APPENDIX 2

LITERATURE REVIEW

Based on the information that has been gathered in Phase I of the FDOT Airport Sustainability Guidebook, a literature review was completed to document existing research, data, and information on sustainability resources that have been completed. To accomplish this, four distinct groups of resources were reviewed including:

- Transportation Research Board
- Federal Aviation Administration
- Florida Department of Transportation
- Additional Resources

In total, 25 documents and resources were reviewed and summarized as they apply to the development of the FDOT Airport Sustainability Guidebook. The summaries provided in this section introduce each of the reviewed documents, summarize the tools and resources provided by each document, as well as identify how airports completing sustainability plans or initiatives can access these resources for more information.

TRANSPORTATION RESEARCH BOARD RESOURCES

The Transportation Research Board (TRB) was developed to provide leadership in transportation innovation through research and information exchange. Within TRB, the Airport Cooperative Research Program (ACRP) was developed as an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. In total, nine (9) TRB resources were reviewed and summarized for their applicability to sustainability efforts for Florida's airports. Many of these documents are explicitly related to sustainability and airports; however, some simply provide useful tools or materials that could be applied to airports implementing and tracking sustainability initiatives. To access these reports and to find out more information on the TRB or ACRP, please visit: www.trb.org.

1. **Report 141: Renewable Energy as an Airport Revenue Source**
   Prepared by: Transportation Research Board, 2015
   http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_rpt_141.pdf

   Report 141 contains information on using renewable energy sources at airports through case studies and feasibility assessments of multiple renewable energy options. Key components of *Report 141* include:

   - Evaluation of the airport factors that influence what forms of energy are feasible at an airport
   - Guidance on conducting financial assessments of chosen renewable energy sources
     - Guidance on renewable energy implementation
   - A Renewable Energy Funding Matrix
   - Sample Request for Proposals are referenced within and are available at:
     http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_rpt_141_AppendixF.pdf

Report 141 outlines the benefits of a renewable energy project and how it can be applied to airport operations and facilities. The document introduces numerous types of renewable energy sources and provides evaluation factors that assist in deciding which, if any, renewable energy sources could be implemented at an airport. *Report 141* also provides guidance on the implementation process for renewable energy from conducting financial assessments through the stakeholder input and final approvals.

Airports considering the implementation of renewable energy are encouraged to reference *Report 141.* When implemented properly, renewable energy can lead to financial benefits, reduction of environmental damage, and improve the public opinion of the airport. Renewable energy sources are becoming ever more politically and financially feasible; this report contains the guidance necessary for the introduction of renewable energy at airports.

2. **Synthesis 66: Lessons learned from Airport Sustainability Plans**
   Prepared by: Transportation Research Board, 2015
   http://www.trb.org/Main/Blurbs/172887.aspx

   Synthesis 66 provides a summary of the lessons learned from a sustainability implementation survey sent to airports around the nation. This report organized information from 31 medium and small general aviation and commercial service airports from 20 states. Based on the survey results Synthesis 66 provides the following:

   o Advice on the development of sustainability plans
   o Typical drivers, aids, and barriers to implementation
   o Sustainability implementation lessons learned
   o Airport sustainability case studies

   This summary was developed to aid airports in the implementation of sustainability by summarizing the information received from the survey, and providing case study examples from airports who have already completed sustainability initiatives. This report promotes sustainability as a process of continued improvement and displays the different ways in which sustainability has been implemented at airports.

   Airports are encouraged to consult this report before, and while sustainability initiatives are being implemented. Airports may find the case studies useful as they briefly summarize the local conditions, and provide case by case advice on the implementation of sustainability.

3. **Report 110: Evaluating Impacts of Sustainability Practices on Airport Operations and Maintenance**
   Prepared by: Transportation Research Board, 2014
   http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_110.pdf

   Report 110 provides guidance on the proper function and use of two tools developed to monitor the impact of sustainability on airports' operations and maintenance; these tools are:

   o **Evaluation Process (EP)**: Guides users to scope the analysis and collect relevant data, as it relates to sustainability practices for use in the Cost Benefit Tool

- **Cost Benefit Tool (CBT)**: Helps users categorize the data collected in the EP to support the assessment of potential impacts resulting from the implementation of sustainability initiatives on maintenance budgets and resources

  http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_110.iso [1]

  Video tutorial on how to use the CBT: http://vimeo.com/116156429

The proper use of these tools assists airports by ensuring operations and maintenance considerations are included within the sustainability initiatives' decision-making process. The document identifies that a proper implementation of sustainability practices (1) assesses the full budgetary and operational lifecycle implications, and (2) engages operations and maintenance department personnel early in the process. The CBT allows users to compare traditional operations actions against those with sustainability measures applied. The proper use of this tool helps each user decide whether a new initiative will be a benefit or a detriment to the operations at the airport.

When considering sustainability initiatives, it is encouraged that airports reference *Report 110* to aid in the implementation of new operation and maintenance methods or systems. It should also be noted that airports with existing EP and CBT tools may also find this document useful as its contents may be used to improve their existing tools.

4. **Report 119: Prototype Airport Sustainability Rating System – Characteristics, Viability, and Implementation Options**
   Prepared by: Transportation Research Board, 2014
   http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_119.pdf

Report 119 contains an exploration and explanation of the Prototype Rating System (Prototype) and how it can be used by airports. The primary components of *Report 119* include:

- The methods used to create the Prototype
- A user's guide for the Prototype
- A list of sustainability best practices
- Sustainability activity definitions and performance metrics

Report 119 was developed to provide information on implementation options for the Prototype. The purpose of this rating system is to focus on high-level sustainability performance allowing for the flexibility of airports to choose the most appropriate strategy. The intent of this approach is to integrate sustainability throughout the airport's functions and sphere of influence while guiding airports through documentation and verification of their sustainability initiatives. The Prototype was developed to allow airports to track their sustainability performance internally, but also for comparative purposes.

Using the information within *Report 119*, airports are able to utilize the established scoring framework in a flexible an individualized manner to better evaluate their sustainable

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[1] Accompanying the report, CD-149: Evaluation Process and Cost–Benefit Tool contains spreadsheet tools and an instructional video that demonstrates how to use data from an example project. CD-149 is available for download from TRB's website as an ISO image. Instructions for burning a CD-ROM from an ISO image can be found here: http://onlinepubs.trb.org/Onlinepubs/create-and-burn-iso.pdf

performance. Airports are also able to make use of the sustainable best practices section of the report to improve the implementation of sustainability measures at the facility.

5. **Report 80: Guidebook for Incorporating Sustainability into Traditional Airport Projects**
   Prepared by: Transportation Research Board, 2012
   http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_080.pdf

   Report 80 provides guidance on incorporating sustainability into airport projects using the Airport Sustainability Assessment Tool (ASAT) developed as part of this report. To accomplish this, *Report 80* provides the following tools and supplemental information:

   ⊙ **Airport Sustainability Assessment Tool (ASAT)**: Allows users to evaluate which sustainability practices would be most applicable based on the conditions at the airport and includes a comprehensive list of suggestions for incorporating sustainable initiatives with traditional airport projects

   http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_080.xls

   Report 80 and the ASAT were developed to allow users to assess the practices that would be most applicable and practical for the airport situation/environment, while also eliminating the need to research all relevant material, a savings of airport employee time and expense. Sustainability initiatives provided in *Report 80* can be incorporated into both new construction projects, the retrofitting of existing facilities, as well as be applied to airport equipment.

   Report 80 is recommended for airports that are already considering sustainability initiatives, those searching for ideas or sustainable strategies, and those who would like to know what sustainability measures have been implemented at other airports. *Report 80* also highlights the need for a sustainability champion or sustainability plan/vision statement for an airport to fully make use of the document and implement a comprehensive initiative that addresses the airport's unique needs.

6. **Report 19A: Resource Guide to Airport Performance Indicators**
   Prepared by: Transportation Research Board, 2011
   http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_019A.pdf

   Report 19A provides users with a list of Airport Performance Indicators (APIs) that can be used to accurately measure an airport's performance across multiple functional areas including general aviation, human resources, and operations. APIs are provided in the following categories:

   ⊙ **Core APIs**: Important for overall operation or otherwise important to the airport executive level and/or the airport governing board
   ⊙ **Key APIs**: Important for the operations of key airport departments of functions
   ⊙ **Other APIs**: Not considered as useful for airport overall operation, to the executive level, or to key airport departmental functions

   Report 19A was developed to supply airport sponsors with the information for developing and implementing strategic planning and performance-measurement systems. *Report 19A* has compiled and categorized a list of APIs that airports can use for benchmarking their

performance. *Report 19A* also provides guidance on the use of the APIs and how they can be applied to individual airports.

When considering the implementation of sustainable initiatives, each airport is encouraged to have a thorough understanding of their existing performance to ensure future efforts will be beneficial. *Report 19A* should be referenced by airports that are developing performance measures as part of a sustainability plan. This document organizes the APIs by functional area of the airport and provides descriptions of what the indicator is, where to find the information, which airports will use the information, and how the information can be used.

7. **Synthesis 42: Sustainable Airport Construction Practices**
    Prepared by: Transportation Research Board, 2011
    http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_042.pdf

    Synthesis 42 organizes 480 sustainable construction practices into three categories: Pre-Construction, During Construction, and Commissioning/Post Construction. Additionally *Synthesis 42* contains a thorough list of sustainable construction case studies, and includes the following informational matrices that sort sustainable construction practices in a variety of ways:

    ○ Categorized by practice category (Policies and regulations, construction methods, logistics, etc.)
    ○ Categorized by construction implementation stage categories (Pre, during, and post construction)

    Synthesis 42 is a summary of sustainable construction practices (referred to as the "collection") available for stakeholders involved in the planning, design, and/or construction, and post construction activities related to airport development or redevelopment projects.

    Airports should reference *Synthesis 42* when planning and designing any construction projects, as it provides a list of practices that can be applied to enhance the sustainability of the project as well as the airport. Using this report allows airports to deviate from traditional construction methods and potentially see increased benefits through the application of sustainable construction practices.

8. **Report 20: Strategic Planning in the Airport Industry**
    Prepared by: Transportation Research Board, 2009
    http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_020.pdf

    Report 20 contains information and guidance on strategic planning and how to properly implement the strategic planning process. The Report provides airports with the tools necessary to appropriately incorporate their sustainability goals into their overall strategic plan. Within *Report 20*, the following tools and information are provided to assist airports in the strategic planning process:

    ○ A step-by-step framework that allows an airport to efficiently navigate the strategic planning process

       http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_020workbook.pdf

o Information and guidance to aid in the understanding or implementation of strategic planning at airports
o Case studies outlining the strategic planning efforts of airports and airport systems around the country

Report 20 was developed to provide a comprehensive, user-friendly management tool that could be used to design, implement, and manage the strategic planning process, leading to the development of an airport strategic plan. As defined in this report, strategic planning is the "process undertaken by an organization to define its future and formulate a road map to guide the organization from its current state to its visions for the future." *Report 20* provides an overview and examples of planning techniques, including a baseline process to undertake the strategic planning process. A model framework that identifies steps to develop a strategic plan is also provided, including pre-planning activities; mission, vision, values, and airport environment; strategic issues and leading strategies; specific objectives and action plans; and performance and evaluation measures. As noted in *Report 20*, there are numerous factors that can influence the strategic planning process, including the size and type of airport, type and availability of stakeholders, airport activities and services, and the regulatory environment. Case studies of several airports are provided to aid in the understanding of the report.

Airports developing sustainability plans should use the information contained within this document to ensure that the goals are consistent with and incorporated into its strategic planning framework.

9. **Synthesis 10: Airport Sustainability Practices**
Prepared by: Transportation Research Board, 2008

http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf

Synthesis 10 was developed to inform interested users on a range of airport sustainability initiatives collected from a comprehensive literature review and online survey. *Synthesis 10* provides the following tools to assist airports when developing and implementing sustainability plans and initiatives:

o **Management Performance Scale**: Helps assess the extent to which sustainability management practices are integrated into the business process at airports (Appendix B of ACRP Synthesis Report 10)
o **Airport Sustainability Practices Matrix**: Catalogues sustainable airport practices by commercial hub size, location (domestic or international), and type of sustainable practices (land use, waste, noise, etc.) (Appendix D of ACRP Synthesis Report 10)

Synthesis 10 documents a range of airport sustainability practices developed for airport operators to focus on their triple bottom line (environmental, economic, and social). The literature review was performed to identify existing sustainable practices and gather the information necessary for the development of the online survey. Based "on overall sustainability performance, respondents from international airports and large U.S. airports rated their airports' performance higher than those from small and medium U.S. airports." It was commonly agreed that regulation and airport policies were the main reasons the airports have implemented sustainability practices. Both large and international (non-US)

airports identified environmental sustainability as a priority while the smaller airports tended to focus on economic priorities. All of the respondents identified funding as the primary inhibitor to sustainability implementation.

Airport sponsors are encouraged to reference this document when considering the implementation of sustainable practices. *Synthesis 10* details the drivers, priorities, and barriers to sustainability practices by using data from existing airports around the world. The document also outlines sustainability practices within the three areas of the triple bottom line: environmental, economic, and social. Understanding these three types of sustainability can be used at airports is essential for the success of any airport sustainability plan or initiative.

10. **NCHRP Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies**
Prepared by: Transportation Research Board, 2011

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_708.pdf

NCHRP Report 708 was developed to provide transportation agencies with tools to apply concepts of sustainability in core activities through performance measurement. To assist in this, *Report 708* includes the following:

- Sustainability definitions and issues background
- Theories on the application of sustainability
- A sustainability performance measurement framework
- Methods to evaluate sustainability initiatives and determine effectiveness

NCHRP Report 708 describes the principles of sustainability as they relate to various transportation agencies. Included with this is a set of possible goals that can be used to address those principles, as well as performance measures. *NCHRP Report 708* serves users that have some understanding of performance measurement, but still require guidance on providing this information to agency leadership. *NCHRP Report 708* provides a framework for transportation agencies to apply sustainability initiatives and generate performance measurements.

If the airport is familiar with sustainability concepts and ready to design sustainability performance measures, *NCHRP Report 708* should be referenced for information on establishing performance measures to evaluate the program, as well as gauge the effectiveness of the strategies in implementing sustainability.

FEDERAL AVIATION ADMINISTRATION RESOURCES

The Federal Aviation Administration (FAA) is responsible for the advancement, safety, and regulation of civil aviation in the US. The FAA is also one of the primary funding sources for all airport projects. To support the FAA's goals, the agency has developed numerous documents and resources to assist aviation entities. For this document, seven (7) FAA documents and resources were reviewed and summarized for applicability to sustainability efforts. Some of the documents are explicitly related to sustainability and airports; however, some simply provide useful tools or information that could be used when implementing and tracking airport sustainability initiatives. To access these reports and to find out more information on the FAA, please visit: www.faa.gov

Prepared by: The FAA, September 30, 2014

http://www.faa.gov/airports/planning_capacity/npias/reports/media/npias-2015-2019-report-narrative.pdf

The *National Plan of Integrated Airport Systems (NPIAS)* provides an overview and evaluation of the public-use airports that are important to national air transportation and eligible for AIP funding. Within this document, the following are included:

- An overview of the composition of the national airport system
- Overall objectives of the NPIAS and an evaluation of the system's performance
- Aviation forecasts and how this information will affect airports
- The overall development requirements and estimates for future costs

The *NPIAS* also lists each airport, its role, and ASSET classification for general aviation airports.

The NPIAS was developed to support the strategic priorities and key initiatives identified in the FAA Administrator's Strategic Initiatives for safety, access, and global leadership by identifying the needs of the system to meet those priorities. Airports that receive funding due to their inclusion in the NPIAS are encouraged to be familiar with this document and how it relates to their airport.

Airports are encouraged to reference this document to understand their projected development, and how the airport fits into the national system.

1. *General Aviation ASSET Documents:*
   General Aviation Airports: A National Asset **(ASSET 1)**
   Prepared by: The FAA, May, 2012
   ASSET 2: In-Depth Review of the 497 Unclassified Airports (ASSET 2)
   Prepared by: The FAA, March 2014
   http://www.faa.gov/airports/planning_capacity/ga_study/

ASSET 1 was completed by the FAA to explore the role that general aviation airports play in the National Air Transportation System. *ASSET 1* provides users with an overview of the types of services general aviation (GA) airports provide within the national airport system and categorizes the GA airports that facilitate this activity. *ASSET 1* outlines the following information:

- The societal importance of GA airports
- Four new ASSET categories to organize GA airports by activity: National, Regional, Local, and Basic
- The identification of 497 GA airports that did not fit within the four categories (Unclassified) and the plan to address these airports within another study

This report documents important aeronautical functions that are economically and effectively supported at general aviation airports. These functions range from emergency preparedness and response to the direct transportation of people and freight, as well as commercial applications such as agricultural spraying, aerial surveying, and energy exploration.

ASSET 2 documents the review of the 497 facilities that could not be categorized in 2012 as part of *Asset 1*. Key information from this report includes:

- 212 of the previously unclassified airports were classified within one of the four ASSET categories
- 281 of the unclassified airports will remain unclassified within the NPIAS
- A matrix showing the breakdown of the categories of the NPIAS airports organized by state

ASSET 2 provides an additional review of the 497 airports that did not meet the criteria necessary to be designated under one of the four airport categories detailed in *ASSET 1*. The FAA teamed with an in-depth stakeholder process to conduct the review and were able to classify an additional 212 airports within the four ASSET categories. Those airports that are not classified in one of the four categories will be eligible for federal funding when they are able to meet the criteria for one of the four ASSET categories.

The information included in these studies should be referenced for GA airports considering the implementation of sustainability plans and initiatives. This information will help airports understand what similarly sized airports have also done as it related to sustainability. Additionally, airports identified within one of the four ASSET categories will have access to federal funding opportunities, which may increase their ability to implements sustainability initiatives.

2. **Airport Improvement Program Handbook**
   Prepared by: The FAA, September 30, 2014
   http://www.faa.gov/airports/aip/aip_handbook/media/AIP-Handbook-Order-5100-38D.pdf

   The Airport Improvement Program Handbook (AIP Handbook) provides guidance on the types, eligibility, and steps necessary to receive funding through the AIP. The AIP Handbook outlines the following:

   - Types of sponsors and entities eligible for grant funding
   - Type of projects eligible for funding
   - Types of AIP funding available
   - Guidance on the grant process

   Airports considering sustainability initiatives are encouraged to reference this document and be familiar with the funding opportunities that are available from the federal government. Of particular importance to sustainability projects is the fact that AIP funds are available for the participation in the Voluntary Airport Low Emission Program (VALE), the Zero Emission Vehicle Program (ZEV), and the development of comprehensive planning study documents, including sustainable master plans. More information on the funding requirements of these projects can be found in Appendix S of the AIP Handbook.

3. **FAA AC 150/5070-6B: Airport Master Plans**
   Prepared by: The FAA, July 29, 2005
   http://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5070-6B-Change-2-Consolidated.pdf

Advisory Circular 150/5070-6B outlines the features and content necessary for an airport to complete the master planning process. The following are included within this document:

o   Guidance on the necessary steps and elements of an airport master plan
o   Guidance on the development of individual components of an airport master plan
o   A listing of potential stakeholders to include in the master planning process
o   Guidance on the specific requirements of an airport layout plan set

The purpose of this AC is to provide Federal guidance to airports of all sizes on the preparation of airport master plans. This AC outlines the required steps and important features that must be included within the FAA's prescribed airport master planning process. This AC also outlines the needs and requirements of the airport layout plan (ALP) drawings. Airport master planning is an important step for airports to undertake to ensure that they are meeting the needs of the national airspace system; as such the master plans must be kept current to reflect existing conditions of the airports and associated communities. As all airports are unique, the scope and content of each master planning process must be tailored to the individual airport's needs.

The only specific reference to sustainability planning that this AC provides is in the Facility Requirements section. It states that a master plan should identify or consider practices that enhance the airport's overall sustainability, including initiatives that maximize linkages with public transportation to reduce private vehicle trips to the airport, promote recycling and waste minimization, increase energy efficiency (including the use of alternative energy sources), reduce airport-related emissions, facilitate airport-related community and economic development, and increase community engagement in the airport planning and development process. Of note, Airport Improvement Program (AIP) funding is available for the development of comprehensive sustainability planning documents. Traditionally, sustainability can be incorporated into a master plan either as a stand-alone chapter or as a component of each individual section of a master plan.

Airports are encouraged to reference this document to determine ways in which sustainability can be incorporated within the airport master planning process. Incorporating sustainability into the master planning process shows the airport's commitment to improving the economic, social, operational, and environmental conditions within the community into the future. In addition to this resource, the FAA also provides guidance related to sustainability in the FAA's *Recycling, Reuse, and Waste Reduction at Airports: A Synthesis Document* (detailed in this section).

4.   **Sustainable Master Plan Pilot Program (including Lessons Learned)**
     Prepared by: The FAA, December 17, 2012
     Interim Guidance for FAA's Sustainable Master Plan Pilot Program (Interim Guidance):
     http://www.faa.gov/airports/environmental/sustainability/
     Lessons Learned from the Sustainable Master Plan Pilot Program (Lessons Learned):
     http://www.faa.gov/airports/environmental/sustainability/

The *Interim Guidance* and *Lessons Learned* contain a summary of the FAA's Sustainable Master Plan Pilot Program and information collected from the participants. Within the report, the following are included:

- An introduction of the Sustainable Master Plan Pilot Program
- Lessons learned from the participants of the Sustainable Master Plan Pilot Program
- A list of notable sustainability goals, targets, and initiatives found from the Sustainable Master Plan Pilot Program
- Links to documents completed during the Sustainable Master Plan Pilot Program

The Sustainable Master Plan Pilot Program began in 2010 with the intent of assisting airports in reducing their environmental impacts and improving community relationships while meeting operational and planning requirements. The goal of this program was to incorporate sustainability within traditional airport long range planning. Through the pilot program, selected airports had the option of developing a sustainable master plan or a stand-alone sustainable management plan. Sustainable master plans incorporate sustainable initiatives within the airport's traditional master planning document whereas the sustainability management plans are intended to be a separate document comprised entirely of sustainability content. The ultimate outcome of the Sustainable Master Plan Pilot Program is a list of best practices and lessons learned from the airports that participated in the program. These best practices and lessons learned include topics such as developing a sustainability mission statement, conducting a baseline assessment, and methods of public involvement. In total, there are 20 best practices and lessons learned that airports can reference in implementing sustainability initiatives. In Florida, Tampa International, Northeast Florida Regional, and Vero Beach Regional were selected to participate in the program.

This report and the associated case studies should be referenced by airports considering the inclusion of sustainable initiatives either within their master plans or in the creation of sustainability management plans. The lessons learned, examples of appropriate sustainable initiatives, and sustainability goals listed within this report could also save airports both time and money, by outlining the successes of the pilot program for others to follow. More FAA guidance on airport sustainability can be found at
http://www.faa.gov/airports/environmental/sustainability/

5. **Recycling, Reuse, and Waste Reduction at Airports: A Synthesis Document (Recycling Synthesis)**
    Prepared by: The FAA, April 24, 2013
    https://www.faa.gov/airports/environmental/airport_recycling/
    Recycling Synthesis provides guidance on the implementation of recycling and waste management programs at airports. The document contains three major sections for consideration:

    - The establishment of municipal solid waste recycling programs
    - The establishment of construction and demolition waste management programs
    - A listing of airports that have implemented recycling programs and their lessons learned

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The *Recycling Synthesis* is intended to be a "one-stop shop" for airports to review when considering recycling and waste reduction strategies. Contained within this document are recommendations and methods for the implementation of these management initiatives. The primary focus of the *Recycling Synthesis* is for the management of municipal solid waste (MSW) and reducing the volume sent to the landfill. In addition to MSW, construction and demolition waste at airports typically represents such a large volume that it was the secondary emphasis of the document.

Airports interested in implementing sustainability initiatives are encouraged to consider waste management strategies within their planning efforts. Properly implemented waste management strategies can provide economic, environmental, operational, and social benefits for the airport and surrounding community. The case study analysis contained within the *Recycling Synthesis* enables airports to reference real projects and utilize the information for waste management initiatives. Additionally, Section 122 of the *FAA Modernization and Reform Act of 2012* requires airports to prepare a Recycling, Reuse, and Waste Reduction plan as part of their master plan, sustainability plan, or as a standalone document. Included in the *FAA Modernization and Reform Act of 2012* is the provision that the following issues are required to be addressed as part of a Recycling, Reuse, and Waste Reduction plan:

1. Feasibility of solid waste recycling
2. Minimizing the generation of solid waste
3. Operation and maintenance requirements
4. Review of waste management contracts
5. Potential cost savings or generation of revenue

Understanding the required components of the *FAA Modernization and Reform Act of 2012* is important for airports to understand when developing either a master plan or sustainability plan. These provisions should be reviewed and understood prior to beginning any sustainability planning initiative at an airport.

FLORIDA DEPARTMENT OF TRANSPORTATION RESOURCES

The Florida Department of Transportation (FDOT) is responsible for coordinating the planning and development of a safe, viable, and balanced state transportation system serving all regions of the state. Within FDOT, the Aviation and Spaceports Office (ASO) is tasked with promoting the development and improvement of aviation facilities, regulating airports, and protecting approaches. To accomplish this, FDOT has developed numerous documents and resources to assist airports in a multitude of ways. For this report, six (6) FDOT documents and resources were reviewed and summarized for their applicability to sustainability efforts for Florida's airports. Currently, FDOT does not have any documents or resources that are explicitly related to sustainability. As such, the information collected is linked and referenced throughout the Guidebook. Unless otherwise noted, to access these reports, please visit: www.dot.state.fl.us/aviation/flpub.shtm

1. **Florida Transportation Plan**
   Prepared by: Florida Department of Transportation, 2010
   http://www.dot.state.fl.us/planning/FTP/

The *Florida Transportation Plan (FTP)* defines the overall transportation goals of Florida and was developed to make it more economically competitive, livable, and environmentally sustainable for future generations. The FTP is updated every five years to accommodate and respond to new trends and challenges to meet future mobility needs. The current version of the report, 2060 FTP, provides the following vision for the future for airports and aviation facilities:

- A statewide, multimodal system of trade gateways, logistics centers, and transportation corridors to position Florida as a global hub for commerce and investment
- An evolving air and space transportation system enabling Florida to remain a global leader for moving people and cargo between Florida and destinations in other states, nations, and orbit

Currently, the FTP is being updated to provide direction to FDOT and all organizations that are involved in planning and managing Florida's transportation system, including statewide, regional, and local partners. For this FTP update, seven goals (desired outcomes) were developed to highlight Florida's transportation system over the next 50 years; these include:

- Safety and security for residents, businesses, and visitors
- Efficient and reliable mobility for people and freight
- Transportation solutions that support Florida's global economic competitiveness
- Transportation solutions that enhance Florida's environment and conserve energy
- Agile, resilient, and quality transportation infrastructure
- More transportation choices for people and freight
- Transportation solutions that support quality places to live, learn, work, and play

The development of the FDOT *Airport Sustainability Guidebook* will both compliment and supplement the overarching goals of the most current FTP. When feasible, there will be specific references and documentation as to how the FDOT *Airport Sustainability Guidebook* is supporting the FTP. For more information on the FTP, please visit:
www.dot.state.fl.us/planning/FTP/

2. **Florida's Strategic Intermodal System Strategic Plan**
   Prepared by: Florida Department of Transportation, 2010
   http://www.dot.state.fl.us/planning/sis/

The Strategic Intermodal System (SIS) is comprised of Florida's largest and most strategic air, space, water, rail, and highway transportation facilities. There are currently 19 airports that are included in the SIS. Of these 19 airports, seven are Commercial Service SIS Airports, and two are SIS General Aviation Reliever Airports. The remaining 10 are Commercial Service Emerging SIS Airports. Airport eligibility into the SIS and categorization must meet the identified criteria as updated. More information on the SIS criteria can be found on the SIS website: http://www.dot.state.fl.us/planning/sis/. SIS funds can be used for airport facilities in need of additional capacity. The SIS strategic plan creates the policies used to designate SIS facilities, where funding should be allocated, and how to establish priorities among these investments. The SIS has identified seven objectives within the strategic plan:

- Enhance connectivity between Florida's economic regions and between Florida and other states and nations for both people and freight

- Reduce delay on and improve the reliability of travel and transport using the SIS facilities
- Expand modal alternatives to SIS highways for travel and transport between regions, state, and nations
- Provide for safe and efficient transfers for both people and freight between all transportation modes
- Provide transportation systems to support statewide goals related to economic diversification and development
- Reduce growth rate in vehicle-miles traveled and associated energy consumption and emissions of air pollutants and greenhouse gasses
- Help ensure Florida's transportation system can meet national defense and emergency response and evacuation needs

Florida's airports that are designated or eligible for designation as SIS facilities are encouraged to become familiar with the SIS Strategic Plan and have an understanding of the prioritization standards for funding and improvements. Many of Florida's airports are identified as SIS and benefit from its emphasis on complete transportation systems. The SIS has been developed to support interconnectivity and economic development which greatly benefit airports considering the implementation of sustainability initiatives related to capacity-enhancing projects.

3. **Florida Aviation System Plan 2025***
   Prepared by: Florida Department of Transportation, 2012
   *The FASP 2035, a comprehensive update, is currently underway.
   www.dot.state.fl.us/aviation/flpub.shtm

The Florida Aviation System Plan (FASP) was developed through the coordination of the FDOT, the FAA, and Florida's public airports through the Continuing Florida Aviation System Planning Process (CFASPP). The FASP involves standard aviation system planning elements provided within most state aviation system plans, and assists in updating and maintaining the Florida Aviation Database (FAD), a comprehensive statewide aviation database. The FASP 2025 includes an analysis of the intermodal aspects of the state transportation system and a strategic aviation planning element that identifies seven strategic goals and the measurements, approaches, and recommendations to achieve these goals:

- Support new technologies and innovation in aviation
- Contribute to sustainable growth while remaining sensitive to the environment
- Provide efficient, safe, convenient, and secure airports
- Enhance Florida's leadership and prominence In the aviation industry
- Protect airspace and promote compatible land use planning around Florida airports
- Promote aviation to business, government, and the public
- Foster Florida's reputation as a military-friendly state

The Continuing Florida Aviation System Planning Process is a public involvement and communication process with tri-annual meetings to exchange information between federal, state, and local aviation planners and airport sponsors and reach consensus on comprehensive estimates of needed airport improvements and related capital costs, discuss funding strategies, trends, and concerns related to Florida's airports, and serve as a continuous stakeholder input process for the FASP. The FASP and CFASPP are excellent

examples of Florida's devotion to maintaining a robust aviation presence throughout the state. They are effective ways for airports to stay aware of current trends and to understand the funding, goals, and changes to Florida's aviation system. It is recommended airports reference this document to ensure that their sustainability initiatives aid in the promotion of Florida's aviation industry. Airports considering implementing or those that have already implemented sustainability initiatives are encouraged to be active participants within their CFASPP regions to ensure the sharing of knowledge and an understanding of their region's trends and conditions. Airports should take care to reference the most up to date version of the FASP as FDOT is currently working to update the document.

4. **FDOT Guidebook for Airport Master Planning**
Prepared by: Florida Department of Transportation, 2010
www.dot.state.fl.us/aviation/flpub.shtm

The *FDOT Guidebook for Airport Master Planning* was developed for use by airport owners/sponsors, operators, and consultants when developing Florida airport master plans to assist in effective and appropriate master plan studies. It is of the highest importance to FDOT that the *Guidebook for Airport Master Planning* be utilized to help the state meet its airport improvement needs in a logical and cohesive manner. To accomplish this, the *Guidebook for Airport Master Planning* provides the following:

o Guidance on the necessary steps of an airport master plan
o Guidance on the development of individual components of an airport master plan

Based on new federal regulations, airport master plans must incorporate sustainability if the airport does not have an adopted sustainability management plan. In a master plan, the sustainability element can either be a stand-alone section or combined with other sections, as appropriate. This FDOT Sustainability Guidebook includes suggestions and references regarding sustainability applicability and how it may affect master plans. Currently, the *Guidebook for Airport Master Planning* is being updated to account for changes since the 2010 version was developed. Please check with FDOT to ensure that the current version is used.

5. **FDOT General Aviation Airport Business Plan Guidebook**
Prepared by: Florida Department of Transportation, 2014
www.dot.state.fl.us/aviation/flpub.shtm

The *FDOT General Aviation (GA) Business Plan Guidebook* was developed as a resource to assist GA airports to develop financial strategies geared at a broad range of topics affecting an airport and its fiscal success. In an effort to remain financially self-sufficient, airports have focused on improving their financial health by diversifying their business models to include more non-aeronautical revenue. To accomplish this, the Guidebook provides the following key elements:

o Case studies on airports that completed business plans
o Step-by-step instructions on the business planning process
o Best management practices for airports completing a business plan

Additionally, it provides information on how airports interact with the community around them and assists airports in garnering support from the local community.

There are two ways in which airports can achieve financial self-sufficiency: increasing revenues and decreasing costs. The *GA Business Plan Guidebook* was developed to help airports increase revenues through diversification of the business model, while the FDOT Airport Sustainability Guidebook is being developed to help airports reduce costs. Whenever appropriate, references to the *GA Business Plan Guidebook* are provided in the Sustainability Guidebook.

6. **Airport Compatible Land Use Guidebook**
Prepared by: Florida Department of Transportation, 2012

www.dot.state.fl.us/aviation/flpub.shtm

The *Airport Compatible Land Use Guidebook* highlights important information and factors that must be considered when evaluating various land use and development decisions that have the potential to impact public-use airports or military airfields in Florida. Information in the *Airport Compatible Land Use Guidebook* is applicable to individuals, airport sponsors, land developers, professional aviation consultants, state agencies and planners, and local government officials and planners. To accomplish this, the *Airport Compatible Land Use Guidebook* is divided into four distinct sections:

- **Section One**: Provides detail on the specific areas around airports and airfields that need to be protected from tall structures that may interfere with navigable airspace and/or land uses that may jeopardize compatibility
- **Section Two**: Provides detail on state laws, federal regulations, and various processes in place to prevent incompatible development around airports/airfields
- **Section Three**: Provides an overview of the process that all local governments in Florida should follow when they review a development application in order to be compliant with existing state statutes and federal regulations
- **Section Four**: Discusses strategies to prevent or correct land use incompatibilities around airports/airfields and responsibilities related to compatible land use

The *Airport Compatible Land Use Guidebook* is based on current state law and existing federal regulations. The focus of the guidebook is on providing information that helps all applicable parties comply with existing laws and regulations. In order for any airport to be well integrated with the community around it, development at and surrounding the airport must be appropriately planned and implemented. Where appropriate, references to the *Airport Compatible Land Use Guidebook* are made that highlight the relationship between airport sustainability and land use compatibility at airports.

ADDITIONAL RESOURCES

In addition to the documents previously discussed, three additional sources were researched for their applicability to the FDOT *Airport Sustainability Guidebook*. The Sustainable Aviation Guidance Alliance (SAGA) Database, TRB Aviation Sustainability Subcommittee Materials, and the Florida Airports Council (FAC) Sustainability Initiatives Database all provide in detailed information related to sustainability and sustainability initiatives. More information on each of these resources is provided subsequently.

1. **Florida Airports Council Sustainability Initiatives**
   www.floridaairports.org/

   In 2010, the Florida Airports Council (FAC) initiated a program to document the sustainability plans, programs, and initiatives that had been completed at Florida airports. To accomplish this goal, a survey was developed by the FAC Sustainability Task Force and was distributed to all FAC member airports to gather information on sustainability policies, initiatives, energy/waste reduction goals, beneficial information, and local "green" or sustainability initiatives/policies. Of all airports, responses were received from 27 airports in Florida. From this survey, a list of airports with various sustainability programs was developed. These sustainability programs include:

   ○ Sustainability or "green" policies
   ○ Sustainable planning/design/construction guidelines or sustainability plans
   ○ Airport and/or airline waste recycling programs
   ○ Local procurement process
   ○ Alternative energy production
   ○ LED lighting (roadways or airfield)

   Additional information on specific initiatives that individual airports have implemented are also provided. These include installation of high efficiency chillers, conducting a greenhouse gas inventory, and water conservation projects such as low-flow sinks, among many others. Any airport considering developing a sustainability plan or implementing sustainability initiatives should reference this site to see if any airport partners around the state have implemented a similar program. FAC's Sustainability Initiatives website can be accessed at: www.floridaairports.org/

2. **Sustainable Aviation Guidance Alliance Database**
   www.airportsustainability.org

   The Sustainable Aviation Guidance Alliance (SAGA) was formed in 2008 to create consistent and consensus-based sustainability resources available for all airports. A web-based system was developed by SAGA members to provide users with an extensive list of sustainability actions and initiatives that can be implemented at airports. The SAGA website was developed to be interactive and allow users to learn about sustainability, share ideas and experiences, search sustainable practices based on custom information, and efficiently plan, implement, and monitor sustainability activities. To accomplish this, the website is divided into five modules:

   ○ **Share**: This module allows users to add sustainable initiatives/practices to a library of sustainable initiatives as well as allows users to share case studies, documents, links, and comments on the initiatives/practices
   ○ **Learn**: This module allows users to learn about the definition of sustainability, practical applications of sustainability principles at airports, and methods for integrating sustainability into existing business processes and an organization's culture
   ○ **Search**: This module allows users to search for sustainability initiatives/practices that are meaningful to their organization as well as identify, evaluate, prioritize, and select initiatives/practices that help the airport

- **Plan**: This module provides a scalable framework, based on an individual airport's culture and business model, to assist users in starting, implementing, improving, and maintaining sustainability initiatives/practices. The framework is a systematic approach to set goals, prioritize actions and monitor progress
- **Measure**: This module provides information and guidance on how to measure progress in sustainability, including steps to help airports identify key performance indicators (KPIs) and associated metrics for sustainability goals and practices

In total, the SAGA Database contains nearly 1,000 individual sustainability practices that can be utilized by airports. To assist users in navigating these practices, there are numerous search parameters that allow users to search for sustainability practices that are applicable to the airport. Parameters include climate, airport type (commercial, GA, military), and type of sustainability practice (energy use, economic performance, airport leadership, etc.).

Airports are encouraged to reference and utilize the SAGA Database and website both prior to and as part of any sustainability project or initiative. The SAGA website provides a user-friendly location for sustainability education and guidance on the overall development and implementation of sustainability initiatives. The SAGA website also provides templates for action monitoring and strategy development as well as numerous other resources. Prior to beginning any sustainability project or initiative, all airports should review the SAGA website to understand the resources that it provides. The SAGA website can be accessed at: www.airportsustainability.org

3. **TRB AV030 Aviation Sustainability Subcommittee Materials**
   www.trb.org/AV030/AV030.aspx.

To provide airports with specific information and resources related to specific aviation topics, the Transportation Research Board (TRB) developed an Information Resource Series to highlight information on particular topic areas from a broad range of sources that are referenced throughout all TRB resources. Related to sustainability, the Committee on the Environmental Impacts of Aviation (AV030) focuses on environmental issues central to airport planning, design, construction, and operation as well as aviation system and aviation technology development issues. Within this Resource Series, TRB provides numerous resources, publications, and news sources on the environmental impacts of aviation. Reports and resources included in the Environmental Impacts of Aviation Information Resource Series include:

- TRB Publications (from all TRB programs)
- Transportation Research Record Series (peer-reviewed papers published in the journal of TRB)
- National Academies Publications (from other units of the National Academies)
- Other Publications (from outside TRB and the National Academies)

In total, there are over 50 resources provided in the Environmental Impacts of Aviation Information Resource Series. To further the priorities of individual components of the Environmental Impacts of Aviation Committee, five subcommittees were developed to promote understanding and research in individual fields. The five subcommittee fields are:

- Aviation Sustainability – Subcommittee AV030(1)

- Aviation Climate – Subcommittee AV030(2)
- Aviation Water – Subcommittee AV030(3)
- Aviation Noise – Subcommittee AV030(4)/ADC40(1)
- Alternative Aviation Fuels – Subcommittee AV030(5)

Within the Aviation Sustainability Subcommittee, a Sustainability Prioritization Matrix was developed and presented that includes 21 different sustainability subject areas and the current state of their development and use. The Aviation Sustainability Subcommittee seeks to:

- Learn about the current state of the art and practice of sustainability as applied to aviation
- Educate its members and TRB as a whole about opportunities and challenges of aviation sustainability
- Identify gaps in knowledge and research needed to effectively advance aviation sustainability

For more information on the Environmental Impacts of Aviation Committee, please visit: www.trb.org/AV030/AV030.aspx. For more information on the Aviation Sustainability Subcommittee, please visit: sites.google.com/site/trbav030/av030-subcommittees/sustainability