinancialIncentives.aspx> Accessed June 4, 2015.

²⁵ City of Roanoke. *LEAN Roanoke*. <http://www.roanokeva.gov/85256a8d0062af37/vwContentByKey/N29BEJ4E081JBEDEN> Accessed June 4, 2015.

²⁶ Old Dominion University, The Center for Sea Level Rise. *2nd Largest Population Risk*. <http://www.centerforsealevelrise.org/about-sea-level-rise/2nd-largest-population-at-risk/> Accessed June 8, 2015.

VSB 1443 Comprehensive Plan: Strategies to Combat Projected Sea-Level Rise. <https://lis.virginia.gov/cgi-bin/legp604.exe?151+sum+SB1443>. Accessed May 20, 2016.

²⁸ United States Environmental Protection Agency. (2015). *Climate Change Indicators in the United States, Heavy Precipitation*. <http://www.epa.gov/climatechange/science/indicators/weather-climate/heavy-precip.html> Accessed June 9, 2015.

²⁹ CoreLogic. (2011). *2011 CoreLogic Storm Surge Report, Residential Storm-Surge Exposure Estimates for 10 U.S. Cities*. http://www.corelogic.com/about-us/researchtrends/asset_upload_file246_4260.pdf Accessed June 9, 2015.

flood plains.³⁰ In 2015, the Governor McAuliffe convened the Climate Change and Resiliency Update Commission which recommended a creating a renewable energy target for state agencies and bolstering the resilience of coastal communities to rising seas.³¹

The reduction of GHGs – the category of gases that trap heat in the atmosphere – plays an integral role in slowing climate change. As airports in Virginia improve energy and fuel efficiency, and reduce fossil fuel use for landside activities, they will directly support the reduction of GHGs. The Virginia Commission on Climate Change established a goal of reducing statewide GHG emissions by 30 percent compared to business-as-usual projected emissions by 2025. To meet this goal, the Commission’s report made a series of recommendations, including: increasing the proportion of energy demands that are met by renewable sources; having state and local governments implement practices to reduce GHG emissions; and enhancing natural carbon sequestration capacity.³²

On July 1, 2014, Governor McAuliffe signed Executive Order 19, announcing plans to update the state’s Climate Change Action Plan by convening the Climate Change and Resiliency Update Commission. The Governor specifically cited the need to better prepare Virginia’s coastal communities for rising sea levels and more extreme weather occurrences.³³

At the local level, 12 mayors from Virginia signed onto the United States Conference of Mayors Climate Protection Agreement.³⁴ These 12 mayors represent:

- City of Alexandria
- Town of Blacksburg
- City of Charlottesville
- City of Covington
- City of Fredericksburg
- City of Newport News
- City of Norfolk
- City of Portsmouth
- City of Richmond
- City of Salem
- City of Virginia Beach
- City of Williamsburg

³⁰ Commonwealth of Virginia, Governor’s Commission on Climate Change. (2008). *Final Report: A Climate Change Action Plan*. http://www.sealevelrisevirginia.net/docs/homepage/CCC_Final_Report-Final_12152008.pdf Accessed June 3, 2015.

³¹ Commonwealth of Virginia Governor Terence R. McAuliffe’s Climate Change and Resiliency Update Commission <https://naturalresources.virginia.gov/media/5101/climate-commission-and-resiliency-update-commission-report.pdf>, Accessed May 20, 2016.

³² Commonwealth of Virginia, Governor’s Commission on Climate Change. (2008). *Final Report: A Climate Change Action Plan*. http://www.sealevelrisevirginia.net/docs/homepage/CCC_Final_Report-Final_12152008.pdf Accessed June 3, 2015.

³³ Commonwealth of Virginia, Office of the Governor. (2014). *Governor McAuliffe Signs Executive Order Convening Climate Change and Resiliency Update Commission*. <https://governor.virginia.gov/newsroom/newsarticle?articleid=5342> Accessed June 3, 2015.

³⁴ The United States Conference of Mayors, Climate Protection Center. *Mayors Leading the Way on Climate Protection*. <http://www.usmayors.org/climateprotection/revise/> Accessed June 4, 2015.

By signing the agreement, the mayors agreed to:

- Meet or beat the United States GHG reduction target in the Kyoto Protocol (a 1997 international agreement on GHG emissions reductions, in which the target for the United States was a 7 percent reduction from 1990 levels by 2012) in their own communities;
- Urge state and federal governments to enact policies and programs to meet or beat the Kyoto Protocol target; and
- Urge the U.S. Congress to pass comprehensive GHG reduction legislation.³⁵

Virginia businesses and governments are now taking steps to better prepare for the impacts of climate changes in the Commonwealth. For example, the City of Charlottesville has taken steps to educate its residents about the potential harms of climate change. The City’s recommendations focus on “conservation and energy efficiency.”³⁶ Similarly, the City of Virginia Beach, a coastal community that is especially susceptible to sea level rise and storm surge, has developed a comprehensive Sustainability Plan. The Sustainability Plan includes elements such as energy efficiency goals and efforts for ensuring human health, and will help to mitigate climate change.³⁷

Air Quality

Poor air quality can lead to respiratory issues as well as other medical problems due to prolonged exposure to polluted air. Across the Commonwealth, there are nine areas classified as “non-attainment” by the EPA for having air pollution levels above the national ambient air quality standard for 8-HR Ozone. These locations include Alexandria, Arlington County, Fairfax City and County, Falls Church, Loudoun County, Manassas, Manassas Park, and Prince William County. Due to efforts at the state, regional, and local levels, Virginia’s air quality has been improving for more than a decade. Exposure to fine particulate matter has decreased every year, and the number of days during which the federal ozone standard was exceeded has dropped from 295 days per three-year average in 2002–2004 to just 26 days across 2012–2014. Northern Virginia continues to have the poorest air quality in the Commonwealth, with an average of 16 days per year, exceeding the ozone standard over the same 2012–2014 period.³⁸

Virginia has a variety of programs to reduce air pollution, under the regulatory purview of the State Air Pollution Control Board, authorized through the Air Pollution Control Law of Virginia. Local and regional governments lead many of the efforts. For example, the City of Alexandria works to spread awareness of air quality issues and measures to remedy these health threats. The City announces to the public when the air quality level is poor so that residents can stay inside, and also helps to improve air quality by promoting alternative forms of transportation.³⁹ The Greater Roanoke Valley Asthma and Air Quality Coalition works to improve air quality through education about the effects of poor air quality on respiratory health. To improve the air quality of Arlington County, the local government began using

³⁵ The United States Conference of Mayors, Climate Protection Center. *U.S. Conference of Mayors Climate Protection Agreement*. <http://www.usmayors.org/climateprotection/agreement.htm> Accessed June 4, 2015.

³⁶ City of Charlottesville. *Climate Change – A Basic Overview*. <http://www.charlottesville.org/Index.aspx?page=2446> Accessed June 4, 2015.

³⁷ City of Virginia Beach. *Sustainability Plan*. <http://www.vbgov.com/government/offices/eso/sustainability-plan/Pages/default.aspx> Accessed June 4, 2015.

³⁸ Virginia Performs, Council on Virginia’s Future. (2015). *Air Quality*. <http://vaperforms.virginia.gov/indicators/naturalResources/airQuality.php> Accessed June 15, 2015.

³⁹ City of Alexandria. (2014). *Environmental Quality*. <http://www.alexandriava.gov/AirQuality> Accessed June 8, 2015.

alternative fuels for its public transit, and greatly encourages the use of public transit specifically for the associated air quality benefits.⁴⁰ The Virginia Clean Cities program runs the Clean Transportation Project, a statewide initiative that promotes alternatively-powered vehicles as a means to improve air quality, and thus human and environmental health. This program involves education and outreach specifically targeted to members of local government.⁴¹

Waste

Sustainable Management of Waste

Most of the waste generated at airports is regulated by federal, state, or local laws depending on what the waste contains. Waste management at airports is divided into eight categories, as defined in the FAA's Office of Airports 2013 "*Recycling, Reuse and Waste Reduction at Airports: A Synthesis Document*": municipal solid waste, construction and demolition waste, green waste, food waste, waste from aircraft flights, lavatory waste, spill cleanup and remediation waste, and hazardous materials.⁴² Many airports pay particular attention to construction and demolition waste, which is potentially a significant component of an airport's total waste in terms of weight and volume during construction and renovation activities. Construction waste must be considered for recycling into various components in accordance with existing recycling initiatives.

Many U.S. airports, including some in Virginia, have made successful efforts to institute a recycling program while also minimizing municipal waste. To encourage recycling and to reduce litter, the Virginia DEQ offers the Litter Prevention and Recycling Grant Program, which provides funding for local municipalities to implement litter prevention initiatives.⁴³ The Virginia Recycling Association provides reports on waste minimization and recycling efforts and also offers awards for outstanding recycling initiatives to further incentivize the reuse of materials.⁴⁴ Many local governments throughout the Commonwealth also have their own waste management and recycling programs.

Spill Prevention

Spilling oil and other harmful materials is not only wasteful and inefficient – it can also have detrimental impacts on the surrounding environment. It only takes one gallon of oil to contaminate a million gallons of water.⁴⁵ The EPA's Oil Pollution Prevention Regulation (40 CFR 112) requires preparation and implementation of an SPCC plan to prevent oil pollution from facilities that store more than minimal amounts of oil. The regulations cover any type of oil – specifically those with reasonable expectation of spilling to a navigable waterway – and ensure effective responses to those discharges. The regulations require inspection, standards for storage tanks, and recommend best practices for operation in order to

⁴⁰ Greater Roanoke Valley Asthma and Air Quality Coalition. *About*. <https://breatheroanoke.wordpress.com/about/> Accessed June 4, 2015.

⁴¹ Virginia Clean Cities. *Success Stories*. <http://www.vacleancities.org/about/success-stories/> Accessed June 4, 2015.

⁴² FAA Office of Airports. (2013). *Recycling, Reuse and Waste Reduction at Airports: A Synthesis Document*. <https://www.faa.gov/airports/resources/publications/reports/environmental/media/RecyclingSynthesis2013.pdf> Accessed June 15, 2015.

⁴³ Virginia Department of Environmental Quality. *Litter Prevention and Recycling Grant Programs*. <http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RecyclingandLitterPreventionPrograms/LitterPreventionandRecyclingGrantPrograms.aspx> Accessed June 4, 2015.

⁴⁴ Virginia recycling Association. *Featured Programs*. <http://www.vrarecycles.org/> Accessed June 4, 2015.

⁴⁵ U.S. Environmental Protection Agency. *Spill Prevention, Control, and Countermeasure (SPCC) Regulation*. <http://www.epa.gov/oem/docs/oil/spcc/spccbluebroch.pdf> 40 CFR part 112. Accessed June 4, 2015.

help prevent spillage.⁴⁶ Virginia DEQ’s Pollution Response Program (PREP) helps during waste pollution incidents and serves to better prepare state agencies for pollution-related disasters.⁴⁷ Some Virginia airports are required to prepare and follow an SPCC in order to reduce and minimize these spills. In doing so, they support their communities in alleviating harm to the environment and avoid potential clean-up costs.

Natural Resources

Water Quality and Conservation

Clean, accessible water is integral to many industries and essential to individual Virginians. Water scarcity and pollution have serious implications. The efforts of airports to reduce their own water consumption and avoid pollution of water sources play a key role in maintaining safe water supplies for the future. Many entities in Virginia are already undertaking strategic efforts to save water, and Virginia airports are working to protect water quality in the Commonwealth, which is especially important given the state’s proximity to the Chesapeake Bay. The Chesapeake Bay Watershed Agreement was signed into effect on June 16, 2014⁴⁸ with support from large and small communities surrounding the bay, and aims to maintain the health of this unique watershed. This collection of agreements outlines 10 specific goals for the communities involved, as they strive to restore the Chesapeake Bay estuary and watershed. These goals envision “clean water, abundant life, conserved lands and access to the water, a vibrant cultural heritage, and a diversity of engaged citizens and stakeholders.” Additionally, Virginia is in the process of compiling its Virginia State Water Resources Plan. This plan is to be submitted to the governor and bases its recommendations on the plans of various local governments and their demonstrated needs. The plan analyzes current uses of water, examines whether they are sustainable given future water needs, and highlights the need for efficient use of water resources in light of the notable 1999–2002 drought.⁴⁹ Examples of water protection also exist at the local level. The City of Charlottesville encourages citizens to become involved and take action to protect the community’s water sources. The City maintains its Adopt-A-Stream Program through which citizen groups undertake maintenance of specific stretches of waterways.⁵⁰

Stormwater runoff travels across impervious surfaces, such as pavement or concrete, and feeds into rivers, lakes, and drinking water reservoirs. In some cases, this stormwater carries harmful pollutants. Excessive runoff can also cause erosion issues and flooding. To mitigate these problems, the Virginia DEQ has instituted specific stormwater regulations through its Stormwater Management Program. By issuing permits, DEQ now regulates the discharge of water from public sewer systems, as well as from construction activities. DEQ’s regulations also aim to reduce erosion and sediment flow from disturbing

⁴⁶ U.S. Environmental Protection Agency. *Spill Prevention, Control, and Countermeasure (SPCC) Regulation*. <http://www.epa.gov/oem/docs/oil/spcc/spccbluebroch.pdf> 40 CFR part 112. Accessed June 4, 2015.

⁴⁷ Virginia Department of Environmental Quality. *Pollution Response & Preparedness*. <http://www.deq.virginia.gov/Programs/PollutionResponsePreparedness.aspx> Accessed June 4, 2015.

⁴⁸ Chesapeake Bay Program. *Chesapeake Bay Watershed Agreement*. <http://www.chesapeakebay.net/chesapeakebaywatershedagreement/page> Accessed June 4, 2015.

⁴⁹ Virginia Department of Environmental Quality. *State Water Resource Plan*. <http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/WaterSupplyPlanning/StateWaterPlan.aspx> Accessed June 4, 2015.

⁵⁰ City of Charlottesville. *Stream Clean-up & Adopt-A-Stream*. <http://www.charlottesville.org/Index.aspx?page=564> Accessed June 4, 2015.

soil.⁵¹ Further regulations address the wide range of activities that affect stormwater flow, including Plastic Chamber Systems, mosquito control tactics, and even bio-retention filtration systems.⁵² As airports and other relevant businesses comply with DEQ Stormwater Regulations, they will reduce environmental damage from runoff and the amount of work and time required for cleanup, thus saving the government, and ultimately themselves, significant amounts of money.

⁵¹ Virginia Department of Environmental Quality. *Virginia Stormwater Management Program Regulations*.
<http://www.deq.virginia.gov/programs/water/stormwatermanagement/vsmppermits.aspx> Accessed June 4, 2015.

⁵² Commonwealth of Virginia, Department of Environmental Quality. *Publications*.
<http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/Publications.aspx> Accessed June 9, 2015.

3. VIRGINIA'S AIRPORT SUSTAINABILITY MANAGEMENT PLAN

Airports in Virginia face an array of sustainability challenges and opportunities. Many of their existing sustainability-related efforts address some of these challenges, while also supporting the initiatives of local, regional, and state entities. This section of the Virginia Airports SMP builds on the earlier sections and presents the foundational elements of the plan, which include DOAV's definition of sustainability, and the sustainability categories. It also introduces the SMP Supplements, which follow on from the Statewide Framework and provide the detailed goals, metrics, initiatives, and guidance to help Virginia airports of various types and sizes improve the sustainability of their operations.

3.1 SMP History

The development of this SMP began in January 2015, and it was completed in the summer of 2016. DOAV initiated the development of this SMP for Virginia's 66 public-use airports to undertake tailored sustainability planning to meet their local priorities, needs, and abilities while reflecting each airport's contribution to economic viability, system efficiency, natural resource conservation, and social responsibility. A Statewide Steering Council was assembled to help guide the process, and ensure that the plan produced was feasible for implementation. This council included stakeholders from each airport tier/size as well as representatives from FAA, DOAV, and from industry and other groups. With facilitation by the contractor team, DOAV engaged the council in a brainstorming exercise to generate ideas for DOAV's updated mission statement and the sustainability categories that would ultimately frame the SMP. Additional airport stakeholders, such as airport managers and aviation consultants, were also involved in the development of the SMP through a survey and follow-up interviews conducted in March and April of 2015, as well as through audience polling at the Virginia Aviation Conference Spring Meeting in April 2015. These exercises served to identify current airport sustainability practices, as well as interest, potential, and barriers for further initiatives. The information gathered was then used to determine DOAV's updated mission statement, and the categories and sub-categories of the SMP. The mission statement, categories, and sub-categories can be found below.

3.2 Updated DOAV Mission Statement

In order to help seamlessly integrate sustainability planning into DOAV's organizational priorities, DOAV has updated its existing mission statement to reflect the emerging emphasis on an aviation system that is sustainable for generations to come. The updated DOAV mission statement is provided below, with new content underlined.

DOAV's mission is to:

- Cultivate an advanced and sustainable aviation system that is safe, secure and provides for economic development;
- Promote aviation awareness and education; and
- Provide the safest and most efficient flight services for the Commonwealth leadership and state agencies.

3.3 Sustainability Definition

DOAV has developed a sustainability definition that is tailored to the needs, concerns, and priorities of public-use airports in the Commonwealth. DOAV's sustainability definition is as follows:

For DOAV, "sustainability" is a strategic approach to airport planning, development, asset management, and resource protection – including financial, environmental, community relations,

and other factors – that prioritizes current operational needs while best preparing Virginia’s airports for continued success in the future.

3.4 Sustainability Categories

DOAV’s recommended sustainability categories represent economic, environmental, social, and operational areas of relevance to Virginia’s airports. The categories and subcategories form the basis of the SMP Supplements for each type/size of airport. Each category and subcategory will have accompanying goals, performance targets, metrics, and example initiatives from which airports can select the most relevant for their facility and operations. DOAV’s sustainability categories are:

1. Economic performance;
2. Airport community;
3. Energy and Emissions;
4. Waste; and
5. Natural resources.

Table 1, below, presents the categories and subcategories, and includes a narrative explaining the rationale behind selecting that subcategory and several examples to provide further context for the information that will be presented in the SMP Supplements.

Table 1: Sustainability categories and subcategories

Category	Subcategory	Rationale & Examples
Economic performance	Air service and business development	Maintenance of continued aviation revenue is essential for the economic sustainability of every airport. Assisting airports in identifying and implementing best practices for business development and retention will support sustained economic viability for airports and their communities. <u>Examples:</u> <ul style="list-style-type: none"> • Attracting and retaining tenants. • Planning for future changes in passenger service patterns. • Coordinating with local tourism and economic development initiatives.
	Non-aeronautical development	Expansion and diversification of non-aviation revenue streams is an area of priority for many airports to ensure funding stability and self-sufficiency. <u>Examples:</u> <ul style="list-style-type: none"> • Development of new alternative revenue streams from real estate rental and development, renewable energy generation, and other sources. • Enhanced revenue opportunities from concessions and parking fees. • Coordinating with local tourism and economic development initiatives.
	Asset management and resilience	Managing and protecting airports’ physical assets presents both a key challenge and an opportunity for airport operations. Airports face asset management challenges around capital investment planning, deferred maintenance, and other financing and funding measures. Ensuring sufficient resilience and durability of airport facilities reduces the risk of service disruptions and helps ensure business continuity over time. Capital investments that consider the risks associated with more frequent and severe weather events are likely to be more cost-effective in the long run.

		<p><u>Examples:</u></p> <ul style="list-style-type: none"> • Infrastructure planning that accounts for possible changes in climate, frequency of extreme weather events, and sea level rise. • Land use planning that allows for community endorsed expansion that offers amenities to both airport operators and neighboring community. • High-performance facility design and construction (e.g., following Leadership in Energy & Environmental Design [LEED] guidelines) for reduced resource use (energy, water, etc.), financial savings, and improved staff productivity and visitor comfort. • Energy resiliency measures, such as microgrid technology. • Security initiatives to protect existing facilities and resources. • Purchasing and other operational programs.
Airport community	Public outreach	<p>Understanding and actively responding to communities’ needs and concerns is important to maintain public support for an airport’s operation and growth. Effective outreach to and engagement with external stakeholders are essential to helping airports operate efficiently and grow appropriately while being good neighbors.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Overall community relations, engagement, and communication patterns. • Addressing noise through operational considerations, advocating for airport-compatible development, and effective communication with the public about noise issues. • Building strong local relationships to weigh in on local land use planning. • Advocating for adequate surface transportation connectivity (including transit and freight). • Tourism development. • Health and safety initiatives that affect airport customers and other visitors.
	Airport workforce	<p>Many airports noted various challenges related to workforce development, training, staffing, and retention. Proactive and creative planning around workforce issues is essential for sustained airport viability.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Health- and safety-related education, training, counseling, prevention and risk control programs, as well as incident management. • Workforce development through training and skills programs – for current employees and to ensure a sufficient talent pool • Transition planning for key airport staff. • Tenant outreach and engagement to identify operational improvements that cost cut, reduce environmental impact, and generate positive local economic development. • Diversity, accessibility, and inclusion. • Collaboration between and among airports.

Energy and Emissions	Energy efficiency	<p>Energy efficiency serves as a crucial juncture between environmental conservation and economic vitality. Among airport stakeholders, energy efficiency was widely cited as a key strategy to reduce airport costs and improve operations. Airport managers face competing priorities and tight budgets when deciding among maintenance and operations projects. Implementing energy efficiency improvements allows for low-cost, high-impact sustainability benefits, such as lower electricity expenditures, reduced emissions, and decreased maintenance time.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Replacing current lighting fixtures with LEDs. • Light timers. • Window tinting. • Fine-tuning building systems and upgrading to high efficiency HVAC equipment.
	Transportation fuels	<p>Transportation fuels are an integral part of keeping airports fully functional and efficient. Yet faced with unpredictable fuel costs, airports may stand to benefit from utilizing alternative sources of fuel for ground support equipment (GSE) as well as implementing strategies to reduce fuel use as a whole. Managing transportation fuels also offers an opportunity to improve local air quality for airport employees and surrounding communities, and reduce greenhouse gas emissions.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Alternative fuels for GSE and other vehicles, such as electric tractors and compressed natural gas (CNG) shuttles. • Appropriately sized ground transit and maintenance vehicles. • Optimized travel patterns. • Utilizing vehicles for multiple uses. • Vegetation management to reduce mowing and maintenance needs.
	Energy generation	<p>Similar to energy efficiency, on-site energy generation serves as a bridge between resource conservation and economic vitality. By producing electricity from renewable resources, airports can reduce costs and access a compelling non-aviation revenue stream, shelter themselves from fluctuations in utility energy prices, and reduce their greenhouse gas emissions. Through Virginia’s net-metering rule, commercial energy systems up to 500 kW in size can offset grid electricity consumption at retail rates. By first implementing energy efficiency measures, airports can appropriately size and price their on-site energy generation needs.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • On-site solar photovoltaic systems on rooftops or unused airport land. • On-site small-scale wind turbines. • On-site biomass energy generation. • Geothermal energy systems. • On-site production of natural gas.

Waste	Waste management and recycling	<p>Like all commercial facilities, airports purchase, consume, and dispose of materials. Optimizing the management of these processes provides an opportunity to streamline operations by eliminating unnecessary waste and reducing costs. In addition to traditional materials, such as paper, cardboard, and plastic, airports also have the opportunity to improve handling of organic materials as well as construction and demolition waste.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Clearly labeled and consistent waste management infrastructure. • Coordination with local public/private recycling organizations. • Environmentally preferable purchasing favoring items with minimal and recyclable packaging. • Composting program (large airports). • Using waste materials as a revenue stream. • Waste management contract reviews.
	Chemical and hazardous waste management	<p>Due to the nature of airport operations, managing chemical and hazardous waste is an unavoidable responsibility and an area for potential operational improvements. Effective chemical and hazardous waste management helps airports comply with stormwater regulations, avoid toxic environmental exposures, and foster positive community relations.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Alternative or improved de-icing and snow removal methods. • Infrastructure and process improvements for spill containment. • Appropriate storage and proper labeling. • Employee training on proper containment and disposal • Vegetation management for reduced chemical use
Natural resources	Stormwater management	<p>Stormwater management is the largest environmental concern for many Virginia airports. Given recently enhanced regulations concerning stormwater quality, airport stakeholders expressed a need to not only comply with regulations, but also to control the cost of compliance and be prepared to adapt to future changes.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Preventative maintenance and spill prevention techniques. • Erosion control. • Natural treatment systems. • Facility designs to reduce potential for runoff contamination. • Enhanced wildlife management.
	Water efficiency	<p>Optimizing water use represents a potential cost saving opportunity for Virginia’s airports. Although water efficiency is not typically a top priority for airport managers, guidance on how to approach water savings would facilitate water conservation and free up financial resources for other priorities.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> • Low-flow fixtures. • Eliminating leaks. • Weather responsive irrigation systems. • Irrigation-free landscaping. • Rainwater capture.

3.5 Introduction to the SMP Supplements

This SMP Statewide Framework presents the overall vision for airport sustainability in the Commonwealth and recommends sustainability categories for each airport's consideration. SMP Supplements provide additional detail and are intended to further define specific goals, metrics, and possible sustainability initiatives for three types/sizes of airports, as shown in Figure 12. The several types and sizes of airports in Virginia have varying degrees of institutional and financial capacity to plan and implement sustainability initiatives. The purpose of the Supplements is to ensure that airport operators are provided with the most user-friendly, practical resources possible to help them advance sustainability efforts while minimizing added burden on busy personnel and limited airport resources.



Figure 12: Organization of the Virginia Airports Sustainability Management Plan (SMP) Statewide Framework and Supplements

Figure 13, below, shows how the required elements of the FAA guidance are integrated into the Virginia Airports SMP Statewide Framework and each of the SMP Supplements. The elements that FAA requires in an airport SMP include:

- Sustainability policy, mission statement, or vision—this provides the high-level rationale, context, and background for the SMP;
- Defined sustainability categories in various economic, environmental, social, and operational areas applicable to their airport;
- Goals or measurable targets customized for each airport;
- Performance metrics to track and manage performance; and
- Identified initiatives that will be implemented to make progress towards the goals.

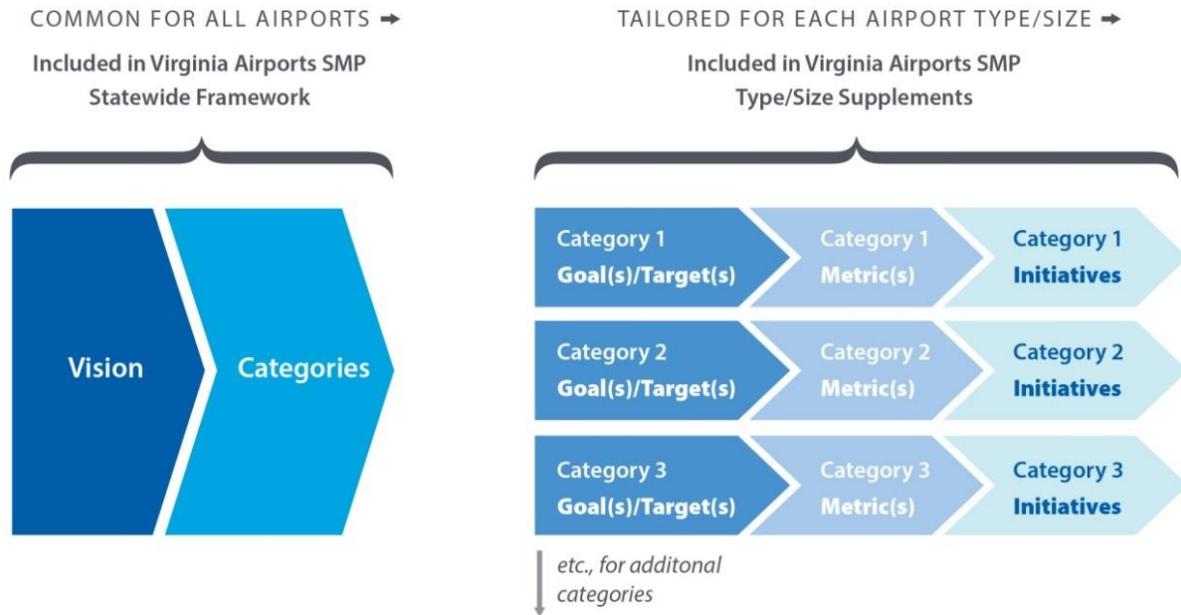


Figure 13: Relationship between the sustainability vision, categories, goals, metrics, and explicit initiatives

Each airport in the Commonwealth is encouraged to select the SMP Supplement for its type/size and explore the sustainability goals, targets, performance metrics, and initiatives contained therein. These respective SMP Supplements are designed to be easy to implement with a focus on tangible outcomes. They provide Virginia’s public-use airports with a framework for undertaking tailored sustainability planning, and include resources such as templates, tools, and guidance on funding opportunities to maximize ease of utilization by airport operators and minimize strain on limited financial and institutional resources. The Supplements provide the “meat” of the SMP to help airport operators address current challenges and take advantage of the benefits of sustainability, including cost savings, protection of environmental resources for future generations, and efficiency of operations.

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APPENDIX A: LIST OF VIRGINIA AIRPORTS BY SIZE TIER, GEOGRAPHIC REGION, AND SETTING

Airport Name	Type of airport	Mountain (M)/ Piedmont (P)/ Tidewater (T)	Rural (R)/ Urban (U)
Commercial Service			
Charlottesville-Albemarle Airport (CHO)	Commercial Service	M	U
Lynchburg Regional Airport (LYH)	Commercial Service	P	U
Newport News/Williamsburg International Airport (PHF)	Commercial Service	T	U
Norfolk International Airport (ORF)	Commercial Service	T	U
Richmond International Airport (RIC)	Commercial Service	P	U
Roanoke-Blacksburg Regional Airport (ROA)	Commercial Service	M	U
Ronald Reagan Washington National Airport (DCA)	Commercial Service	P	U
Shenandoah Valley Regional Airport (SHD)	Commercial Service	M	R
Washington Dulles International Airport (IAD)	Commercial Service	P	U
Reliever and GA-Regional			
Chesapeake Regional Airport (CPK)	Reliever	T	R
Hampton Roads Executive Airport (PVG)	Reliever	T	U
Hanover County Municipal Airport (OFP)	Reliever	P	U
Leesburg Executive Airport (JYO)	Reliever	P	U
Manassas Regional Airport (HEF)	Reliever	P	U
Richmond Executive - Chesterfield County Airport (FCI)	Reliever	P	U
Stafford Regional Airport (RMN)	Reliever	P	U
Warrenton-Fauquier Airport (HWY)	Reliever	P	R
Accomack County Airport (MFV)	General Aviation - Regional	T	R
Blue Ridge Regional Airport (MTV)	General Aviation - Regional	M	R
Culpeper Regional Airport (CJR)	General Aviation - Regional	P	R
Danville Regional Airport (DAN)	General Aviation - Regional	P	R
Dinwiddie County Airport (PTB)	General Aviation - Regional	P	R
Emporia-Greensville Regional Airport (EMV)	General Aviation - Regional	T	R
Farmville Regional Airport (FVX)	General Aviation - Regional	P	R
Ingalls Field Airport (HSP)	General Aviation - Regional	M	R
Lonesome Pine Airport (LNP)	General Aviation - Regional	M	R
Louisa County Airport/Freeman Field (LKU)	General Aviation - Regional	P	R

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Mecklenburg-Brunswick Regional Airport (AVC)	General Aviation - Regional	P	R
Middle Peninsula Regional Airport (FYJ)	General Aviation - Regional	T	R
Mountain Empire Airport (MKJ)	General Aviation - Regional	M	R
New River Valley Airport (PSK)	General Aviation - Regional	M	R
Suffolk Executive Airport (SFQ)	General Aviation - Regional	T	R
Tappahannock-Essex County Airport (XSA)	General Aviation - Regional	T	R
Tazewell County Airport (JFZ)	General Aviation - Regional	M	R
Virginia Highlands Airport (VJI)	General Aviation - Regional	M	R
Virginia Tech/Montgomery Executive Airport (BCB)	General Aviation - Regional	M	R
William M Tuck Airport (W78)	General Aviation - Regional	P	R
Winchester Regional Airport (OKV)	General Aviation - Regional	M	U
GA-Community and Local Service			
Allen C Perkinson Airport/Blackstone Army Airfield (BKT)	General Aviation - Community	P	R
Brookneal-Campbell County Airport (OV4)	General Aviation - Community	P	R
Franklin Municipal-John Beverly Rose Airport (FKN)	General Aviation - Community	T	R
Front Royal-Warren County Airport (FRR)	General Aviation - Community	M	R
Lake Country Regional Airport (W63)	General Aviation - Community	P	R
Lee County Airport (OVG)	General Aviation - Community	M	R
Luray Caverns Airport (LUA)	General Aviation - Community	M	R
New Kent County Airport (W96)	General Aviation - Community	T	R
Orange County Airport (OMH)	General Aviation - Community	P	R
Shannon Airport (EZF)	General Aviation - Community	P	U
Tangier Island Airport (TGI)	General Aviation - Community	T	R
Twin County Airport (HLX)	General Aviation - Community	M	R
Wakefield Municipal Airport (AKQ)	General Aviation - Community	T	R
Williamsburg-Jamestown Airport (JGG)	General Aviation - Community	T	U
Bridgewater Air Park (VBW)	Local Service	M	R
Chase City Municipal Airport (CXE)	Local Service	P	R

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Crewe Municipal Airport (W81)	Local Service	P	R
Eagle's Nest Airport (W13)	Local Service	M	R
Falwell Airport (W24)	Local Service	M	R
Gordonsville Municipal Airport (GVE)	Local Service	P	R
Grundy Municipal Airport (GDY)	Local Service	M	R
Hummel Field Airport (W75)	Local Service	T	R
Lake Anna Airport (7W4)	Local Service	P	R
Lawrenceville/Brunswick Municipal Airport (LVL)	Local Service	P	R
Lunenburg County Airport (W31)	Local Service	P	R
New London Airport (W90)	Local Service	M	R
New Market Airport (8W2)	Local Service	M	R
Smith Mountain Lake Airport (W91)	Local Service	M	R

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